1. Indian History
   5.1. Post-Maurya/Pre-Gupta Period 5.2. The Sangam Period 6. Gupta Period
   II. MEDIEVAL INDIA: 8. Early-Medieval Period 9. North India (Rajputa Period) II. South India (Cholas & Others)
   9. Sultanate Period I. The Delhi Sultanate II. Vijayanagar & Other Kingdoms
   10. Religious Movements I. Bhakti Movement II. Sufi Movement
   III. MODERN INDIA: 14. Expansion of British Power (In the context of Bengal, Mysore, Punjab etc.) 15. Economic Impact of British Rule
   IV. MISCELLANEOUS: Important Dates, Places, Foreign Travellers/Envoy, Abbreviated or Alternative Names, Sayings, Battles, Reforms/Acts, Committees/Commissions, Congress Session and Governor-Generals & Viceroyos.

2. World History
   II. MEDIEVAL WORLD: Medieval Europe (Feudalism, Crusades), Arab Civilization, Medieval China, Medieval Japan, Seven Wonders of Medieval World.
   IV. MISCELLANEOUS: Important Dates, Association of places, Abbreviated or Alternative Names, Important Battles.

3. Geography
   The Solar System, Continents and Oceans, Biosphere, Lithosphere, Hydrosphere, Atmosphere, Latitudes and Longitudes, Different heat zones of the earth, Longitudes and time zones, International Date Line, Motion of the earth, Effect of the tilted axis on day and night, the Atmosphere (composition and layer of the Atmosphere), Weather and Climate, Atmospheric Pressure, Internal Structure of the earth, Rocks, Earthquakes and Volcanoes, Various Landforms (Mountains, Plateaux, Plains, Grasslands, Landforms created by the river system, Landforms created by glacier, Landforms created by the action of wind, Landforms created by the actions of Groundwater), The Indian Sub continent Position, extent and physical features, Climatic diversity in the Indian Sub-continent, Soil resources of the Indian sub-continent, Agriculture in India, Land use pattern of India, Water resources and their utilization in India, Multipurpose river valley projects, Transport in India.

4. Indian Polity and Constitution

5. Indian Economy
   ★ Appendix-1 Highlights of Economic Survey 2014-15  ★ Appendix-2 Socio Economic and Caste Census 2011

6. Physics
Indian History

Ancient India

1. Harappan/Indus Civilization (2500 BC-1750 BC)
   - The oldest name—Indus Civilization.
   - According to archaeological tradition, the most appropriate name—Harappan Civilization (Harappa—the first discovered site).
   - According to geographical point of view, the most suitable name—Indus—Saraswati Civilization (the largest concentration of settlement along the Indus—Saraswati river valley; 80% settlement along the Saraswati).
   - The most accepted period—2500 BC-1750 BC (by Carbon-14 dating).

   John Marshall was the first scholar to use the term 'Indus Civilization'.

   The Indus Civilization belongs to Proto-Historic Period (Chalcolithic Age/Bronze Age).

   The Indus Civilization was spread over Sindh, Baluchistan, Punjab, Haryana, Rajasthan, Gujarat, Western U.P. and Northern Maharashtra.

   Scholars generally believe that Harappa—Ghaggar—Mohenjodaro axis represents the heartland of the Indus Civilization.

   The Northern-most site of Indus Civilization—Ropar (Sutlej)/Punjab (Earlier); Mandi (Chenab)/Jammu-Kashmir (Now).

   The Southern-most site of Indus Civilization—Bhadradri (Kim)/Gujarat (Earlier); Daimabad (Pravara)/Maharashtra (Now).

   The Eastern-most site of Indus Civilization—Alamgirpur (Hindon)/Uttar Pradesh.

   The Western-most site of Indus Civilization—Sutkagendor (Dashk)/Makran Coast (Pakistan—Iran Border).

   Capital Cities—Harappa, Mohenjodaro

   Port Cities—Lothal, Sutkagendor, Allahdino, Balakot, Kuntasi

<table>
<thead>
<tr>
<th>Site</th>
<th>River</th>
<th>District</th>
<th>State / Province</th>
<th>Country</th>
<th>Excavators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harappa</td>
<td>Ravi</td>
<td>Sahiwal</td>
<td>Punjab</td>
<td>Pakistan</td>
<td>Daya Ram Sahni (1921), Madho Swaroop Vatsa (1926), Wheeler (1946)</td>
</tr>
<tr>
<td>Mohenjodaro</td>
<td>Indus</td>
<td>Larkana</td>
<td>Sindh</td>
<td>Pakistan</td>
<td>Rakhil Das Barjindri (1922), Mackay (1927), Wheeler (1930)</td>
</tr>
<tr>
<td>(Nakhchivan i.e.</td>
<td>Indus</td>
<td>Nawabshah</td>
<td>Sindh</td>
<td>Pakistan</td>
<td>Mackay (1925), N.G. Mazumdar (1931)</td>
</tr>
<tr>
<td>(Oasis of Sindh)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chanhudaro</td>
<td>Indus</td>
<td></td>
<td>Sindh</td>
<td>Pakistan</td>
<td></td>
</tr>
<tr>
<td>Lothal</td>
<td>Bhogava</td>
<td>Ahmedabad</td>
<td>Gujarat</td>
<td>India</td>
<td>S.R. Rao (1954)</td>
</tr>
<tr>
<td>Kalibanga</td>
<td>Ghasgar</td>
<td>Hanumangarh</td>
<td>Rajasthan</td>
<td>India</td>
<td>Amalanand Ghosh (1951), B.V. Lal and B.K. Thapar (1961)</td>
</tr>
<tr>
<td>(i.e. the bangles of black colour)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Banawali</td>
<td>Ghasgar</td>
<td>Fatchabad</td>
<td>Haryana</td>
<td>India</td>
<td>R. S. Bist (1973)</td>
</tr>
<tr>
<td>Dholavira</td>
<td>Luni</td>
<td>Kutchh</td>
<td>Gujarat</td>
<td>India</td>
<td>J.P. Joshi (1967-68)</td>
</tr>
</tbody>
</table>

Appendix:
Census of India 2011: Figures At a Glance

***
Indian History

Imports

<table>
<thead>
<tr>
<th>Item</th>
<th>From</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>Kolar (Karnataka), Afghanistan, Persia (Iran)</td>
</tr>
<tr>
<td>Silver</td>
<td>Afghanistan, Persia (Iran), South India</td>
</tr>
<tr>
<td>Copper</td>
<td>Khetri (Rajasthan), Baluchistan, Arabia</td>
</tr>
<tr>
<td>Tin</td>
<td>Afghanistan, Bihar</td>
</tr>
<tr>
<td>Lapis Lazuli and Sapphire</td>
<td>Badak-shan (Afghanistan)</td>
</tr>
<tr>
<td>Jade</td>
<td>Central Asia</td>
</tr>
<tr>
<td>Steatite</td>
<td>Shaiber-i-Sokhta (Iran), Kirthar Hills (Pakistan)</td>
</tr>
<tr>
<td>Amethyst</td>
<td>Maharashtra</td>
</tr>
<tr>
<td>Agate, Chaledonies</td>
<td>Surashtra and West India</td>
</tr>
</tbody>
</table>

Exports: Agricultural products, cotton goods, terracotta figurines, pottery, certain beads (from Chanhu-daro), conch-shell (from Lothal), ivory products, copper etc.

A very interesting feature of this civilization was that Iron was not known to the people.

The Sumerian texts refer to trade relations with ‘Meluhha’ which was the name given to the Indus region.

Shatughai and Mundigaq were the Indus sites found in Afghanistan.

The Sumerian texts also refer to two intermediate stations—Dilmun (Bahrain) and Makan (Makran coast). Susa and Ur are Mesopotamian places where Harappan seals were found.

The Harappans were the earliest people to produce cotton. (It was called ‘Sindur’ by the Greeks).

As there is no evidence of coins, barter is assumed to have been the normal method of exchange of goods.

Lothal was an ancient port of Indus civilization.

The Indus Civilization was primarily urban.

There is no clear-cut evidence of the nature of political authority but it seems that the ruling class were a class of merchants.

The Harappan people didn’t worship their gods in temple. No temple has been unearthed. An idea of their religion is formed from the statues and figurines found.

The most commonly found figurine is of Mother-Goddess (Matrdevi or Shakti). There is evidence of prevalence of Yoni (female sex organ) worship.

The chief male deity was the ‘Pasupati Mahadeva’ i.e. the lord of Animals (Proto-Shiva) represented in seals as sitting in yogic posture; he is surrounded by four animals (elephant, tiger, rhino and buffalo) and two deer appear at his feet. There was the prevalence of Phallic (lingam) worship.

Thus Shiva-Shakti worship, the oldest form of worship in India, appears to have been part of the religious belief of Harppan people (esp. humped bull).

The remains and relics also reveal that zoolatry i.e. animal worship and tree worship (esp. peepal) were in vogue in those days.
2. Vedic Culture (1500 BC-600 BC)

Original Home of the Aryan

The location of the original home of the Aryans still remains a controversial point. Some scholars believe that the Aryans were native to the soil of India and some other scholars believe that the Aryans were migrated from outside [Central Asia (Max Muller) / Europe / Arctic region (B. G. Tilak)].

According to popular belief, the Aryans are supposed to have migrated from Central Asia into the Indian subcontinent in several stages or waves during 2000 BC-1500 BC.

Boghazkai Inscription (Asia Minor, Turkey), which mentions 4 vedic gods Indra, Varuna, Mitra and Nasatyas, proves Central Asian Theory as their homeland.

The group that came to India first settled in the present Frontier Province and the Punjab — then called Saptapadhis or region of seven rivers. They lived here for many centuries and gradually pushed into the interior to settle in the valleys of the Ganges and the Yamuna.

Vedic Literature (1500 BC-600 BC)

It is presumed that the Rig Veda was composed while the Aryans were still in the Punjab.


Vedic Literature had grown up in course of time and was really handed down from generation to generation by word of mouth. Hence these are called Shruti (to hear).

The most important of Vedic Literature are Vedas. Vedas are called Apaurasheya i.e. not created by man but God-gifted and Nitya i.e. existing in all eternity.

There are four Vedas—Rig Veda, Sama Veda, Yajur Veda and Atharva Veda. The first three Vedas are jointly called Vedatrayi i.e. trio of Vedas.

Of the four Vedas, the Rig Veda (Collection of lyrics) is the oldest text in the world, and therefore, is also known as the ‘first testament of mankind’. The Rig Veda contains 1028 hymns, divided into 10 mandalas. Six mandalas from 2nd to 7th mandalas are called Gayatri-Vamsa Mandalas (Kula Granthis). The 1st and 10th mandalas are said to have been added later. The 10th mandala contains the famous Purushasukta which explains the 4 Varnas—Brahmana, Kshatriya, Vaishya and Shudra. The hymns of Rig Veda were recited by Hotri.

The Sama Veda (book of chants) had 1549 hymns. All hymns (excluding 75) were taken from the Rig Veda. The hymns of the Sama Veda were recited by Udgatri. This Veda is important for Indian music.

The Yajur Veda (book of sacrificial prayers) is a ritual Veda. Its hymns were recited by Adhvaryus. It is divided into two parts—Krishna Yajur Veda and Shukla Yajur Veda. In contrast to the first two which are in verse entirely, this one is in both verse and prose.

The Atharva Veda (book of magical formulae), the fourth and the last one, contains charms and spells to ward off evils and diseases. For a very long time it was not included in the category of the Vedas.

The Brahmanas explain the hymns of the Vedas. They are written in prose and ritualistic in nature. Brahma means ‘sacrifice’. The various sacrifices and rituals have been elaborately discussed in the Brahmanas. Every Veda has several Brahmanas attached to it:

- Rig Veda: Aitareya and Kaushitakik Sankhyayana.
- Sama Veda: Panchvisha (Tandya Maha Brahmanas), Shadavish Chhandogya and Jaiminaya.
- Yajur Veda: Shatapatha (the oldest and the largest Brahmanas) and Taittiriyas.
- Atharva Veda: Gopatha.

- The word Aranyas means ‘the forest’. The ‘forest texts’ were called Aranyakas because they were written mainly for the hermits and the students living in jungles. The Aranyakas are the concluding portions of the Brahmanas.
- The Upanishads are philosophical texts. They are generally called Vedanta, as they came towards the end of the Veda. There are 108 Upanishads. Vihradaryakas is the oldest Upanishad.

Literature of Vedic Tradition (600 BC-600 AD)


There are six Vedangas:

1. Shiksha (Phonetics): ‘Pratishakyas’—the oldest text on phonetics.
3. Vyakarana (Grammar): ‘Ashtadhyayi’ (Panini)—the oldest grammar of the word.
4. Nirukta (Etymology): ‘Nirukta’ (Nask) based on ‘Nighantu’ (Kashyap)—the collection of difficult Vedic words (‘Nighantu’—the oldest word-collection of the world; ‘Nirukta’—the oldest dictionary of the world).
5. Chhanda (Metrics): ‘Chhandasutras’ (Pingal)—famous text.

There are six famous Sringis: (i) Manu Sringa (Pre-Gupta Period)—the oldest Sringa text; Commentators: Vishwarupa, Meghatithi, Gotbrindra, Kulkuk Brah.
(ii) Yajnavalkya Sringa (Pre-Gupta Period)—Commentators: Vishwarupa, Jimutvahan (Dayabhag), Vijyaneshwar, (Mitakshara) Apararks (a King of Shillah plot) (iii) Narad Sringa (Gupta period) (iv) Parasara Sringa (Gupta period) (v) Brhatapati Sringa (Gupta period) (vi) Katyayana Sringa (Gupta period).

There are mainly two Mahakavyas (Epics):
1. The Ramayana (Valmiki): It is known as ‘Adi Kavya’ (the oldest epic of the world). At present, it consists of 24,000 shlokas i.e. verses (Originally 6,000, Later—12,000, Finally—24,000) in 7 Kandas i.e. sections; 1st and 7th Kandas were the latest additions to the Ramayana.
2. The Mahabharata (Ved Vyasa): The longest epic of the world. At present, it consists of 1,00,000 shlokas i.e. verses (Originally—8,800–Jay Samhita, Later—24,000–Chaturvinshti Samhita/Bhagavat, Finally—1,00,000–Shatasahasti Samhita/Maha Bhagavat) in 18 Parvans i.e. chapters, plus the Harivamsa supplement. Bhagavat Gita is extracted from Bhishma Parvan of Mahabharata. Shanti Parvan is the largest parvan (chapter) of the Mahabharata.

The Purana means ‘the old’. There are 18 famous ‘Puranas’. The Matsya Purana is the oldest Puranic text. The other important Puranas are the Bhagavata, the Vishnu, the Vayu and the Brhamnda. They describe genealogies of various royal dynasties.

The Upavedas (the auxiliary Vedas) were traditionally associated with Vedas:

**Upavedas**
- Ayurveda i.e. Medicine
- Gandharvaveda i.e. Music
- Dhanurveda i.e. Archery
- Shilpveda/i.e. Artveda

There are 6 schools of Indian philosophy known as Shad-Darshanas.

**Darshana**
1. Sankhya Darshana
2. Yoga Darshana
3. Nyaya Darshana
4. Vaishiksha Darshana
5. Mimansa/Purva-Mimansa
6. Vedanta/Uttara-Mimansa

**Founder**
- Kapila
- Patanjali
- Aksapada Gautama
- Utku Kanada
- Jaimini
- Badarayana

**Basic Text**
- Sankhya Sutra
- Yoga Sutra
- Nyaya Sutra
- Vaishiksha Sutra
- Purva Mimansa Sutra
- Brahma Sutra/Vedanta Sutra

**Geographical Area**
- Rig Veda is the only source of knowledge for this period.
- From the names of rivers, mountains (Himavant i.e. Himalaya, Munjavant i.e. Hindu Kush) and ocean in Rig Veda we have a clear idea of the geographical area in which Rigvedic people lived.
- Rig Veda mentions 40 rivers. The Nandisukta hymn of the Rig Veda mentions 21 rivers which include the Ganges in the east and the Kubha (Kabul) in the west.
- Rigvedic people, who called themselves Aryans, were confined in the area which came to be known as Sapta Sindhu i.e. land of the seven rivers. Sapta Sindhu comprises Sindhu and their five tributaries—Vitasta, Asikani, Vipas, Parushni & Sutudri and Saraswati.
- According to the Rig Veda, the most mentioned river—Sindhu, the most pious river—Saraswati, mention of the Ganges twice, mention of Yamuna three times.
- The Dasaraj War (The Battle of Ten Kings)
  According to Rig Veda, the famous Dasaraj war was the internecine war of the Aryans. The Dasaraj war gives names of ten kings who participated in a war against Sadas who was a Raja of the Tristis family. The ten kings were the states of Purus, Yudis, Turaswas, Anus and Druhues along with five others viz. Alinas, Pakhtas, Bhalanas, Sibis and Vishmanis. The battle was fought on the bank of Parushni (Ravi) in which Sadas emerged victorious.

**Polity**
- The Kula (the family) was the basis of both social and political organisations. Above the Kula were the Gama, the Vis, the Jana and the Rashtra. A group of Kula (families) formed a Grama (the village) and so on.
- Regarding the form of government it was of patriarchal nature. Monarchy was normal, but non-monarchical polities were also there.
- The Rashtra was ruled by a King or Rajan and the royal descent was by hereditary based on the law of primogeniture. Probably elective monarchy was also known.
- Very little is known about ministers of the king. The Purohita or domestic priest was the first-ranking official. He was the king’s preceptor, friend, philosopher and guide. Other important royal officials were Senani (army chief) and Gramani (head of village).

**Unit**
- Kula (the family)
- Grama (the village)
- Vis (the clan)
- Jana (the people)
- Rashtra (the country)

**Head**
- Kulapa
- Gramani
- Vispati
- Gopa/Gopati
- Rajan
metals were used in weapons. Arrows were tipped with points of metal or poisoned horn. References are made to the moving fort (Purcharishnu) and a machine for assaulting strongholds.

> The king had religious duties also. He was the upholder of the established order and moral rules.

> Rig Veda speaks of assemblies such as the Sabha, Samiti, Vidath, Gana. Sabha was committee of few privileged and important individuals. Two popular assemblies, Sabha and Samiti, acted as checks on the arbitrary rule of kings. Later Vedas record that the Sabha functioned as a court of justice.

> Theft, burglary, stealing of cattle and cheating were some of the then prevent crimes.

Society

> The Rigvedic society comprised four varnas, namely Brahmana, Kshatriya, Vaisya and Shudra. This classification of society was based on the professions or occupations of the individuals.

> Teachers and priests were called Brahmanas rulers and administrators were called Kshatriyas; farmers, merchants and bankers were called Vaishyas; and artisans and labourers were reckoned as Shudras.

> These vocations were followed by persons according to their ability and liking, and the occupations had not become hereditary as they became later on.

> Members of the same family took to different professions and belonged to different varnas as well illustrated by a hymn of the Rig Veda. In this hymn a person says: 'I am a singer; my father is a physician, my mother is a grinder of corn.'

> The unit of society was family, primarily monogamous and patriarchal.

> Child marriage was not in vogue.

> A widow could marry the younger brother of her deceased husband (Niyoga).

> The father's property was inherited by son.

> Right to property existed in respect of moveable things like cattle, horse, gold and ornaments and also in respect of immovable property like land and house.

> The home of the teacher was the school where he taught the particular sacred texts.

> Milk and its products—curd, butter and ghee—formed an important part of the diet. There is also the mention of grain cooked with milk (Kshira-pakamadanam).

> The meat of fish, birds and animals was eaten.

> The cow was already deemed Aghanya i.e. not to be killed.

> Rig Veda prescribes a penalty of death or expulsion from the kingdom to those who kill or injure cows.

> Alcoholic drinks, Sura and Soma were also consumed.

> Aryans were primarily agricultural and pastoral people who reckoned their wealth in terms of cows.

> Amusements included music, dancing, chariot-racing and dicing. One stanza in the Rig Veda known as the gambler’s lament says: 'My wife rejects me and her mother hates me.'

Religion

> During the Rigvedic time the Gods worshipped were generally the personified powers of Nature. It was believed that divine powers were capable of conferring both boons and punishments on man. Fire was sacred as it was regarded to be the intermediary between man and God.

> There were nearly 33 Gods. Later tradition classified them into 3 categories of terrestrial (prithvisthana), aerial or intermediate (antarikshasthana) and celestial (dyushthana) god.


> Indra, Agni and Varuna were the most popular deities of Rigvedic Aryans.

> Indra or Purandara (destroyer of fort): The most important god (250 Rigvedic hymns are devoted to him); who played the role of warrior and was considered to be the rain god.

> Agni: The second most important god (200 Rigvedic hymns are devoted to him); fire god was considered to be the intermediary between the gods and the people.

> Varuna: Personified water; was supposed to uphold 'Rita' or the natural order ('Ritasyayogata').

> Surya (Sun) was worshiped in 5 forms: Surya, Savitri, Mitra, Pushan and Vishnu.

> Surya (Sun): God who used to drive daily across the sky in his chariot driven by seven horses.

> Savitri (the god of light): The famous Gayatri Mantra is addressed to her.

> Mitra: A solar god.

> Pushan: The god of marriage; main function—guarding of roads, herdsmen and straying cattle.

> Vishnu: A god which covered earth in three steps (Upakrama).

> Soma: Originally a plant producing a potent drink during courses of Agnishomana sacrifice, could be hemp / biang, called king of plants; identified later with the moon. The 9th mandala of Rig Veda, which contains 114 hymns, is attributed to the Soma. That's why it is called the Soma Mandala.

> Other Gods/Goddesses: Rudra (the god of animals), Dyaus (the oldest god and the father of the world), Yama (the god of death). Ashwin/Nastya (the god of health, youth and immortality); Aditi (the great mother of gods), Sindhu (river goddess).

> Sometimes gods were visualised as animals but there was no animal worship.

> The nature of Rigvedic religion was Henotheism i.e. a belief in many gods but each god standing out in turns as the highest.

> Their religion primarily consisted of the worship of gods with a simple ceremonial known as Yajna or sacrifice. Sacrifices consisted of offerings of milk, ghee, grain, flesh and soma.
Economy

- The Aryans crossed the nomadic stage. Yet, great importance was attached to herds of cattle. Various animals were domesticated.
- The Vedic people were probably not familiar with cat and camel. Tiger was not known, but the wild animals like lion, elephant and boar were known to them.
- In all probability, very little of trade was there.
- Money and markets were known but they were not extensively used. Cows and gold ornaments of fixed value were the media of exchange. Coins were not known.
- Complexity in producing goods made its appearance. Men of various professions like carpenters, smiths, tanners, weavers, potters and grinders of corn were there.
- The art of healing wounds and curing diseases were in existence. There were experts in surgery. Along with herbs and drugs charms and spells were regarded as equally potent in healing diseases.
- OCP (Ochre Coloured Pottery) Culture: 1500 BC-1000 BC.

Later Vedic Period: 1000 BC - 600 BC

Geographical Area

- During the later Vedic period, the Aryan settlements covered virtually the whole of Northern India.
- The centre of culture now shifted from Saraswati to Ganges (Madhya desa).
- There was mention of more rivers such as Narmada, Sadanara (modern Gandak), Chambal etc.
- The expansion of people towards the east is indicated in a legend of Satapatha Brahama—how Videha Madhava migrated from the Saraswati region, crossed Sadanara and came to the land of Videha (modern Tirhut). “He (Agni) then went burning along the earth towards the east, and Gotama Rahugana (the priest) and Videgh Mathava followed after him.” — Satapatha Brahama.
- Emergence of Janapadas—Kuru (Combination of Purus and Bharatas), Panchala (Combination of Turvashas and Krivis), Kashi etc. in Doab region.
- Later Vedic literatures mention Vindhyas mountain (Southern mountain).
- Reference to the territorial divisions the later Vedas gives three broad divisions of India viz. Aryavarta (Northern India), Madhya desa (Central India) and Dakhinapath (Southern India).

Politics

- Large kingdoms and stately cities made their appearance in the later Vedic Period.
- In Taittiriya Brahmana we notice the theory of the divine origin of kingship.
- The governmental machinery became more elaborate than before, as a sequel to the growth of the power of the king. New civil functionaries, besides the only civil functionary of the Rigvedic period the purohita came into existence. These were the Bhagadudha (Collector of taxes), the Suta/Sarathi (the royal herald or charioteer), the Khastri (Chamberlain), the Akshavapa (Courier).
- The military officials of the Rigvedic times, the Senani (the general) and the Gramani (the head of the village) continued to function.
- The period also saw the beginning of a regular system of provincial government. Thus, we find Sthapati being entrusted with the duty of administering outlying areas occupied by the aboriginals and Satapati being put over a group of one hundred villages. Adhvriti was the village official. Ugras, mentioned in the Upanishada, was probably a police official.
- The popular control over the affairs of the kingdom was exercised through Sabha and Samita as in the Rigvedic period. Vidatha had completely disappeared by now.
- Even during the later Vedic times, kings did not possess a standing army.
- Judicial also grew. The king played a great role in administering criminal law. The killing of an embryo, homicide, the murder of a Brahmana, in particular, stealing of gold and drinking sura were regarded as serious crimes. Treason was a capital offence.

Society

- As the time passed by Yajnas became elaborate and complicated ceremonial leading to the emergence of learned men known as Brahmans.
- And as the Aryans expanded to the east and south, group of people known as Kshatraliya emerged to conquer territories and administer them. The remaining Aryans formed a separate class known as Vaishyas, a word derived from Vis meaning ‘people’. The non-Aryan formed the fourth class known as Shudras.
- Nevertheless, these divisions of society were not rigid.
- The institution of Gotra i.e., the clan appeared in later Vedic Period.
- The higher castes could marry with the lower ones, but marriage with shudras was not permitted. The idea of pollution appeared in society.
- The earliest reference to the 4 Ashramas (the stages of life)—Brahmacharya, Grahastha, Vanprastha and Sanyasa—is found in the Jabala Upanishad. The Ashrama system was formed to attain 4 Purusharthas (Dharma, Artha, Kama and Moksha).
- The status of women declined. According to Aitareya Brahmana a daughter is the sources of misery but a son is the protector of family.
- According to Maitrayani Samhita there are three evils—liquor, woman and dice.
- Though monogamy (a man having one wife) was the ideal but polygamy (a man having more than one wife) was frequent.
- Women were prohibited to attend the political assemblies.
- Yajnavalkya-Gargi dialogue (Vrihadaranyaka Upanishada) indicates that some women had got higher education.

Types of Hindu Marriage (Vivaha)

- Brahma Vivaha: Giving the girl to a man with dowry.
- Daiva Vivaha: Giving the girl to the priest himself in lieu of his fees.
- Arsha Vivaha: Giving the girl to a man after accepting a bride-price.
- Prajapaty Vivaha: Giving the girl to a man without demanding a bride-price.
Religion

- The earlier divinities **Indra** and **Agni** were relegated into the background while **Prajapati** (creator of the Universe, later known as **Brahma**), **Vishnu** (Patron god of Aryans) and **Rudra** (God of animals, later identified with **Shiva/Mahesha**) rose in prominence. Now **Prajapati** became supreme God.

- **Pushana**, who protected cattle in the early Vedic Period, now became the god of **Shudras**.

- **Brihadaranyaka Upanishada** was first to work to give the doctrine of transmigration (**Punarjanma/Samsara-chakra**) and deeds (**Karma**).

- The early simple ceremonial of Rigvedic Period gave place to elaborate sacrifices requiring the services of as many as 17 priests. In the later Vedas and Brahmans sacrifices (**Yajnas**) came into prominence.

There were two varieties of sacrifices—

1. **Laghyayajas** (Simple/Private Sacrifices): Performed by householder e.g., **Pancha Mahayajna**, **Agnihotra**, **Darsha Yajna** (on **Amavasya** i.e. on the last day of the dark fortnight), **Purnamasa Yajna** (on **Purnima** i.e. on the day of full moon) etc.

2. **Mahayajnas** (Grand/Royal Sacrifices): Sacrifices that could only be undertaken by an aristocratic and wealthy man and the king.
   - **Rajasuya Yajna**: Royal consecration, which in its full form comprised a series of sacrifices lasting over a year. In later days it was replaced by simplified **Abhisheka** i.e. anointment.
   - **Vajapeya Yajna**: Drink of strength, which lasted for a period of seventeen days up to full one year.
   - **Asvamedha Yajna**: Horse sacrifice, which lasted for three days.

**Indian History**

(d) **Agnishtoma Yajna**: Sacrifice of animals dedicated to Agni, which lasted one day, although Yajnika (performer of Yajna) and his wife spent ascetic life for a year before Yajna. On the occasion of this Yajna, *soma rasa* was consumed.

Towards the end of the Vedic Period, there was the emergence of a strong reaction against cults, rituals and priestly domination; Reflection of this mood is found in the **Upanishads**

**Economy**

- Land had now become more valuable than cows. Agriculture began to replace rearing of cattle. The plough was at times drawn by 24 oxen. Manure was known.

- Rice, barley, beans, sesame and wheat were cultivated.

- Production of goods advanced as indicated by new occupations like fisherman, washerman, dyers, door-keepers and footmen.

- Indicating specialisation distinction was drawn between the chariot-maker and the carpenter and the tanner and the hide-dresser.

- Considerable advance was made in the knowledge of metals. Mention of tin, silver and iron was made apart from gold and *ayas* (either copper or iron) in the Rig Veda.

- Evidence was there regarding organisation of merchants into guilds because of reference to corporations (**Ganas**) and aldermen (**Sreshtins**).

**PGW (Painted Grey Ware) Culture**: 1100 BC - 600 BC

### 3.1 Mahajanapada Period (600 BC-325 BC)

<table>
<thead>
<tr>
<th>Mahajanapadas (Modern Area)</th>
<th>Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anga</strong> (districts of Munger and Bhagalpur in Bihar)</td>
<td>Champa/Champa Nagar</td>
</tr>
<tr>
<td><strong>Magadha</strong> (districts of Patna, Gaya and Nalanda in Bihar)</td>
<td>Girivraj, Rajgrha/Rajgr (Bimbisara), Patliputra (Udayin), Vaishali (Shishumanaga), Patliputra (Kalashok)</td>
</tr>
<tr>
<td><strong>Vai</strong> (districts of Muzaffarpur &amp; Vaishali in Bihar)</td>
<td>Videha, Mithila, Vaishali</td>
</tr>
<tr>
<td><strong>Malla</strong> (districts of Dooria, Basti, Gorakhpur and Siddharthnagar in U.P.)</td>
<td>Kuishnara and Pawa</td>
</tr>
<tr>
<td><strong>Kashi</strong> (districts of Varanasi in U.P.)</td>
<td>Varanasi</td>
</tr>
<tr>
<td><strong>Kosala</strong> (districts of Faizabad, Gonda, Bahraich in U.P.)</td>
<td>North Kosal-Sravasti/Sahat-Mahet</td>
</tr>
<tr>
<td><strong>Vatsa</strong> (districts of Allahabad, Mirzapur in U.P.)</td>
<td>South Kosal-Sakat/Ayodhya</td>
</tr>
<tr>
<td><strong>Chedi</strong> (Bundelkhand area)</td>
<td>Kausambi</td>
</tr>
<tr>
<td><strong>Kuru</strong> (Haryana and Delhi area)</td>
<td>Indraprastha (modern Delhi)</td>
</tr>
<tr>
<td><strong>Panchara</strong> (Ruhelkhand, Western U.P.)</td>
<td>North Panchar-Ahichhatra</td>
</tr>
<tr>
<td><strong>Shorasena</strong> (Brajmandal)</td>
<td>South Panchar-Kampilya</td>
</tr>
<tr>
<td><strong>Matsya</strong> (Alwar, Bharatpur and Jaipur in Rajastan)</td>
<td>Mathura</td>
</tr>
<tr>
<td><strong>Avanti</strong> (Malwa)</td>
<td>Viratnagar</td>
</tr>
<tr>
<td><strong>North Avanti-Ujjayini</strong></td>
<td>South Avanti-Mahishmati</td>
</tr>
</tbody>
</table>
He conquered Anga.

- He sent a royal physician, Jivaka, to Ujjain, when Avanti King Pradyota was suffered by jaundice.
- Known as Seniya, he was the first Indian king who had a regular and standing army.
- He built the city of New Rajagriha.

**Ajatasatru (Kunika): 492 BC-460 BC**

- Bimbisara was succeeded by his son Ajatasatru. Ajatasatru killed his father and seized the throne.
- Ajatasatru followed a more aggressive policy. He gained complete control over Kashi and broke the earlier amicable relations by attacking his maternal uncle Prasenjit, the king of Kosala.
- The Vaji confederation was Ajatasatru’s next target of attack. This war was a lengthy one and tradition tells us that after a long period of 16 years, he was able to defeat the Vaji only through deceit, by sowing the seeds of discord amongst the people of Vaji.
- The three things that played important role to defeat the Vaji—1. Sundhara and Vatsakar—Ajatasatru’s diplomatic ministers, who sowed the seeds of discord amongst Vajis. 2. Rathamusalna—a kind of chariot to which a mace was attached 3. Mahishalakanta—a war engine which catapulted big stones.
- In this way Kashi and Vaishali (the capital of Vaji) were added to Magadha, making it the most powerful territorial power in the Ganges Valley.
- He built the fort of Rajagriha and a watch-fort (Jaladurga) at a village called Patali, on the banks of the Ganges.

**Udaiyin: 460 BC-440 BC**

- Udaiyin was succeeded by his son Udaiyin.
- His reign is important because he laid the foundations of the city of Patliputra at the confluence of the Son and the Ganges and shifted the capital from Rajagriha to Patliputra.

**Shishunaga Dynasty: 412 BC-344 BC**

- Nag-Dasak was unworthy to rule. So the people got disgusted and elected Shishunaga as the King, the minister of the last king.
- The most important achievement of Shishunaga was the destruction of the Pradyota dynasty of Avanti. This brought to an end the hundred year old rivalry between Magadha and Avanti. From then on Avanti become a part of the Magadha rule.
- Shishunaga was succeeded by Kalashoka (Kakavarna). His reign is important because he convened the Second Buddhists Council in Vaishali (383 BC).

**Nanda Dynasty: 344 BC-323 BC**

- The Shishunaga dynasty was overthrown by Mahapadma who established a new line of kings known as the Nandas.
- Mahapadma is known as Sarvakshatrantak i.e. Uprooter of all the Kshatriyas (Puranas) and Ugrasena i.e. Owner of huge army (Pali texts).
The Puranas call Mahapadma Ekrat i.e. the sole monarch. He seems to have overthrown all the dynasties which ruled at the time of Shishungas. He is often described as ‘the first empire builder of Indian history’.

Mahapadma was succeeded by his eight sons. Dhanananda was the last one.

The last king Dhanananda is possibly identical with the Agrames or Xandrames of the Greek texts.

It was during the rule of Dhanananda that the invasion of Alexander took place in north-west India in 326 BC.

According to Greek writer Curtius, Dhanananda commanded a huge army 20,000 cavalry, 200,000 infantry, 2,000 chariots and 3,000 elephants. It was the might of Dhanananda that terrorised Alexander and stopped his march to the Gangetic Valley.

The Nanda dynasty came to an end about 322-21 BC and was supplanted by another dynasty known as Mauryas, with Chandragupta Maurya as the founder.

Foreign Invasions

I. **Iranian/Persian Invasion—Darius’s Invasion (518 BC)**

- The Achaemenian rulers of Iran (Persia), who expanded their empire at the same time as the Magadhan princes, took advantage of the political disunity on the North-West Frontier of India.

- The Achaemenian ruler *Darius I (Darayabahu)* penetrated into North-West India in 518 BC and annexed Punjab, West of the Indus and Sindh. This area constituted the 20th province (Kshatrapa) of Iran, the total number of provinces in the Iranian empire being 28. This province was the most fertile area of the Iranian empire. From this province the empire received 360 talent gold as revenue.

- The Indo-Iranian contact lasted for about 200 years.

**Effects of Iranian Invasion**

1. It gave an impetus to Indo-Iranian trade and commerce.
2. Through the Iranian, the Greeks came to know about the great wealth of India and this eventually led to Alexander’s invasion of India.
3. The Iranian scribes brought into India a form of writing which came to be known as the *Kharosthi* script. It was written from right to left like the Arabic.
4. Iranian influence on the Mauryan Sculpture is clearly perceptible, especially in the bell shaped capitals. Iranian influence may also be traced in the preambles of Ashoka’s edicts as well as in certain words used in them.

II. **Macedonian Invasion—Alexander’s Invasion (326 BC)**

- In the 4th century BC, the Greeks and the Iranian fought for the supremacy of the world. Under the leadership of Alexander of Macedonia the Greek finally destroyed the Iranian empire.

- Alexander succeeded his father Philip to the throne of Macedonia. He was then only 20 years of age.

- From his very childhood he used to dream of world-conquest. He quickly conquered many areas.

As a preliminary step to conquer India, the Kabul valley and the hilly area of North-West frontier were conquered, and he reached Ohind near Attock in 326 BC.

- The rulers of Taxila and Abhisara submitted but *Porus (Paru)* refused to do so.
- Alexander then crossed the Jhelum by a trick. Porus was defeated in the battle that followed, but Alexander treated him very generously for his bravery. *(Battle of Vitasta i.e. modern Jhelum, Greek-Hydaspes – 326 BC)*.
- This was how the Indians were defeated because of their disunity.

- After a brilliant victory at Sakala, the Greek forces reached the Beas. Alexander had to return from this place as his soldiers refused to go any further. The battle of Jhelum and Sakla had opened their eyes and they were afraid of the great Magadhan empire across the Beas.

- After making administrative arrangements for the conquered territory, Alexander marched back in Sep. 325 BC.

- He reached Babylon in 323 BC where he died at the age of 33.

**Effects of Alexander’s Invasion**

1. By opening up both the land and sea routes between India and Europe, it brought both of them closer to each other.
2. Indirectly this invasion made possible the establishment of Indo-Bactrian and Indo-Parthian states, which at a later stage considerably influenced Indian architecture (Gandharan school of sculpture), astronomy, coinage etc.
3. The invasion opened the eyes of Indian politicians to the necessity of creating a unified empire.
4. The date of the Invasion of Alexander is the ‘first reliable date in early Indian history’ and considerably helps us in solving chronological difficulties.

3.2. **Religious Movements (600 BC-400 BC)**

Various religious movements viz. Buddhism, Jainism etc. were born and grew up in the Post-Vedic Period known as the Period of Second Urbanisation or the Age of Buddha (6th Century BC to 4th Century BC).

**Causes of Religious Movements**

1. The vedic philosophy had lost its original purity.
2. The vedic religion had become very complex and had degenerated into superstitions, dogmas and rituals.
4. Introduction of a new agricultural economy in Eastern India.
5. The desire of Vaishyas to improve their social position with the increase in their economic position due to the growth of trade.

**Buddhism**

**Buddha’s Life**

- *Gautama Buddha*, founder of Buddhism, was born in 563 BC (widely accepted), on the vaisakha purnima day at *Lumbinivana* (Rumindehi District, Nepal) in the Sakya Kshatriya clan.
Great Events of Buddha’s Life | Symbols
---|---
**Janma (Birth)** | Lotus and Bull
**Mahabhihishkramana (Renunciation)** | Horse
**Nirvana/Sambodi (Enlightenment)** | Bodhi tree
**Dharmachakra pravartana (First Sermon) Wheel** | Wheel
**Mahaparinirvana (Death)** | Stupa

**Triratna i.e. Three Jewels of Buddhism**

<table>
<thead>
<tr>
<th>Buddhist C.</th>
<th>Year</th>
<th>Venue</th>
<th>Chairman</th>
<th>Patron</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Buddhist Council</td>
<td>483BC</td>
<td>Saptaparni Mahakassapa Cave, Rajgirha</td>
<td>Ajatashatru (Haranyaksha and Vinaya Pitaka by Ananda Dynasty) and Upali respectively</td>
<td>Compilation of Sutta Pitaka</td>
<td></td>
</tr>
<tr>
<td>2nd Buddhist Council</td>
<td>383BC</td>
<td>Chullavanga Sambakham Vaishali</td>
<td>Kalashoka (Shisunaga Dynasty)</td>
<td>(i) The monks of Vaishali wanted some change in rites. (ii) Schism into Sthavira, Vaadars and Mahasanghikas.</td>
<td></td>
</tr>
<tr>
<td>3rd Buddhist Council</td>
<td>250BC</td>
<td>Ashokarama Vihar, Patliputra</td>
<td>Mogaliputta Tissa</td>
<td>Ashoka (Maurya Dynasty)</td>
<td>(i) Compilation of Abhidhamma Pitaka (ii) Decision to send missionaries to various parts of the world</td>
</tr>
<tr>
<td>4th Buddhist Council</td>
<td>98AD</td>
<td>Kundala Vana, Kashmir</td>
<td>Chairman-Vasumitra, Vice Chairman-Ashvaghosa</td>
<td>Kanishka (Kushana Dynasty)</td>
<td>(i) Compilation of Mahavibha sha shastra (Sanskrit comment on Tripitaka) (ii) the division of Buddhists into Hinayanists and Mahayanaists</td>
</tr>
</tbody>
</table>

**Buddhist Literature**

I. Pali Texts

- **Tripitaka**: Pitaka literally means ‘basket’ and it was called so, because the original texts were written on palm-leaves and kept in baskets. *Sutta Pitaka*—Buddha’s sayings, *Vinaya Pitaka*—monastic code, *Abhidhamma pitaka*—religious discourses of Buddha (Abhidhamma Pitaka comprises of Dighgha Nikaya, Majhim Nikaya, Sutudhika Nikaya, Anguttar Nikaya and Khuddak/ Koshdra Nikaya).
- **Maha Pitaka** (i.e. Questions of Milinda)—a dialogue between Milinda (identical with Indo-Greek ruler Menander) and Buddhist saint Nigasena.
- **Dipavamsa** and **Mahavamsa**—The great chronicles of Sri Lanka.

II. Sanskrit Texts

- Buddha Charita, Saundarananda, Sutralankar, Sariputra Prakaran and Vajra Suchi—Ashwagoshtha; Mahavibha shastra—Vasumitra; Visudhamagga, Atthakhathyena and Sumanagvasini—Buddhagosha; Mahayamika Karika and Pratiparamita Karika—Nagarjuna etc.

**Sects of Buddhism**

- **Hinayana** (i.e. the Lesser Vehicle): 1. Its followers believed in the original teaching of Buddha. 2. They sought individual salvation through self-discipline and meditation. 3. They did not believe in idol-worship. 4. They favoured Pali language. 5. It is known as ‘Southern Buddhist Religion’, because it prevailed.
in the South of India, e.g. Sri Lanka, Burma (Myanmar), Syam (Thailand), Java etc. 6. There were two sects of Hinayana—Vaibhasika and Saunatranika.

Mahayana (i.e. the Greater Vehicle): 1. Its followers believed in the heavenliness of Buddha. They sought salvation of all through the grace and help of Buddha and Bodhisattva. 3. They believed in idol-worship 4. They favoured Sanskrit language. 5. It is known as 'Northern Buddhist Religion', because it prevailed in the North of India, e.g. China, Korea, Japan, etc. 6. There were two sects of Mahayana—Madhyamika/Shunyavada (founder—Nagarjun) and Yogachara/Vijnanavada (founder—Maitreyanath and his disciple Asanga).

Vajrayana: Its followers believed that salvation could be best attained by acquiring the magical power, which they called Vajra. 2. The chief divinities of this new sect were the Taras. 3. It became popular in Eastern India, particularly Bengal and Bihar.

Bodhisattvas
1. Vajrapani: like Indra, he holds a thunderbolt, foe of sin and evil.
2. Avlokitesvara (the lord who looks down) also called Padmapani (the lotus bearer) — kind-hearted.
3. Manjushri (Stimulator of understanding): He holds a book describing 10 paramitas (spiritual perfections).

Sacred Shrines
- Lumbini, Bodh Gaya, Sarnath and Kusinagar, where the four principal events of the Buddha's life, namely Birth, Enlightenment, First Sermon and Death took place. To these are added four places—Svatasti, Rajgir, Vaishali and Sankasya—these eight places have all along been considered as the eight holy places (Ashtasthana).
- Other centres of Buddhism in Ancient India—Amaravati and Nalanda in the Andhra Pradesh; Nalanda in Bihar; Junagadh and Vallabhi in Gujarat; Sanchi and Bharhut in Maharastra; Dhaulagiri in Orissa; Kannauj, Kaushambi and Mathura in U.P.; and Jagadala and Somapuri in West Bengal.
- Buddhist architecture was developed in three forms:
  1. Stupa—relics of the Buddha or some prominent Buddhist monks are preserved
  2. Chaitya—prayer hall
  3. Vihara—residence

Royal Patrons: Bimbisara and Ajatashatru (Magadhan ruler), Prasenjit (Kosala ruler), Udayan (Vatsa ruler), Pradyota (Avanti ruler), Asoka and Dasharatha (Muryan ruler), Milinda/Menander (Indo-Greek ruler), Kanishka (Kushana ruler), Harshvardhana (Vardhana ruler), Gopala, Dharmapala and Rummala (Pala rulers).

Note:
1. Asoka, the greatest patron of Buddhism, called 3rd Buddhist council and sent mission, comprising of his son Mahendra and his daughter Sanghamitra to Sri Lanka.
2. Kanishka called 4th Buddhist council and sent mission to China, Korea and Japan.
3. Palas of Bengal and Bihar were last great patrons of Buddhism.

Jainism
- According to Jain tradition there were 24 Thirthankaras (literally Ford-maker, across the stream of existence), the first being Rishabhadheva/Adinatha and last being Mahavira.
- The Vishnu Purana and the Bhagavat Purana describe Rishabha as an incarnation of Narayana.
- Thename of two Jain Tirthankaras—Rishabha and Arishtanemi—are found in the Rig Veda.
- Historically, early 22 Tirthankaras is ambiguous.
- We have historical proof of only the last two—Parshwanath (23rd) and Mahavira (24th).
- Parshwanath was a prince of Benares who abandoned the throne and led the life of a hermit and died at Sammet-Shikhar/Parshwanath Hill, Giridih, Jharkhand. His four main teachings (Chaturthi) were 1. Ahimsa (non-injury) 2. Satya (non-lying) 3. Asteya (non-stealing) 4. Aparigraha (non-possession). Mahavira adopted all these four teachings and added one more, that is Brahmacharya (Chastity) to it.

Mahavira’s Life
- Mahavira was born in 540 BC in a village Kundgrama near Vaishali in Bihar.
- His father Siddhartha was the head of the Jnathrika Kshtriya clan under Vaji of Vaishali and his mother Trishala was the sister of Chetaka, the king of Vaishali. Mahavira was also related to Bimbisara, the ruler of Magadha, who had married Chellana, the daughter of Chetaka.
- Mahavira was married to Yashoda (daughter of Samarvira king) and a
produced a daughter Anonia Priyadarshini whose husband Jamali became the first disciple of Mahavira.

At the age of 30, after the death of his father, he renounced his family, became an ascetic and proceeded in search of truth. He was accompanied by Makkhal Gosala but later due to some differences Gosala left him and founded Ajivika sect.

At the age of 42, under a sal tree at Jambhiagrama on the bank of river Rijupatika, Mahavira attained Kaivalya (supreme) knowledge.

From now onwards he was called Kevalin (perfect learned), Jina or Jitendriya (one who conquered his senses). Nirgrantha (free from all bonds), Arhat (blessed one) and Mahavira (the brave) and his followers were named Jain.

He delivered his first sermon at Pavato his 11 disciples known as 11 Gandharas (Gandharvas). Later, he founded a Jain Sangha (Jain commune) at Pava.

At the Age of 72 in 468 BC, he passed away at Pavapuri near Biharsharif in Bihar. Sudharma only one of 11 Gandharas who survived after the death of Mahavira.

Doctrines of Jainism

Triratna i.e. Three Gems of Jainism
The aim of existence is to attain through the triratna of
1. Sanyak Shradha / Viswas (Right faith) : It is the belief in Thirthankaras.
2. Sanyak Jnan (Right knowledge) : It is the knowledge of the Jain creed.
3. Sanyak Karma / Acharana (Right action / conduct) : It is the practice of the 5 vows of Jainism.

Pancha Mahavratas i.e. Five Vows of Jainism
Five vows of Jainism are : 1. Ahimsa (non-injury) 2. Satya (non-lying) 3. Astra (non-stealing) 4. Aparigraha (non-possession) 5. Brahmacharya (chastity). The first four vows were laid down by Parshwanath. The fifth one was added by Mahavira.

Types of Knowledge

Syadva i.e. The Theory of May Be / Perhaps : All our judgements are necessarily relative, conditional and limited. According to Syadva seven modes of prediction (Saptabhangi Nayavac) are possible. Absolute affirmation and absolute negation both are wrong. All judgements are conditional. Syadva is also known as Anekantvada i.e. the theory of plurality or multiplicity.


Jain Literature

The sacred literature of the Svetambaras is written in a type of Prakrit called Ardhamagadhi Prakrit, and may be classified as follows: 1. 12 Angas 2. 12 Upangas 3. 10 Parikams 4. 6 Chhedasatras 5. 4 Mulasatras 6. 2 Sutra-Granthas.

Note: 14 Purvas / Parvas- It is the part of 12 Angas and the oldest text of Mahavira's preachings.

Besides this, the important Jain texts are:

Sects of Jainism

In 298 BC, there was a serious famine in Magadh (South Bihar) leading to a great exodus of many Jain monks to the Deccan and South India (Shravanbelgola) along with Bhdrabahu and Chandragupta Maurya. They returned back after 12 years. The leader of the group, which stayed back at Magadh was Shublabahdra. When the Jains (Bhdrabahu and others) returned from South India, they held that complete nudity be an essential part of the teachings of Mahavira, while the monks in Magadh began to put on white clothes.

Thus arose the two sects Shvetambaras (white clad) and Digambaras (sky-clad).
1. Shvetambaras (i.e. those who put on white robes) - Shublabahdra
2. Digambaras (i.e. those who were stark naked) - Bhdrabahu.

Examples of Jain Architecture

1. Gumpas i.e. Caves e.g. Hathigumpha, Baghagumpha etc., Udaigiri and Khandagiri (Orissa) - Kharavela
2. Dilwara temples e.g. Vimalavasahi temple, Tejapala temple - Mount Abu (Rajasthan)
3. Temples - Girnar and Palitana (Gujarat)
4. Temples e.g. Pavapuri temple, Rajagriha temple - Bihar
5. Statue of Gomateshwar/Bahubali - Shravanbelgola (Karnataka).

Royal Patrons

I. North India :
1. Nandas; Bimbisar, Ajatshatru and Udayin (Haranyak); Chandraguptra Maurya, Bindusara and Samprati (Mauryan) - Magadh
2. Pradyota (Avanti)

II. South India :
1. Ganga Dynasty
2. Kadamb Dynasty
3. Amoghavarsha (Rashtrakuta Dynasty)
4. Siddharaj Jai Singh and Kumarpala (Chaulukya / Solanki) - the last great patrons of Jainism.
4. Maurya Period (322 BC-185 BC)

Sources for Mauryan History

1. Literary Sources
   a. **Kautilya’s “Arthasastra”**: It is the most important literary source for the Mauryas. It is a treatise on government and polity. It gives a clear and methodological analysis of political and economic conditions of the Mauryan period.
   b. **Megasthenese’s “Indica”**: Megasthenes was the ambassador of Seleucus Nikator in the court of Chandragupta Maurya. His “Indica” is foremost among all the foreigners’ accounts for Maurya. But its original copy is lost, and it has survived only as quotations in the text of classical Greek writers, such as Strabo, Diodorus, Arrian, Plutarch and Latin writers such as Pliny and Justin. It refers to Mauryan administration, 7-caste system, absence of slavery and usury in India etc.
   c. **Visakhha Datta’s “Mudra Raksaha”**: Though it was written during Gupta period, it describes how Chandragupta Maurya get Chanakya’s assistance to overthrow the Nandas. Besides this, it gives an excellent account of the prevailing socio-economic conditions.
   d. **Pitamahs**: Though they are a collection of legends interspersed with religious teachings, they give us the chronology and lists of Mauryan kings.
   e. **Buddhist Literature**: 1. Indian Buddhist text Jatakas (a part of Khuddakapitaka which describes 549 stories of Buddha’s previous births) reveal a general picture of socio-economic conditions of Mauryan period. 2. Ceylonese Buddhist chronicles Dipawamsa and Mahavamsa describe the part played by Ashoka in spreading Buddhism to Sri Lanka. 3. Tibetan Buddhist text Divyavedana gives information about Ashoka and his efforts to spread Buddhism.

2. Archaeological Sources
   a. **Ashokan Edicts and Inscriptions**: There are Rock Edicts, Pillar Edicts and Cave Inscriptions located at several places in the Indian sub-continent. Their importance came to be appreciated only after their decipherment by James Prinsep in 1837 and also the identification of Ashoka as the author of these edicts in the beginning of the 20th century. Majority of them are in the nature of Ashoka’s proclamations to the public at large, and only a small group of them describe his own acceptance of Buddhism and his relationship with the Sangha (Commune). Though Prakrit was the language used in them, the script varied from region to region (Kharoshti in the North-West, Greek and Aramaic in the West and Brahmi in the East of India).
   b. **Other Inscriptions**: Junagadh Rock Inscription of Rudradaman, Sohagura Copper Plate Inscription in Gorakhpur district of U.P, Mahasthan Inscription in Bogara district of Bangladesh. – All these are directly concerned with the Mauryan Period, though they believed to be not necessarily those of Ashoka.
   c. **Material Remains**: Wooden palace of Chandragupta Maurya, Northern Black Polished Ware (NBPW), Silver and Copper punch-marked coins found in Kumharar (Patna) and other places are the material remains of the Mauryan period.

---

Indian History

<table>
<thead>
<tr>
<th>Ashokan Edicts</th>
<th>Contents</th>
<th>Found at</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) 14 Major Rock Edicts</td>
<td>Various Principles of Dhamma</td>
<td>Manshera (Pakistan) Shahbaigarhi (Marian, Pakistan), Kali (Dehradun, Uttarakhond), Junagadh (Gimir, Gujarat), Sopara (Than, Maharashtra), Yerragudi (Kurnul, Andhra Pradesh), Bhauri (Khurda, Orissa), Jagada (Ganjam, Orissa)</td>
</tr>
<tr>
<td>ii) 2 Kalinga Rock Edicts</td>
<td>New system of administration after the Kalinga war</td>
<td>Daudnagar (Goroda, Orissa), Jagada (Ganjam, Orissa)</td>
</tr>
<tr>
<td>iii) Minor Rock Edicts</td>
<td>Personal history of Ashoka and summary of his dhamma</td>
<td>Sasaram (Bihar), Maski (Andhra Pradesh), Bhargava (Rajasthan), Rupanath (MP), Gavimath, Palki- undu, Siddhpur, Jating Rameshwar, Brahmagiri (Karnataka)</td>
</tr>
<tr>
<td>iv) Bhabru-Bairat Rock Edicts</td>
<td>Ashoka’s conversion to Buddhism</td>
<td>Bhabru-Bairat (Rajasthan)</td>
</tr>
</tbody>
</table>

II. Pillar Edicts

<table>
<thead>
<tr>
<th>Ashokan Edicts</th>
<th>Contents</th>
<th>Found at</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) 7 Pillar Edicts</td>
<td>Appendix to rock Edicts</td>
<td>Murrut-Delhi (Chhoti Lata), Topra-Delhi (Badi Lata), Allahabad (UP); Lauriya Nandangadhi, Lauriya Anra and Rampurry (Bihar)</td>
</tr>
<tr>
<td>ii) 4 Minor Pillar Edicts</td>
<td>Signs of Ashoka’s fanaticism into Dhamma</td>
<td>Sanchi (MP), Samand and Allahabad (UP)</td>
</tr>
<tr>
<td>iii) 2 Tarai Pillar Edicts</td>
<td>Ashoka’s respect for Buddhism</td>
<td>Rummadei/Lumbini and Nigaliva (Tarai of Nepal)</td>
</tr>
</tbody>
</table>

III. Cave Edicts

<table>
<thead>
<tr>
<th>Ashokan 14 Major Rock Edicts</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prohibition of animal sacrifices and festive gatherings.</td>
<td></td>
</tr>
<tr>
<td>3. Respect to Brahmanas.</td>
<td></td>
</tr>
<tr>
<td>4. Courtesy to relatives, elders, consideration for animals.</td>
<td></td>
</tr>
<tr>
<td>5. Appointment of Dhamma Mahamatras and their duties.</td>
<td></td>
</tr>
<tr>
<td>6. Need for efficient organisation of administration (orders to Dhamma Mahamatras).</td>
<td></td>
</tr>
<tr>
<td>7. Need for tolerance among all religious sects.</td>
<td></td>
</tr>
<tr>
<td>10. Conquest through Dhamma instead of war.</td>
<td></td>
</tr>
<tr>
<td>11. Explanation of Dhamma-policy.</td>
<td></td>
</tr>
<tr>
<td>12. Appeal for tolerance among all religious sects.</td>
<td></td>
</tr>
<tr>
<td>13. Kalinga war, mention 5 contemporary Hellenic (Greek) kings.</td>
<td></td>
</tr>
</tbody>
</table>
Origin of the Mauryas

The Puranas describe them as Shudras.

‘Mudrakshas’ of Vishakhadatta uses the terms Vrishal/ Kulhina (of low clan).

The Classical writers, such as Justin, describe Chandragupta only as a man of humble origin.

The Junagharh Rock Inscription of Rudrakdamana (150 AD) has some indirect evidence, suggesting that the Mauryas might have been of Vaishya origin.

The Buddhist work, on the other hand, try to link the Mauryan dynasty with the Sakya Khatriya clan to which Buddha belonged. According to them, the region from which the Mauryas came was full of peacocks (Mor), and hence they came to be known as ‘Moriyas’. It is obvious from this that the Buddhists were trying to elevate the social position of Ashoka (their patron) and his predecessors.

In conclusion, we can say that the Mauryas belonged to the Moriya tribe and were certainly of a low caste, though it is not clear as to which low caste.

Chandragupta Maurya : 322 BC-298 BC

Chandragupta dethroned the last Nanda ruler Dhananand and occupied Pataliputra in 322 BC with the help of Kautilya (Chankya).

In 305 BC, Chandragupta Maurya defeated Seleucus Nikator, who surrendered a vast territory including Aria (herat), Arachosia (Kandhar), Gedrosia (Baluchistan) and Paropamisade (Kabul), in return for 500 elephants. According to treaty between Chandragupta and Seleucus, the Hindukush became boundary between their states.

Megasathenes was a Greek ambassador sent to the court of Chandragupta Maurya by Seleucus Nikator.

Chandragupta became a Jain and went to Chandragiri Hill, Sravanbelgola (Karnataka) with Bhadrabahu, where he died by slow starvation (Kaya-Klesha/Salekhan).

Under Chandragupta Maurya, for the first time, the whole of Northern India was united.

Trade flourished, agriculture was regulated, weights and measures were standardised and money came into use.

Taxation, sanitation and famine relief became the concerns of the state.

Bindusara : 298 BC-273 BC

Bindusara succeeded his son Bindusara.

Bindusara, known to the Greeks as Amitrochates (derived from the Sanskrit word Amitraghata i.e. slayers of foes), is said to have carried his arms to the Deccan (upto Mysore).

Bindusara asked Antiochus I of Syria to send some sweet wine, dried figs and a sophist. Antiochus I sent wine and figs but politely replied that Greek philosophers are not for sale.

Bindusara patronised Ajivikas.

Ashoka : 273 BC-232 BC

According to Buddhist texts when Ashoka, the son of Bindusara, was born, his mother happy to have a child, said, ‘Now I am Ashoka’, i.e., without sorrow. And so the child was named.

It appears from the available evidence (Buddhist literature mainly) that there was a struggle for the throne among the princes on the death of Bindusara.

According to Buddhist tradition, Ashoka usurped the throne after killing his 99 brothers and spared Tissa, the youngest one. Radhagupta a minister of Bindusara helped him in fratricidal struggle.

This war of succession accounts for interregnum of four years (273-269 BC), and only after securing his position on the throne, Ashoka had himself formally crowned in 269 BC.

Under Ashoka, the Mauryan Empire reached its climax. For the first time, the whole of the sub-continent, leaving out the extreme south, was under imperial control.

Ashoka

Devanampriyas Ashoka Rajas

Raja Ashoka

Raja Ashoka Devanampiya

Piyadassi Raja Magadh

Piyadassi Raja

Piyadassi

Ashoka Maurya

Ashoka Vardhan

Maski minor rock edict.

Gurjara minor rock edict

Nittur minor rock edict

Udegodum minor rock edict

Bhakura-Bairat minor rock edict

Barabar cave inscription

Kandhar major rock edict and Deepamasa.

Rudrakdamana’s Junaghar rock edict.

Puranas.

Ashoka fought the Kalinga war in 261 BC in 9th years of his coronation. The king was moved by the massacre in this war and therefore abandoned the policy of physical occupation in favour of policy of cultural conquest. In other words, Bherighosa was replaced by Dhammaggosa.

Ashoka was not an extreme pacifist. He did not pursue the policy of peace for sake of peace under all conditions. Thus, he retained Kalinga after his conquest and incorporated it into his empire.

Ashoka sent missionaries to the kingdoms of the Cholas and the Pandyas, and five states ruled by Greek kings (Antiochus II, Syria; Philadelphos Ptolemy II, Egypt; Antigonus, Macedon; Maggus, Syria; Alexander, Epirus). We also know that he sent missionaries to Ceylon (Sri Lanka) and Suvarnabhumi (Burma) and also parts of South-East Asia.

Ashoka’s Dhamma

Ashoka’s Dhamma cannot be regarded as a sectarian faith. Its broad objective was to preserve the social order it ordained that people should obey their parents, pay respect to Brahmans and Buddhist monks and show mercy to slaves and servants.

He held that if people behaved well they would attain Swarga (heaven). He did never say that they would attain Nirvana, which was the goal of Buddhist teachings.

Later Mauryas : 232 BC-185 BC

The Mauryan dynasty lasted 137 years.

Ashoka’s death was followed by the division of the Mauryan Empire into two parts-Western and Eastern.
Mauryan kings | Other names of the king | Ambassador (Greek king)
---|---|---
Chandragupta | Sandrocottus-Strabo, Justin Androcottus-Ariam, Plutarch Vishala/Kulhina (i.e.of low clan)-Vishakhadatta (Mudra-rakshasa) | Megasthenes (302-298 BC) (Seleucus Nikator-Persia and Babylonia)
Bindusara | Amitrochates—Greek texts, Vindupala—Chinese text Sinhasana—Jain text Bhadradasa—Yau Purana | Dimachos (Antiochus I-Syria), Dionysius (Philadelphia/Potlcy II-Egypt)

Mauryan Administration

I. Central Administration

- **The king**: The Mauryan government was a centralised bureaucracy of which the nucleus was the king. According to Kautilya / Chanakya, there are 7 elements of states (Saptanga theory)-Raja (the king), Amatya (the secretaries), Janapada (territory), Dung (Fort), Kosh (the treasure), Sena (Army) and Mitra (Friend). The king was regarded as the soul among all the seven elements of the state.

- **The Mantri Prishad**: The king was assisted by Santri Parishad, whose members included 1. The Yuvaraja (the crown prince) 2. The purohita (the chief priest) 3. The Senapati (the commander-in-chief) (iv) a few other ministers.

<table>
<thead>
<tr>
<th>Important officials</th>
<th>Chief</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samdhara</td>
<td>Chief treasury officer</td>
</tr>
<tr>
<td>Samaharta</td>
<td>The collector general of revenue</td>
</tr>
<tr>
<td>Vyavaharika (Dharmasha)</td>
<td>Chief Justice of Dharmasthiya Nyayalaya (Civil Court)</td>
</tr>
<tr>
<td>Pradesha</td>
<td>Chief Justice of Kantakoshadhan Nyayalaya (Criminal Court)</td>
</tr>
<tr>
<td>Dhamma Mahamatra</td>
<td>A new post created by Ashoka, empowered with the dual functions of propagating Dhama and taking care of the common folk for their material well-being.</td>
</tr>
<tr>
<td>Rashtrapa/ Kumara</td>
<td>The viceroy in charge of a province</td>
</tr>
<tr>
<td>Pradesika</td>
<td>They were the modern district magistrate</td>
</tr>
<tr>
<td>Rajukas</td>
<td>They were the later day Patwaris and responsible for surveying and assessing the land</td>
</tr>
<tr>
<td>Yuktik</td>
<td>A subordinate revenue officer of the district level</td>
</tr>
<tr>
<td>Sthanika</td>
<td>The collecting officer directly under the control of the Pradeshika</td>
</tr>
<tr>
<td>Copa</td>
<td>Responsible for accounts</td>
</tr>
</tbody>
</table>

II. Provincial Administration

<table>
<thead>
<tr>
<th>Province</th>
<th>Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uttarapatha i.e. Northern Province</td>
<td>Taxila</td>
</tr>
<tr>
<td>Avantirashtra i.e. Western Province</td>
<td>Ujjain</td>
</tr>
<tr>
<td>Prach i.e. Eastern and Central Province</td>
<td>Patliputra</td>
</tr>
<tr>
<td>Kalinaga i.e. Eastern Province</td>
<td>Tosali</td>
</tr>
<tr>
<td>Dakhinapatha i.e. Southern Province</td>
<td>Suvarnagiri</td>
</tr>
</tbody>
</table>

Note: According to the Junagadh Rock Edict of Rudrada man, Saurashtra was governed by Pushyagupta, the vaisyah, at the time of Chandragupta Maurya and by the Yavan king, Tushaga at the time of Ashoka.

<table>
<thead>
<tr>
<th>Administrative Unit</th>
<th>Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chakra (i.e. province)</td>
<td>Rashtrapala/Kumara</td>
</tr>
<tr>
<td>Abh/Ashayya (i.e. District)</td>
<td>Pradeshika (administrative) and Rajuka (land revenue)</td>
</tr>
<tr>
<td>Sangrahana (a group of 10 villages)</td>
<td>Gopa</td>
</tr>
<tr>
<td>Gram (i.e. village)</td>
<td>Gramika</td>
</tr>
</tbody>
</table>

III. Municipal Administration

- Kautilya devotes a full chapter to the rules of the Nagaraka, i.e. city superintendent. His chief duty was maintenance of law and order.

- Megasthenes account of the system: 6 committees of five members each, and their functions; 1st - Industrial Arts, 2nd - Entertainment of Foreigners, 3rd - Registration of Births and Deaths, 4th - Trade and Commerce, 5th - Public sale of manufactured goods, and 6th - Collection of taxes on the articles sold (1/10th of purchase price).

IV. Army

- The most striking feature of Mauryan administration was the maintenance of a huge army. They also maintained a Navy.

- According to Megasthenes the administration of Army was carried by a board of 30 officers divided into 6 committee, each committee consisting of 5 members. They are 1. Infantry 2. Cavalry 3. Elephants 4. Chariots 5. Navy 6. Transport.

- In the Mauryan period, there were two types of Gudhapurushash (detectives)-Sansthana (Stationary) and Sanchari (Wandering).
Economy
- The state controlled almost all economic activities.
- Tax collected from peasants varied from 1/4 to 1/6 of the produce.
- The state also provided irrigation facilities (Setubandha) and charged water-tax.
- Tolls were also levied on commodities brought to town for sale and they were collected at gate.
- The state enjoyed monopoly in mining, forest, salt, sale of liquor, manufacture of arms etc.
- Sohagur (Gorakhpur district, U.P) copper plate inscription and Mahabhatana (Bogara district, Bangladesh) inscription deal with the relief measures to be adopted during a famine.
- Important ports: Bharukachch/Bharochand Supara (Western coast), Tamralipta in Bengal (Eastern coast).
- During Mauryan period, the punch-marked coins (most of silver) were the common units of transactions.

Society
- Kautilya/Chanakya/Vishnugupta is not as rigid on the Varna system as the earlier Smritis writers.
- Kautilya's 'Arthasashtra' looked upon the Shudras as an Aryan community which is distinguished from Malecha or non-Aryan community.
- Reduction of gap between the Vaishyas (most of whom were now concentrating on trade though others continued cultivation) and the Shudras (quite a few of whom were now agriculturists and others being artisans).
- Megasthenes states that Indian society was divided into 7 classes:

1. Philosophers
2. Farmers
3. Soldiers
4. Herdsmen
5. Artisans
6. Magistrates
7. Councillors

The ‘classes’ mentioned above appear to have been economic than social.

- Though Megasthenes stated that there were no slavery in India, yet, according to Indian sources, slavery was a recognized institution during Mauryan reign. It appears that Megasthenes was thinking of slavery in full legal sense as it existed in the West.
- Women occupied a high position and freedom in the Mauryan society. According to Kautilya, women were permitted to have a divorce or remarry. Women were employed as personal bodyguards of the king, spies and in other diverse jobs.

Mauryan Art

1. Royal/Court Art: The Royal Palace of Chandragupta Maurya (Kumharat, Patna) and City of Pataliputra, Ashokan Pillars, Caves, Stupas etc.
2. Folk/Popular Art: 1. Figure Sculpture of Yaksha-Yakshini etc. e.g. Yaksha of Parkham (Mathura), Yakshini of Besanagar/Vidisha (M.P.), Chanwari-beared Yakshini of Didarganj (Patna). 2. Terracotta objects. 3. Inscribed stone portrait of Emperor Ashok/Broken relief sculpture of Emperor Ashok (Kanaganhalli, Karnataka).

The Mauryas introduced stone masonry on a large scale during Ashoka.
- Fragments of stone pillars and wooden floor and ceiling indicating the existence of an 80-pillared hall have been discovered at Kumhrar on outskirts of Patna. Seeing this Fa-hien remarks as follows: 'These palaces are so beautiful and excellent that they appear to be the creation of God rather than of men'.
- The pillars represent the masterpieces of Mauryan sculpture. Each pillar is made of single piece of sandstone, only their capitals, which are beautiful pieces of sculpture in form of lion or bulls, are joined with pillar on the top.
- Four lion capital at Samath and Sanchi. Lioned capital of Samath was adopted as 'National Emblem' of India on 26 Jan., 1950.
- Single lion capital at Rampurva and Lauriya Nandangarh.
- Single bull capital at Rampurva.
- A carved elephant at Dauli and engraved elephant at Kalsi.
- The Mauryan artisans who started the practice of hewing out caves from rocks for monks to live in, the earliest example are Barabar caves (Sudama, World Hut, Chaupada of Karna, Rishi Lomesh) in Gaya (Ashokan). The other examples are Nagarjuni caves in Gaya (Dasharath).
- Stupas were built throughout the empire to enshrine the relics of Buddha. Of these, the most famous are at Sanchi and Bharhut.

5. I. Post-Maurya/Pre-Gupta Period (185 BC-319 AD)

I. Native Successors of Mauryas
Sunga Dynasty: 185 BC - 73 BC [Capital-Vidisha (M.P.)]
- Sunga Dynasty was established by Pushyamitra Sunga, a Brahmin Commander-in-Chief of last Mauryan ruler named Bhadradra in 185 BC.
- Pushyamitra was a staunch adherent of orthodox Hinduism. However, the great Buddhist stupa at Bharhut (in M.P.) was built during the reign of Sungas.
- Pushyamitra was succeeded by his son Agnimitra, the hero of Kalidasa’s drama ‘Malvikagnimitra’.
- After Agnimitra, a series of weak rulers such as Vasumitra, Vajramitra, Bhagabhadra, Devabhuti, followed, leading to the decline of the dynasty.
- During their rule there was a revival of Brahminical influence. The Bhagavata religion became important.

- Panjiangi, author of the ‘Mahabhasya’, was born at Gonarda in Central India. Panjiangi was the priest of 2 Asvamedha Yajnas, performed by Pushyamitra Sunga.
- In arts, the Bharhut Stupa is the most famous monument of the Sunga period.
- The fine gateway railing which surrounds the Sanchi stupa, built by Ashoka, constructed during the Sunga period.
- Other examples of Sunga Art: Vihar, Chaitya and Stupa of Bhaja (Poona), Amaravati Stupa, Nasika Chaitya etc.
Kanva Dynasty: 73 BC - 28 BC
[Capital - Patliputra]
> In 73 BC, Devabhuti, the last ruler of the Sunga dynasty, was murdered by his minister Vasudeva who usurped the throne and founded the Kanva dynasty.
> The period of Kanva rule came to an end in 28 BC.

Satavahana Dynasty: 60 BC - 225 AD
[Capital - Pratishtha/Paithan (Maharashtra)]
> The most important of the native successors of the Mauryas in the Deccan and Central India were the Satavahanas.
> The Satavahanas are considered to be identical with the Andhras who were mentioned in the Puranas.
> The early Satavahana kings appeared not in Andhra but in Maharashtra where most of their early inscriptions have been found.
> Simuka (60 BC-37 BC) was the founder of the Satavahana dynasty.
> Satakarni I, its 3rd ruler, raised its power and prestige by conquests.
> Hala, its 17th ruler, was the author of 'Carthasaptasati' or 'Sattasai' in Prakrit.
> Gunadhya, the author of 'Vrishat Katha' (in Prakrit), was the contemporary of Hala.
> It was Gautamiputra Satakarni (106 - 130 AD) who revived the Satavahana power and defeated the Saka Ksatriya Nahapana. He was the greatest Satavahana ruler (23rd Satavahana ruler).
> Visishthiputra Srikarni, its 24th ruler, was married to the daughter of Saka Ksatriya Rudradaman, but defeated by him twice.
> Yajna Sri Satakarni, its 27th ruler, was the dynasty's last great ruler.
> Pulamavi III, its 30th ruler, was the last Satavahana ruler.
> Satavahanas were finally succeeded by the Ikshvakus in 3rd Century AD.
> Satavahanas started the practice of donating land with fiscal and administrative immunities to Brahmanas and Buddhist monks, which eventually weakened their authority. The earliest inscriptive evidence of land grant in India belongs to 1st century BC.
> Under the Satavhanas, many Chaityas (worship halls) and Viharas (monasteries) were cut out from rocks mainly in North-West Deccan or Maharashtra. The famous examples were Nasik, Kanheri and Karle.
> Stupas (large round structure erected over a sacred relic) were seen scattered all around Ellora. The most famous of these attributed to the Satavahana period are Amravati, a sculptural treasure house, and Nagarjunakonda.
> The official language of the Satavahanas was Prakrit.
> The Satavahanas issued their coins in lead (mainly), copper, bronze and potin.

Cheti/Cedi Dynasty of Kalinga
> The history of Kalinga after the death of Ashoka is shrouded in obscurity. A new dynasty, known as the Ceti or Cedi dynasty, rose in the region probably in the 1st century BC.
> Our information about this dynasty is derived solely from the Hathigumpha inscription (near Bhubaneswar, Orissa) of Kharavela, the 3rd ruler of dynasty.
> A follower of Jainism, Kharavela was liberal patron of Jain monks for whose residence he constructed caves on the Udayagiri hill, near Bhubaneswar in Orissa.

II. Foreign Successors of Mauryas

The Indo-Greeks: 2nd Century BC
The Indo-Greeks (Bactrian Greeks) were the first foreign rulers of North-Western India in the Post-Maurya period.
> The most famous Indo-Greek ruler was Menander (165 BC-145 BC), also known as Mulinda. He was converted to Buddhism by Nagasena or Nagarjuna.
> The Indo-Greek rule is important in the history of India because of the large number of coins which they issued.
> The Indo-Greeks were the first rulers in India to issue coins which can definitely be attributed to the kings.
> They were the first to issue gold coins.
> They introduced Hellenistic Greek features in art giving rise to Gandharan school in the North-Western India.

The Sakas: 1st Century BC-4th Century AD
The Sakas, also known as Scythians, replaced the Indo-Greeks in India.
> Among the five branches of Sakas with their seats of power in different parts of India, the most important was the one which ruled in Western India till the 4th Century AD.
> The most famous Saka ruler in India was Rudradaman (130 AD-150 AD).
> He is famous not only for his military conquests (particularly against the Satavahanas) but also for his public works (he repaired the famous Sudarsana lake of the Mauryan period) and his patronage of Sanskrit (he issued the first-ever long inscription in chaste Sanskrit).
> Other important Saka ruler in India were Nahapana, Ushavadeva, Ghatamika, Chashtana etc.
> In about 58 BC a king of Ujjain - Vikramaditya - is supposed to have fought effectively against the Sakas. An era called Vikrama Samvat is reckoned from 58 BC.

The Parthians: 1st Century BC-1st Century AD
Originally the Parthians (Pahlavas) lived in Iran, they replaced the Sakas in North-Western India, but controlled an area much smaller than the Sakas.
> The most famous Parthian king was Gondaphernes in whose reign St. Thomas is said to have come to India for the propagation of Christianity.

The Kushans: 1st Century AD-3rd Century AD
The Kushans were one of the five Yuezhi clans of Central Asia.
> They replaced the Parthians in North-Western India and then expanded to the lower Indus basin and the upper and middle Gangetic basin.
> The first Kushan dynasty was founded by Kadphises I/ Kujula Kadphises. The second king was Kadphises II/ Vema Kadphises who issued gold coins.
> The second Kushan dynasty was founded by Kaniska. Its kings extended the Kushan power over upper India. Their capitals were at Peshawar (Pushapur), Mathura and Mathura.
> The most famous Kushan ruler was Kanishka (78 AD-101 AD), also known as 'Second Ashoka'. He started an era in 78 AD which is now known as the Saka era and is used by the Government of India.
Indian History

The Romans set up two regiments at Muziris (identical with Cranganore) in Chera country. They also built a temple of Augustus at Muziris.

One of the earliest and better known among Chera rulers was Udiyngaral. It is said that he led both the armies of Kurukshetra war and so earned the title Udiyngaral.

The greatest of Chera king, however, was Senguttuvan or Red Chera. It is said that he invaded the North and even crossed the Ganges.

He was also the founder of the famous Pattinacuvin related to worship of goddess of chastity—Kannagi.

The Cholas

The Chola kingdom called as Cholamandalam was situated to the North-East of Pandya kingdom between Pennar and Vellar rivers.

The Chola kingdom corresponded to the modern Tanjore and Tiruchhirappalli districts.

its inland capital was Uraiya, a place famous for cotton trade. One of the main sources of wealth for Cholas was trade in cotton cloth.

Puhar identical with Kaveripattanam was the main port of Cholas and served as alternative capital of Cholas.

The earliest known Chola king was Elara who conquered Sri Lanka and ruled over it for nearly 50 years.

Their greatest king was Karikala (man with charred leg) who founded Puja (Kaveripattanam) and constructed 160 km of embankment along the Kaveri river with the help of 12,000 Sri Lankan slaves.

They maintained an efficient navy.

The Cholas were wiped out in the attack of Pallavas from the North.

The Pandyas

The Pandyas were first mentioned by Megasthenese, who said their Kingdom was famous for pearls.

The Pandya territory included modern districts of Trinvelvelli, Ramand and Madurai in Tamil Nadu. It had its capital at Madurai, situated on the banks of Vaigai river.

The Pandya king profited from trade with Roman Empire and sent emissaries to Roman emperor Augustus and Trojan.

The Pandyas find mention in the Ramayana and Mahabharata.

The earliest known Pandyan ruler was Mudukudumi.

The greatest Pandya king, Nendujiel, accused Kovalan of theft. As a result, the city of Madurai was laid under a curse by Kannagi (Kovalan’s wife).

Sangam Administration

The king was the centre of administration. He was called Ko. Mannam. Vendan Korravan or Iraivan.

Avai was the court of the crowned monarch.

The kingdom was divided into Mandalam Nadu (Province), Ur (town), Perum (Big village), Sinar (Small village), Pattinam (Name of coastal town), Puhar (Harbour areas), Cheri (Suburb of town), Revenue Administration: Karai (Land Tax), Irai (Tribute paid by feudatories and booty collected in war), Ulgu (Custom duties), Iravu (Extra demand or forced gift), Varyam (A well known unit of territory yielding tax), Varyar (Tax collector).

It is said that in Chola territory, watered by Kaveri, the space in which an elephant could lie down produced enough to feed seven persons. It implies the lands were very fertile with irrigation facilities.

Sangam Literature

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Venue</th>
<th>Under the Chairmanship of</th>
<th>Surviving Texts</th>
<th>Patron (Pandy Rules)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Sangam</td>
<td>Ten-Madurai (Old capital of Pandyas, engaged in sea)</td>
<td>Agastaya (Agatijyar)</td>
<td>x</td>
<td>89</td>
</tr>
<tr>
<td>2nd Sangam</td>
<td>Kapatu or Alvari (engaged in sea)</td>
<td>Agastaya (founder chairman); only Tolakapiyam (later chairman)</td>
<td>'Tolakapiyam'</td>
<td>59</td>
</tr>
<tr>
<td>3rd Sangam</td>
<td>North Madurai</td>
<td>Nakkar</td>
<td>Ettutogai, Pattu-pattu, Patinenkilakanakku etc.</td>
<td>49</td>
</tr>
</tbody>
</table>

Sangam was an assembly of Tamil poets held under royal patronage of Pandyyan kings in Madurai. According to tradition, the assembly lasted for 9,990 years and was attended by 8,598 poets and 197 Pandyyan kings.

The first Sangam was attended by Gods and legendary sages. All its works have perished.

Of the second Sangam, the only surviving work is Tolkappiyam, an early work on Tamil grammar written by Tolkappiyar.

Of the third Sangam, the mostly works are surviving. These are Ettutogai (i.e. 8 anthologies), Pattupattu (i.e. 10 idylls), Patinenkilakanakku (i.e. 18 didactical texts) etc.

Ettutogai and Pattupattu are called Melakanakku (18 major works) and narrative in form. Patinenkanakku is called Kilakanakku (18 minor works) and didactic in form.

Kural or Muppar, a part of Patinenkilakanakku and written by Tiruvalluvar is called 'The Bible of Tamil Land'. It is treatise on polity, ethics and social norms.

The Epics: Silappadikaram, Manimekalai, Sivaga Sindamani etc.

Silappadikaram (The story of the Anklet): Written by Ilango Adigal, it deals with the story of Kovalan and Madhavi of Kaveripattinam. It is called 'Iliyad of Tamil poetry'.

Manimekalai: Written by Sittalai Sattanar, it deals with the adventures of Manimekalai, the daughter born of Kovalan and Madhavi. It is a sequel of Silappadikaram and strongly tinged with Buddhism.

6. Gupta Period (319 AD-540 AD)

In 4th Century AD a new dynasty, the Guptas, arose in Magadha and established a large kingdom over the greater part of Northern India (though their empire was not as large as that of the Mauryas). Their rule lasted for more than 200 years.

This period is referred as the 'Classical Age' or 'Golden Age' of ancient India and was perhaps the most prosperous era in the Indian history.

According to epigraphic evidence, the founder of the dynasty was a person named Gupta. He used the simple title of Maharaja.

Gupta was succeeded by his son Chakotkach, who also inherited the title of Maharaja.

Chandragupta I: 319-334 AD

He was the first Gupta ruler to assume the title of Maharajadhiraja.

He strengthened his kingdom by matrimonial alliance with the powerful family of Lichchhavis who were the rulers of Mithila. His marriage to Lichchhavi princess Kumara Devi, brought him enormous power, resources and prestige. He took advantage of the situation and occupied the whole of fertile Gangetic Valley.

He started the Gupta Era in 319-20 AD.

Chandragupta I was able to establish his authority over Magadh, Prayaga and Saketa.

Original type of Gold Coins (Dinars): Chandragupta I-Kumara Devi type.

Samudragupta: 335-380 AD

Samudragupta was the greatest king of Gupta dynasty.

The most detailed and authentic record of his reign is preserved in the Prayaga Prasasti/Allahabad pillar inscription, composed by his court poet Harisesa.

According to Prayaga Prasasti, he was a great conqueror.

In the Gangetic Valley and Central India, Samudragupta annexed the territories
of the defeated monarchs, but in South India he remained content with victories alone and did not annex the territories of the vanquished rulers.

Samudragupta’s military campaigns justify description of him as the "Napoleon of India" by V.A. Smith.

The reference to his dominion over Java, Sumatra and Malayal islands in the sea shows that he had a navy.

When he died his mighty empire bordered that of the Kushan of Western province (modern Afghanistan and Pakistan) and Vakatakas of Deccan (modern Southern Maharashtra).

His greatest achievement was the political unification of most of India or Aryanavarta into a formidable power.

- **Titles:** Kavaraja i.e. king of poets (Prayaga Prasasti), Param Bhagavat (Nalanda copper plate), Ashwamedha-parakrama i.e. whose might was demonstrated by the horse-sacrifice (coin), Vikrami i.e. prowess (coin), Sarva-raj-ochchheta i.e. ruler of all kings (coin) etc. Note: Only Gupta ruler had the title of Sarva-raj-ochchheta.

Samudragupta was a Vaishnavite.

According to the Chinese writer Wang-Hiu-n-Tse, Meghavarna, king of Sri Lanka, sent an embassy to Samudragupta for his permission to build a monastery for Buddhist pilgrims at Bodh Gaya.

**Chandragupta II ‘Vikramaditya’; 380-414 AD**

According to Devi Chandragupta (Vishakhadatta), Samudragupta was succeeded by Ramagupta. It seems Ramagupta ruled for a very short period. He was the only Gupta ruler to issue copper coins.

Ramagupta, a coward and impotent king, agreed to surrender his queen Dhruvadevi to Saka invader. But the prince Chandragupta II, the younger brother of the king, resolved to go to the enemy's camp in the guise of the queen with a view to kill the hated enemy. Chandragupta II succeeded in killing the Saka ruler.

Chandragupta II also succeeded in killing Ramagupta, and not only seized his kingdom but also married his widow Dhruvadevi.

Chandragupta II extended the limits of empire by matrimonial alliances (with the Nagas and Vakatakas) and conquests (Western India). He married Kubermaga of Naga dynasty and married his daughter Prabhavatigupta with Vakataka prince Rudrasena II.

As a result of the overthrow of Saka rule in Western India, the Gupta empire extended upto Arabian sea. He issued silver coins in the memory of victory over Sakas. He was 'the first Gupta ruler to issue silver coins' and adopted the titles Sakari and Vikramaditya. Ujjain seems to have been made the second capital by Chandragupta II.

**Mehrauli** (near Kutub Minar, Delhi) Iron Pillar inscription says that the king defeated the confederacy of Vangas and Vahilkas (Bulgh).


It was in Chandragupta’s time that the Chinese pilgrim Fa-hien visited India.

**Titles:** Devagupta/Devaraja/Devasri, Parama Bhagavata, Narendra Chandra, Sinh Vikram etc.

**Original types of Gold coins (Dinaras):** Ashvarohi type, Chhatradhari type, Chakra—Vikram type etc.

**Kumaragupta I: 415-455 AD**

Chandragupta II was succeeded by his son Kumaragupta I.

Towards the end of his reign, the Gupta empire was threatened from the North by the Huns, who were temporarily checked by his son Skandagupta.

Kumaragupta was the worshipper of god Kartikeya.

He founded the Nalanda Mahavihara which developed into a great centre of learning.

**Titles:** Mahendraditya, Mahendra Sinh and Ashvamedha Mahendra (coins) etc.

**Original types of Gold coins (Dinaras):** Khadgadhari type, Gajaroshi type, Gajaroхи Sinh-nihanta type, Khang-nihanta i.e. rhinoceros-slayer type, Kartikeya type, Aparajit-mudra type etc.

**Skandagupta: 455-467 AD**

Skandagupta, the last great ruler of the Gupta dynasty.

During his reign the Gupta empire was invaded by the Huns. He succeeded in defeating the Huns. Success in repelling the Huns seems to have been celebrated by the assumption of the title ‘Vikramaditya’ (Bhitari Pillar Inscription).

The continuous attacks of the Huns weakened the empire and adversely affected its economy. The gold coinage of Skandagupta bears testimony to this.

The decline of the empire began soon after his death.

**Titles:** Vikramaditya and Kramaditya (coins), Param Bhagavat (coins), Shankrampa (Kahaum Pillar Inscription), Devaraja (Arya Manjushri Mula Kalpa) etc.

The Huns: 500-530 AD—Huns were primitive pastoralists owing herds of cattle and horses but knowing nothing of agriculture. They roamed in the Steppe in search of pasture and water. From the Oxus, the white Huns came into Afghanistan, destroyed the local power and, after establishing themselves there, began to pour into India in 458 AD. However, Skandagupta, who was at the time ruling in Northern India, checked them effectively. Whenever the Gupta empire’s resistance collapsed the Huns occupied the areas up to Central India and Malwa about 500 AD. There were two powerful Hun rulers Toramana and his son Mihirkula. They ruled during 500-530 AD. Mihirkula, a Shaivite, was a persecutor of Buddhism. In 530 AD, the Huns were uprooted by Yashodamana of Mandsaur.
The office of Sandhiravgrahika first appears under Samudragupta, whose amitya Harisena held this title.

Other important officials: Mahapratihari (the Chief usher of the Royal Palace), Dandapashika (Chief officer of Police Department), Vinaayasthitapak (Chief Officer of Religious affairs), Mahaphipati (Chief of Elephant corps), Mahashvapati (Chief of Cavalry) etc.

The important Bhaktis (i.e. provinces) of Gupta period were: Magadha, Bardhaman, Pundra Vardhana, Teerbhukti (Northen Bihar), Eastern Malwa, Western Malwa and Saurashtra.

Administrative Unit | Head
--- | ---
Bhukti/Bhoga (i.e. Province) | Uparika/Bhogapati
Vishaya (i.e. District) | Vishayapati/Ayukta
Vithika/Nagar (i.e. City) | Nagarpati/Purapala
Gram (i.e. village) | Gramika

The administration of the city was in the hand of a council (Paura), which consisted of the president of the city corporation, the chief representative of the guild of merchants, a representative of the artisans and the Chief Accountant.

Whereas under the Mauryas, the city committee was appointed by the Maurya government, under the Guptas, it was comprised of the local representatives.

Decentralisation of the administrative authority began during the Gupta period.

It was during the Gupta rule that the village headmen became more important than before.

The Gupta military organisation was feudal by character (though the emperor had a large standing army).

In the Gupta period for the first time civil and criminal law were clearly defined and demarcated.

Gupta kings depended primarily on land revenue, varying from 1/4 to 1/6 of the produce.

In Gupta period the army was to be fed by the people whenever it passed through the countryside. This tax was called Senabhakta.

The villagers were also subjected to forced labour called vishti for serving royal army and officials.

The Gupta period also experienced an excess of land grants. (Agarha grants, Devagrahara grants). Land grants included the transfer of royal rights over salt and mines, which were under the royal monopoly during the Maurya period.

Society

The varna system begins to get modified owing to the proliferation of castes. This was chiefly due to three factors: (i) A large number of foreigners had been assimilated into the Indian society primarily and were known as Kshatriyas. (ii) There was a large absorption of tribal people into Brahmanical society through land grants. The acculturated tribes were absorbed into the Shudra Varna. (iii) Guilds of craftsmen were often transformed into castes as a result of the decline of trade and urban centres and the localised character of crafts.

The social positions of the Shudras seems to have improved in this period. They were permitted to listen to the epics and Puranas and also worship a new god called Krishna.
> From around the 3rd century onwards the practice of untouchability appears to have intensified and their number registered a rise. Katyayana, a smriti writer of the Gupta period, was the first to use the expression *asparsya* to denote the untouchable.

> The position of women deteriorated further. Polygamy was common.

> Early marriages were advocated and often pre-puberty marriages took place.

> The first example of *Sati* appears in Gupta times in 510 AD in Eran in Madhya Pradesh. (*Bhanugupta’s Era Inscription* - 510 AD)

> Women were denied any right to property except for *Stridhana* in the form of jewellery and garments.

> Under the patronage of Gupta ruler, Vaishnavism became very popular.

> The gods were activated by their unions with the respective consorts. Thus, Lakshmi got her association with Vishnu and Parvati got her association with Shiva.

> This was the period of evolution of Vajrayanaism and Buddhist tantric cults.

> Idol worship became a common feature of Hinduism from Gupta period onwards.

**Economy**

> It is argued by many scholars that the state was the exclusive owner of land. The most decisive argument in favour of the exclusive state ownership of land is in the *Pahladpur Copper Plate inscription* of Buddhagupta.


> In the Gupta period land survey is evident from the *Poona plates of Prabhavati Gupta* and many other inscriptions.

> An officer named *Pustapala* maintained records of all land transactions in the district.

> The Guptas issued the largest number of gold coins in ancient India, but in gold content, Gupta coins are not as pure as Kushan.

> The Guptas also issued good number of silver coins for local exchange.

> The Gupta copper coins are very few as compared to those of Kushan, which show that use of money did not touch common people.

> Gupta period witnessed decline in long distance trade.

> Trade with the Roman Empire declined after 3rd century AD.

> Indian merchants began to rely more heavily on the South-East Asian trade.

> The ports of the East coast - *Tamralipti, Chantashala* and *Kandura* handled the North-Indian trade with South-East Asia; and those of the West coast - *Bharach, Chal, Kalyan* and *Cambay* traded with the Mediterranean and West Asia.

**Culture**

> The architecture of the Gupta period may be divided into three categories:

1. **Rock-cut Caves**: Ajanta and Ellora Groups (Maharashtra) and Bagh (MP).


3. **Stupas**: *Mirpur khas* (Sindh), *Dhammekh* (Saranath) and *Ratnagiri* (Orissa).

> The art of architecture attained great heights. By evolving the *Nagara Style* (*Shikhara style*), the Gupta art ushered in the history of Indian architecture. Shikhara Shrine, a Vaishnav symbol, one of the most characteristic features of temple architecture, found its fullest development during this period. The temple architecture, with its *garbha griha* (shrine room) in which the image of the god was placed, began with the Guptas.

> The fragmentary remains of *Dasavatara temple* of Deogarh is the example of the most ornate and beautifully composed Gupta temple building.

> The centres of the Gandhar sculptures declined and their places were taken by *Benaras, Patliputra* and *Mathura*.

> For the first time we get images of *Vishnu, Shiva* and other Gods.

> Among the best specimen of the images of Buddha is a seated *Buddha image of Sarnath*, which depicts the Buddha preaching the Dharma.

> Of the Brahmancial images perhaps the most impressive was the *Great Boar (Varah)* carved in relief at the entrance of a cave at Udayagiri.

> The painting of this period are found in *Bagh* (Dhar district, MP), and Ajanta (Aurangabad district, Maharashtra). The frescoes of the Ajanta caves are the masterpieces of the paintings of this age.

**Religious Literature**

A. **Hindu Texts**: Some of the old religious books (viz., *Vayu Purana, Vishnu Purana, Matsya Purana*; *Ramayana* and *Mahabharata*; *Manu Smriti*) were re-written. *Narada Smriti, Parashara Smriti, Bhrisapati Smriti* and *Katyayana Smriti* were written in this period.

B. **Buddhist Texts**: *Abhidharma Kosha* (*Dignaga*), *Visuddhimagga* (*Buddhaghosa*).

C. **Jain Texts**: *Nyayavartam* (*Siddhara*).

**Secular Literature**

Scientific Literature

Aryabhatta, Surya Siddhant (Aryabhata), Brahma Sutdanta (Brahma-gupta), Pancha Siddhantaka, Vritta Samhita, Vritta Jataka, Laghu Jataka (Vrthamathila), Ashanga Hridaya (medicine), Vagbhat, Vasantakam, Dhanvantri, Mahabhisarya, Laghubhaskarya (Bhasika), Harvanshada (Paddaka).

Note:
1. Manusmriti was translated in English under the title 'Institutes of Hindu Law' by William Jones.
2. Bhagabata, Shakuntalam (i.e., recognition of Shakuntala) was translated in English by William Jones.
3. Kalidas is known as 'the Shakespeare of India'.
4. Meshrakshtra (i.e., the clay cart), love story of a poor brahman Charudatta and virtuous courtesan Vasundara is notable for its realistic depiction of city life.
5. Kamadha is the earliest book on sex.
6. Brahmavasaswas was translated in Arabic under the title of 'Sind Hind'.

Gupta Period: Golden Age of Ancient India—Reality or Myth?

Arguments:

For: 1. There were political units; foreign rule was completely removed and peace and prosperity prevailed. 2. Enlightened character of government, i.e., taxes were light, punishment mild, etc. 3. Revival of Hinduism but there was tolerance of all other religions. 4. Use of Sanskrit developed and art and literature flourished during the period. 5. Great personages like Kalidasa, Amarsinha, Dhanavantri, Aryabhatta, Vardhamihira lived during this period.


7. Post-Gupta Period/Vardhana Dynasty (550 AD-647 AD)

Pushyabhuti/Vardhana Dynasty

The Pushyabhuti or Vardhana dynasty was founded at Thaneshwar (Kurukshetra district, Haryana) by Pushyabhuti probably towards the beginning of the 6th century. Pushyabhuti were the feudatories of the Guptas, but has assumed independence after the Hun invasions.

The first important ruler of the dynasty was Prabhakaravardhana (580-605 AD).

Prabhakaravardhana was succeeded by his eldest son Rajyavardhana (605-606 AD).

Rajyavardhana had to face problems from the day of his succession to the throne. Graharman, the Vakati ruler of Kannauj and husband of Rajyashri (sister of Rajyavardhana) was murdered by Deva Gupta (the ruler of Malwa) who in alliance with Shashanka (ruler of Gaud or North-Western Bengal) now occupied Kannauj and imprisoned Rajyashri.

Rajyavardhana, therefore, undertook a campaign against Deva Gupta and killed him but he was killed by Shashanka in 606 AD. In the meanwhile Rajyashri escaped into the forests of Central India.

Harshavardhana: 606-647 AD

After the killing of Rajyavardhana, his younger brother, Harshavardhana also known as Siladitya, ascended the Pushyabhuti throne in 606 AD and from this year started the Harsha Era.

After ascending the throne Harsha first rescued his unwed sister Rajyashri, from the Vindhy an forest, where she was going to throw herself into the fire.

Harsha drove out Shashanka from Kannauj who had occupied it after killing of Rayavardhana. He not only unified Kannauj with Thaneshwar but also made it his new capital, which made him the most powerful king of North India.

Harsha thereafter, proceeded towards the west against Shashanka with a view to avenge the death of his brother, Rayavardhana and brother-in-law, Graharman. Harsha was not successful in his first expedition against Gaud, but in his second expedition towards the west of his reign, after the death of Shashanka (died in 637 AD), he conquered Magadha and Shashanka’s empire.

Harshavardhana defeated Dhruvasena II, the Maithaka ruler of Vallabhi. However, Harsha, in order to secure the safety of the western boundary, reinstated him and gave his daughter in marriage to Dhruvasena II. Dhruvasena II accepted the position of a feudatory vassal. It was an important diplomatic achievement of Harsha.

The course of Harsha’s conquests suffered a serious setback on his expedition towards the Deccan. Pulkeshi II of Chalukya dynasty of Vatapi/Vadami inflicted a decisive defeat on him at the bank of Narmada. It was the only defeat of Harsha’s victorious life. The Chalukya records describe Harsha as the lord of whole of Northern country (Sakalottarapatheshvara).

The area under his control covered many parts of Northern India, Eastern Rajasthan and the Ganges Valley as far as Assam. His empire included territories of distant feudal kings too.

Harsha maintained diplomatic relations with China. In 641 AD, he sent an envoy to Tai-Tsong, the Tang Emperor of China. Three Chinese missions subsequently visited his court. Huen-Tsang, the celebrated Chinese pilgrim, visited India during Harsha’s reign. He spent about eight years (635-643 AD) in the dominions of Harsha.

Huen-Tsang mentions two most celebrated events of Harsha’s reign the assemblies at Kannauj and at Prayaga. The Kannauj assembly (643 AD) was held in the honour of Huen-Tsang and to popularise Mahayana sect of Buddhism. The Prayaga assembly was held in 643-644 AD. In Prayaga, Harshavardhana used to celebrate religious festivals at the end of every five years, at the confluence of the Ganges, the Yamuna and the Saraswati. It is said that this was the beginning of the Kumbha fair.

Harshavardhana was a Shaiva by faith, but he showed equal respect to other sects. Huen-Tsang portrays him as a liberal Buddhist (Mahayana) who also honoured gods of others sects.

According to Huen-Tsang, Nalanda University, meant for Buddhist monks, was maintained by the revenue from 100 villages which granted by Harshavardhana.
Indian History

Vatapi in about 642 AD and assumed the title *Vatapikonda* i.e. conqueror of Vatapi.

Pallavas were instrumental in spreading Indian culture in South-East Asia. Till the 8th century AD Pallava influence was predominant in Cambodia. The Pallava type of Shikhara is to be found in the temples of Java, Cambodia and Annam.

**Pallava Art**

Pallava began the Dravida style of temple architecture, which reached culmination under the rule of Cholas.

The development of temple architecture, particularly Dravida style, under the Pallavas can be seen in four stages:

<table>
<thead>
<tr>
<th>Mahendravarma Group</th>
<th>Mahendravarma I (600-630 AD)</th>
<th>Temple at Bhairavkona (North Arcot Distt.), Ananteshwar temple at Undavalli (Guntur Distt.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammala Group</td>
<td>Narsimhavarman I ‘Mammala’ (630-668 AD)</td>
<td>Mandapa temples and Ratha temples (Sapt Pagodas) at Mammalapuram (Mahabalipuram)</td>
</tr>
<tr>
<td>Rajasimha Group</td>
<td>Narsimhavarman II ‘Rajasimha’ (680-720 AD)</td>
<td>Kallashnatha and Vaikunth Perumal Temple at Kanchi, Shore temple at Mammalapuram</td>
</tr>
<tr>
<td>Aparajit Group</td>
<td>Nandivarma ‘Aparajit’ (879-897 AD)</td>
<td>Mukteshwar and Matangeshwar temple at Kanchi, Parshurameswar temple at Gudivalam</td>
</tr>
</tbody>
</table>

The Pallavas also contributed to the development of sculpture in South India. The Pallava sculpture is indebted largely to the Buddhist tradition. It is more monumental and linear in form, thus avoiding the typical ornamentation of the Deccan sculpture. The best example is the Descent of the Ganges or Arjuna’s Penance at Mammalapuram.

**Gupta ‘n’ Post-Gupta Dynasties and Their Founders**

<table>
<thead>
<tr>
<th>Dynasty</th>
<th>Founder</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Chalukyas of Vatapi</td>
<td>Jayasimha</td>
</tr>
<tr>
<td>The Gangas of Talakad</td>
<td>Konakanivarman</td>
</tr>
<tr>
<td>The Guptas of Magadha</td>
<td>Shri Gupta</td>
</tr>
<tr>
<td>The Kadambas of Vanavasi</td>
<td>Mayurasharman</td>
</tr>
<tr>
<td>The Kingdom of Gaud</td>
<td>Shashanka</td>
</tr>
<tr>
<td>The Kingdom of Thaneswar</td>
<td>Pushyabhiuti</td>
</tr>
<tr>
<td>The Later-Guptas of Magadha-Malwa</td>
<td>Krishnagupta</td>
</tr>
<tr>
<td>The Maitrikas of Vallabhi</td>
<td>Bhattarka</td>
</tr>
<tr>
<td>The Maukharis of Kannauj</td>
<td>Yajnavarman</td>
</tr>
<tr>
<td>The Pallavas of Kanchi</td>
<td>Simhavarman</td>
</tr>
<tr>
<td>The Pandyas of Madurai</td>
<td>Kodungon</td>
</tr>
<tr>
<td>The Vakatakas</td>
<td>Vindhyashakti</td>
</tr>
</tbody>
</table>
Medieval India

8. Early-Medieval Period (650-1206)

I. North India (Rajputa Period)

After Harshavardhana, the Rajputas emerged as a powerful force in Northern India and dominated the Indian political scene for nearly 500 years from the 7th century.

### 10 Important Rajputa Kingdoms

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Period</th>
<th>Capital</th>
<th>Founder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chauhan/Chahaman of Delhi-Ajmer</td>
<td>7th Cen.-1192</td>
<td>Delhi</td>
<td>Vasaudeva</td>
</tr>
<tr>
<td>Pratihara/Parihar of Kannauj</td>
<td>730-1036</td>
<td>Avanti, Kannauj</td>
<td>Nagabhata I</td>
</tr>
<tr>
<td>Pawar/Parmar of Malwa</td>
<td>790-1150</td>
<td>Ujjain, Dhar</td>
<td>Sevak II</td>
</tr>
<tr>
<td>Chaukulja/Solanki of Kathiyawar</td>
<td>942-1187</td>
<td>Anishuvada</td>
<td>Mularaja I</td>
</tr>
<tr>
<td>Rastrakuta of Malakhad</td>
<td>752-973</td>
<td>Malakhad/Manyakhetra</td>
<td>Dantidurg (Dant Varman II)</td>
</tr>
<tr>
<td>Chandela of Jejakabhati</td>
<td>831-1202</td>
<td>Khajuraho, Mahoba, Kalinjar</td>
<td>Nannuk</td>
</tr>
<tr>
<td>Kalchuri/Haitha of Chedi</td>
<td>850-1211</td>
<td>Tripuri</td>
<td>Kokkala I</td>
</tr>
<tr>
<td>Gadhawal/Rathor of Kannauj</td>
<td>1090-1194</td>
<td>Kannauj</td>
<td>Chandradeva</td>
</tr>
<tr>
<td>Tomar of Surrounding areas of Haryana and Delhi</td>
<td>—</td>
<td>Dhillika</td>
<td>—</td>
</tr>
<tr>
<td>Guhilota/Sisodiya of Mewar</td>
<td>8th Cen.-1930</td>
<td>Chittor</td>
<td>Bappa Rawal, Hammir I</td>
</tr>
</tbody>
</table>

### Tripartite Struggle

- Towards the close of the 8th century AD, there were three great powers in India: the Palas in the East, the Gurjar-Partiharas in the North and the Rashtrakutas in the Deccan.
- The tripartite struggle for the supremacy among the Palas, Partiharas and the Rashtrakutas was the important event of these centuries.
- The main cause for this struggle was the desire to possess the city of Kannauj (Kannauj Distt., UP) which was then a symbol of sovereignty.

#### The Palas: 750-1150

- **Capital:** Muddagiri/Munger (Bihar)
- **Gopala** founded the Pala empire in 750 AD.
- His son Dharmara (770-810) succeeded him. Dharmara revived **Nalanda University**.
- He founded the **Vikramshila University**.
- The Pala dynasty was succeeded by the **Sen dynasty** of Bengal. **Jayadeva** (‘Gita Gobinda’) was the great court poet of **Lukkaman Sen**.

#### The Pratiharas: 730-1036

- The Pratiharas are also called Gurjara-Pratiharas probably because they originated from Gujrat or South-West Rajastan.
- **Bhoja/Mihir Bhoja (836-882)** was the greatest ruler of this dynasty.
- He was a devotee of Vishnu and adopted the title of ‘Adivarah’.

### The Rashtrakutas: 752-973

- **Dantidurg (752-756)**, who fixed his capital at Malkhand/Malkhed (Gulbarga distt., Karnata), founded the Kingdom.
- The greatest Rashtrakuta rulers were **Govinda III (793-814)** and **Amoghvarsha (814-878)**. Amoghvarsha ruled for 64 years but by temperament he preferred pursuits of religion and literature to war. He was himself an author and wrote **Kavirajamarga**, the earliest Kannada book on Poetics.
- The famous rock-cut **temple of Kailash (Shiva)** at **Ellora** was built by one of the Rashtrakuta kings **Krishna I**.

#### Other Important Rulers

- **Prithviraj Chauhan (1178-92)**: He ruled over Delhi and Agra and fought two important battles, viz. **First Battle of Tarain** was fought in 1191 between the forces of Prithviraj Chauhan and Mohammad Ghori in which the latter was defeated. **Second Battle of Tarain** was fought in 1192 when Mohammad Ghori again invaded India in which Prithviraj Chauhan was defeated and captured and later on slain. The Kingdom of Delhi fell to Mohammad Ghori.
- The Battle of Tarain had great significance in the political scene as it led to the establishment of Muslim rule over North India and, subsequently, in the South for several centuries.
- **Jai Chand Gadhawal/Rathor (1169-94)**: He was the last Rajput King who was also defeated and killed by Mohammad Ghori in the **Battle of Chandrawar** (1194).
- **Rana Kumbha, the Sisodiya ruler of Mewar (1433-68)**: Rana Kumbha was the famous ruler of Mewar. He defeated Mohammad Khilji and erected the Tower of victory (**Vijay Stambha** in Chittor). His successors **Rana Sangram Singh (Rana Sanga)** and **Rana Pratap** were also great kings of Mewar state.

#### Salient features of the Rajputa Kingdoms:

- The country remained free of invasions but lost foreign contact. The caste system was rigid. The Rajputs were proud, warrior and people but hospitable. In the field of culture many great fortresses and temples were built by them such as **Khajuraho (MP)**, **Lingaraja temple** (Bhujaneshwar, Orissa), **Sun temple** (Konarka, Orissa), the **Jagannath temple** (Puri), **Dilwara temple** (Mount Abu).

### Causes of the Decline of Rajputas

- Lack of unity and foresightfulness, caste the system, and defective military organization were some of the causes for the downfall of the Rajputas.

II. South India (Cholas and Others)

#### The Chola Empire: 850-1279AD

- **Capital:** Tanjore, Gangaikondacholapuram
- The founder of the Chola dynasty was **Vijayalaya**, who was at first a feudatory of the Pallavas. He captured Tanjore in 850 AD.
- The greatest Chola rulers were **Rajaraja** (985-1014AD) and his son **Rajendra I** (1014-1044AD).
- **Rajaraja** built **Vrihadeshwar/Rajarajeshwar** temple (attributed to Shiva) at Tanjore.
taking away the wealth from India. In 1025 he attacked and raided the most celebrated Hindu temple of Somnath that lies on the coast in the extreme south of Kathiawar. The temple was destroyed in 1026 AD.

Second Turk Invasion-Mohammad Ghori's Invasion (1175-1206 AD): Mohammed Ghori invaded India and laid the foundation of the Muslim dominion in India. He may be considered the 'founder of Muslim rule' in India.

Reasons for the Success of Turks in India: 1. Rajputas lacked unity and organisation and were divided by rivalries. 2. There was no central government. 3. The Rajput Kingdoms were small and scattered. 4. The Turks were better organised and took advantage of the lack of mutual co-operation among the Rajputas.

The Delhi Sultanate: 1206-1526 AD

Mohammed Ghori's conquests became the nucleus of a new political entity in India-the Delhi Sultanate. This period can be divided into 5 distinct periods viz. 1. The Slave Dynasty (1206-90) 2. The Khalji Dynasty (1290-1320) 3. The Tughlaq Dynasty (1320-1414) 4. The Sayyid Dynasty (1414-51) 5. The Lodhi Dynasty (1451-1526).

The Slave Dynasty: 1206-90 AD

Qutubuddin Aibak: 1206-10

A Turkish slave by origin, he was purchased by Mohammad Ghori who later made him his Governor. After the death of Ghori, Aibak became the master of Hindustan and founded the Slave Dynasty in 1206. For his generosity, he was given the title of Lakh Bakhsh (giver of Laks).

He died in 1210 while playing Chaugan or Polo.

He constructed two mosques—Qwat-ul-Islam at Delhi and Adhai din ka Jhonpra at Ajmer. He also began the constriction of Qutub Minar, in the honour of famous Sufi Saint Khwaja Qutubuddin Bakhtiyar Kaki.

Aibak was a great patron of learning and patronised writers like Hasan-un-Nizami, author of 'Taj-ul-Massir' and Fakhruddin, author of 'Tarikh-i-Mubarak Shahi'.

Shamsuddin Iltutmish: 1211-36

He was a slave of Qutubuddin Aibak and occupied the throne of Delhi in 1211 after deposing Aram Bakhsh.

He was a very capable ruler and is regarded as the 'real founder of the Delhi Sultanate'. He made Delhi the capital in place of Lahore.

He saved Delhi Sultanate from the wrath of Chenguiz Khan, the Mongol leader, by refusing shelter to Kvarizm Shah, whom Chenguiz was chasing.

He introduced the silver coin (tanka) and the copper coin (jital). He organised the Iqta System and introduced reforms in civil administration and army, which was now centrally paid and recruited.

He set up an official nobility of slaves known as Chahalgani/Chalisa (group of 40).

He completed the construction of Qutub Minar which was started by Aibak.

He patronised Minhaj-us-Siraj, author of 'Tabaqat-i-Nasiri'.
Lucent's General Knowledge

Indian History

Ruknuddin : 1236
- He was the son of Ilutmish and was crowned by his mother, Shah Turkan, after death of Ilutmish. He was deposed by Razia, daughter of Ilutmish when he was out of capital to curb a rebellion in Avadh against him.

Razia Sultan : 1236-40
- Though Ilutmish had nominated his daughter Razia as the successor, the nobles placed Ruknuddin Firuz on the throne. However, Razia got rid of Ruknuddin and ascended the throne.
- She was the first and only Muslim lady who ever ruled India.
- She was popular among the people but was not acceptable to the nobles and theologians. She further offended the nobles by her preference for an Abyssinian slave Yakut.
- Soon after her accession, the governors of Multan, Badaun, Hansi and Lahore openly revolted against her. There was a serious rebellion in Bhatinda. Altunia, governor of Bhatinda refused to accept her sovereignty of Razia. Razia accompanied by Yakut marched against Altunia.
- However, Altunia got Yakut murdered and imprisoned Razia. Subsequently, Razia married Altunia and both of them marched towards Delhi.
- In 1240 AD, Razia became the victim of a conspiracy and was assassinated near Kaithal (Haryana).

Bahram Shah : 1240-42
- After Razia, Ilutmish's third son Bahram Shah was put on the throne by the powerful turkish council Chalisa.
- He was considered only as de jure ruler, while Naib-e-mamlakat (the regent) was the de facto ruler.
- Bahram Shah lost his life after his failed attempt to assert his authority once on the throne.

Masud Shah : 1242-46
- He was the son of Ruknuddin but was deposed after Balban and Nasiruddin Mahamud's Mother, Malika-e-Jahan, conspired against him and established Nasiruddin Mahamud as the new Sultan.

Nasiruddin Mahamud : 1246-66
- He was the son of Ilutmish and was known as the Darvesi King as he was very pious and noble. He died in 1266.

Ghiyasuddin Balban : 1266-87
- Balban ascended the throne in 1266.
- He broke the power of Chalisa and restored the prestige of the crown. That was his greatest contribution towards the stability of the Sultanate.
- To keep himself well-informed Balban appointed spies.
- He created a strong centralised army to deal with internal disturbances and to check Mongols who were posing a serious danger to Delhi Sultanate.
- He established the military department Diwan-i-Arz.
- The Persian court model influenced Balban’s conception of Kingship. He took up the title of Zil-i-Ilahi (Shadow of God).

Kaigbad : 1287-90
- A grandson of Balban was seated on the throne by Fakruddin, the Kotwal of Delhi who assumed high political authority during the last days of Balban. But Kaigbad was killed by the Khilji family, which saw the end of Slave dynasty and beginning of Khilji dynasty at Delhi throne.

The Khilji Dynasty : 1290-1320 AD

Jalaluddin Khilji : 1290-96
- Jalaluddin Khilji founded the Khilji dynasty.

Alauddin Khilji : 1296-1316
- He was a nephew and son-in-law of Jalaluddin Khilji. Alauddin Khilji killed him and succeeded the throne in 1296.
- He was the first Turkish Sultan of Delhi who separated religion from politics. He proclaimed ‘Kingship knows no Kinship’.

Alauddin's Imperialism
- Alauddin annexed Gujarat (1298), Ranthambhor (1301), Mewar (1303), Malwa (1305), Jalore (1311). In Deccan, Alauddin's army led by Malik Katur defeated Ram Chandra (Yadava ruler of Devagiri), Prajnapradega (Kakatiya ruler of Warangal), Vir Ballal III (Hoyasala ruler of Dwaramsudra) and Vir Pandya (Pandyu ruler of Madurai).

Administrative Reforms
- In order to avoid the problems created by the nobles, Alauddin issued 4 ordinances. The lst ordinanceaimed at the confiscation of the religious endowments and free grants of lands. By the 2nd ordinance Alauddin reorganised the spy system. The 3rd ordinance prohibited the use of wine. The 4th ordinance issued by Alauddin laid down that nobles should not have social gathering and they should not inter-marry without his permission.
- He introduced the system of Dagh (the branding of horse) and Chehra (descriptive roll of soldiers).
- Alauddin ordered that all land was to be measured and then the share of state was to be fixed.
- The post of special officer called Mustakharaj was created for the purpose of collection of revenue.
- The peasants had to pay the produce as land revenue.
- Alauddin sought to fix cost of all commodities. For the purpose he set up three markets at Delhi: one market for food grains, the second for costly cloth and third for horses, slaves and cattle. Each market was under the control of a high
Mubarak Khan: 1316-20
- After the death of Kafur, Mubarak Khan was freed from prison and worked as a regent for Shihabuddin. He captured the throne at the first opportunity and ruled for at least four years. When he wished to enjoy a better lifestyle, he awarded his lover, Mubarak Hassan, authority over army and palace guards. Mubarak Hassan assumed the title of Khusraw Khan, and within months, Khusraw killed Mubarak Khan and assumed the title of Nasiruddin in mid-1320.

Khusraw Khan: 1320
- Khusraw Khan was killed by Ghazi Malik, governor of Dipalpur, who tried to oppose a rebellion by Ghazi Malik and his son Fakhruddin. This brought an end to the Khatiji dynasty and established the Tughlaq dynasty on the throne of Delhi.

The Tughlaq Dynasty: 1320-1414 AD

Ghiyasuddin Tughlaq: 1320-25
- Khusraw Khan, the last king of the Khatiji dynasty, was killed by Ghazi Malik. Ghazi Malik ascended the throne and assumed the title of Ghiyasuddin Tughlaq.
- He died in an accident and his son Jauna (Ulugh Khan) succeeded him under the title Mohammad-bin-Tughlaq.

Mohammad-bin Tughlaq: 1325-51
- Prince Jauna, son of Ghiyasuddin Tughlaq, ascended the throne in 1325.
- He tried to introduce many administrative reforms. He had five ambitious projects which he completed.

Firoz Shah Tughlaq: 1351-88
- He was a cousin of Mohammad-bin-Tughlaq. After his death, the nobles and theologians of the court selected Firoz Shah as the next Sultan.
- After his accession, Firoz Tughlaq was faced with the problem of preventing the imminent break-up of the Delhi Sultanate. He adopted the policy of trying to appease the nobility, army, and theologians and of asserting his authority over only such areas, which could be easily administered from the centre. He therefore made no attempt to re-assert his authority over South India and Deccan.
- He decreed that whenever a noble died, his son should be allowed to succeed to his position including his Iqta if he had no sons, his son-in-law, and in his absence, his slave was to succeed.

1. Taxation in the Doab (1326): The Sultan made an ill-advised financial experiment in the Doab between the Ganges and Yamuna. He not only increased the rate of taxation but also revived and created some additional Abwabs or cesses. Although the share of the state remained as in time of Alauddin, it was fixed arbitrary not on the basis of actual produce. Prices were also fixed artificially for covering the produce into money. It is said that the increase was twenty-fold and to this were added Ghari or house tax and the Charahi or pasture tax. The Sultan created a new department of Agriculture called Diwan-i-Koohi. The
the new Sultan. He was the first of the Sayyid dynasty which ruled over Delhi and surrounding districts.

- Mubarak Shah (1421-34): He succeeded Khizr at the throne after his successful expeditions against Mewatis, Katehars and the Gangetic Doab area. He was killed by the nobles in his own court.

- Muhammad Shah (1434-43): The nobles put Muhammad Shah on the throne, but he could not survive the in-fighting among the nobles in the court. He was authorised to rule only a meagre area around 30 miles, and rest of the Sultanate was ruled by nobles.

- Alam Shah (1443-51): The last Sayyid king descended in favour ofBahol Lodhi and retired. Thus began the Lodhi dynasty which was confined to Delhi and a few surrounding areas.

The Lodhi Dynasty: 1451-1526 AD

Bahol Lodhi: 1451-88

- Bahol Lodhi was one of the Afghan Sardars. He established himself in Punjab after the invasion of Timur.

- He founded the Lodhi dynasty.

Sikandar Lodhi: 1489-1517

- Sikandar Lodhi was the son of Bahol Lodhi who conquered Bihar and Western Bengal.

- He shifted his capital from Delhi to Agra, a city founded by him.

- Sikandar was a fanatical Muslim and broke the sacred images of the Jwalamukhi Temple at Nagar Kot and ordered the temples of Mathura to be destroyed.

- He took a keen interest in the development of agriculture. He introduced the Gaz-i-Sikandari (Sikandar’s yard) of 32 digits for measuring cultivated fields.

Ibrahim Lodhi: 1517-26

- He was the last king of the Lodhi dynasty and the last Sultan of Delhi.

- He was the son of Sikandar Lodhi.

- The Afghan nobility was brave and freedom-loving people but it was because of its fissiparous and individualistic tendencies that the Afghan monarchy was weakened. Moreover, Ibrahim Lodhi asserted the absolute power of the Sultan. As a result, some of the nobles turned against him.

- At last Daulat Khan Lodhi, the governor of Punjab invited Babur to overthrow Ibrahim Lodhi. Babur accepted the offer and inflicted a crushing defeat on Ibrahim Lodhi in the first battle of Panipat in 1526. Ibrahim Lodhi was killed in the battle Normal and with him ended the Delhi Sultanate.

Causes of Decline of Delhi Sultanate

The main causes were: 1. Despotism and military type of government which did not have the confidence of the people 2. Degeneration of Delhi Sultans (esp. the wild projects of Muhammad-bin-Tughlaq). Incompetence of Firoz Tughlaq 3. War of succession as there was no fixed law for succession 4. Greed and incompetency of the nobles 5. Defective military organisation 6. Vastness of empire and poor means of communication 7. Financial instability 8. Number of slaves increased to 1,80,000 in Firoz Tughlaq’s time which was a burden on the treasury 9. Invasion of Timur.
Mongolian Invasions During Delhi Sultanate

<table>
<thead>
<tr>
<th>Regime of Sultan</th>
<th>Year</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ilutmish</td>
<td>1221 AD</td>
<td>Chengiz Khan came up to the bank of Indus.</td>
</tr>
<tr>
<td>Masud</td>
<td>1241 AD</td>
<td>Tair Bahadur entered Punjab. Towards the end of the 1245 AD, Balban fought back the Mongolians and recovered Multan which was captured by the Mongols.</td>
</tr>
<tr>
<td>Balban</td>
<td>1279 AD</td>
<td>Prince Muhammad of Multan, Bughra Khan from Samarkand and Malik Mubarak of Delhi combined together to defeat the Mongols.</td>
</tr>
<tr>
<td>Balban</td>
<td>1286 AD</td>
<td>Tamar invaded India. Prince Muhammad was killed in the battle, and was decorated with the Khan-i-Shahid title.</td>
</tr>
<tr>
<td>Jalaluddin Khilji</td>
<td>1292 AD</td>
<td>Abdullah came to the Northern part of India. About 4000 Mongols got converted to Islam and became the famous 'New Musalmans'.</td>
</tr>
<tr>
<td>Alauddin Khilji</td>
<td>1296-99 AD</td>
<td>Zafar Khan defeated the Mongols at Jalandhar and Sisaid, their leader was taken prisoner. Zafar Khan was killed in the battle.</td>
</tr>
<tr>
<td>Alauddin Khilji</td>
<td>1304 AD</td>
<td>Ali Beg and Tash were defeated.</td>
</tr>
<tr>
<td>Muhammad-bin-Tughlaq</td>
<td>1329 AD</td>
<td>Tarmashirin Khan was able to reach the outskirts of Delhi but was defeated by Muhammad-bin-Tughlaq.</td>
</tr>
</tbody>
</table>

Administrative under Delhi Sultanate

- The Turkish Sultan in India declared themselves Lieutenant of the faithful i.e. of the Abbasid caliphate of Baghdad and included his name in Khutba, it did not mean that the caliph became the legal ruler. The caliph had only a moral position.

- Political, legal and military authority was vested in the Sultan. He was responsible for administration and was also the commander-in-chief of the military forces.

- No clear law of succession developed among Muslim rulers. Thus military strength was the main factor in succession to the throne.

Central Administration

<table>
<thead>
<tr>
<th>Department</th>
<th>Head (Founded by)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diwan-i-Wizarat (Department of Finance)</td>
<td>Wazir</td>
</tr>
<tr>
<td>Diwan-i-Ariz (Military Department)</td>
<td>Ariz-i-Mumalik</td>
</tr>
<tr>
<td>Diwan-i-Hurra (Department of Correspondence)</td>
<td>Dabir-i-Mumalik</td>
</tr>
<tr>
<td>Diwan-i-Risalat (Department of Appeals)</td>
<td>Dabir-i-Mulq</td>
</tr>
<tr>
<td>Diwan-i-Mustakharaaj (Department of Arrears) (Founded by Alauddin Khilji)</td>
<td></td>
</tr>
<tr>
<td>Diwan-i-Riasat (Department of Commerce)</td>
<td>Rais-i-Mumalik (Founded by Alauddin Khilji)</td>
</tr>
<tr>
<td>Diwan-i-Kohi (Department of Agriculture)</td>
<td></td>
</tr>
<tr>
<td>Diwan-i-Bandgan (Department of Slaves) (Founded by Firoz Tughlaq)</td>
<td></td>
</tr>
<tr>
<td>Diwan-i-Khairat (Department of Charity) (Founded by Firoz Tughlaq)</td>
<td></td>
</tr>
<tr>
<td>Diwan-i-Dastgah (Department of Pensions) (Founded by Firoz Tughlaq)</td>
<td></td>
</tr>
</tbody>
</table>

Art and Architecture Under Delhi Sultanate

- The new features brought by the Turkish conquerors were: 1. the dome, 2. the lofty towers, 3. the true arch unsupported by beam, 4. the vault.

- They also brought with them an expert knowledge of the use of concrete and mortar, which had hitherto been little used in India.

- The Adhai-din ka Jhonpra at Ajmer has a beautiful prayer hall, an exquisitely carved Mehrab of white marble and a decorative arch screen.

- The first example of true or voussoired arch is said to be the tomb of Ghiyasuddin Balban in Mehrauli (Delhi).

- In the Khilji period the usage of voussoired arch and dome was established and for all. Famous examples is the tomb of Hazrat Nizamuddin Aulia at Delhi.

- The Tughlaq buildings show stark simplicity and sobriety, probably indicating less financial resources as well as puritanical tests. Sloping walls and a dark appearance characterise the buildings. Some notable Tughlaq monuments were the fort of Tughlaqabad, the tomb of Ghiyasuddin Tughlaq which marked a new phase in Indo-Islamic architecture by serving as a model for later tombs and the fort of Adilabad.

- The Sayyid period was too short to allow construction of elaborate buildings.

- The construction of double domes was the main feature of Lodhi Architecture. One building worth noting is the Moth ki Masjid erected by the prime minister of Sikandar Lodhi.

Literature of Delhi Sultanate

<table>
<thead>
<tr>
<th>Book</th>
<th>Author</th>
<th>Historical Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tahqiq-i-Hind</td>
<td>Alberuni</td>
<td>Alberuni was an Arabian scholar who wrote about the Slave dynasty</td>
</tr>
<tr>
<td>Tabaqat-i-Nasiri</td>
<td>Minhaj-us-Siraj</td>
<td>Gives an account of Ilutmish's reign</td>
</tr>
<tr>
<td>Laila-Majnu</td>
<td>Amir Khusrau</td>
<td>Court poet of Alauddin Khilji</td>
</tr>
<tr>
<td>Khazain-ul-Futuh</td>
<td>Amir Khusrau</td>
<td>Describes conquests of Alauddin Khilji</td>
</tr>
<tr>
<td>Tughlaq-Nama</td>
<td>Amir Khusrau</td>
<td>Gives account of Ghiyasuddin's reign</td>
</tr>
<tr>
<td>Nuh-Siphir</td>
<td>Amir Khusrau</td>
<td>Poetic description of Alauddin Khilji</td>
</tr>
<tr>
<td>Fatwa-i-Jahandari</td>
<td>Ziauddin Barani</td>
<td>Gives an account of the Tughlaq dynasty</td>
</tr>
<tr>
<td>Tarikha-i-Firoz Shahi</td>
<td>Ziauddin Barani</td>
<td>Gives an account of Firoz Shah's reign</td>
</tr>
<tr>
<td>Fatwah-i-Firoz Shahi</td>
<td>Firoz Shah</td>
<td>Gives an account of his reign</td>
</tr>
<tr>
<td>Kitab-fi-Tahqiq</td>
<td>Alberuni</td>
<td>About Indian sciences</td>
</tr>
<tr>
<td>Qanun-e-Masudi</td>
<td>Alberuni</td>
<td>About astronomy</td>
</tr>
<tr>
<td>Jawahir-fil-Jawahir</td>
<td>Alberuni</td>
<td>About mineralogy</td>
</tr>
<tr>
<td>Qamas</td>
<td>Firozabadi</td>
<td>Arabic words dictionary</td>
</tr>
</tbody>
</table>
VIJAYANAGAR EMPIRE: 1336-1565 AD

Vijayanagar kingdom and the city were founded by Harihar and Bukka (sons of Sangama) who were feudatories of Kakatiyas and later became minister in the court of Kampli.

Vijayanagar kingdom lay in the Deccan, to the south of the Bahmani kingdom.

Vijayanagar period can be divided into four distinct dynasties viz. Sangama, Saluva, Tuluva and Aravidu.

The Sangama Dynasty: 1336-1485 AD


Bukka I (1356-79): Bukka I strengthened the city of Vijayanagar and renamed it Vijayanagar. He restored harmony between the warring Vaishnavas and the Jains. The Rais of Malabar, Ceylon and other countries kept ambassadors at his court.

Harihar II (1379-1404): Bukka I was succeeded by his son Harihar II.

Deva Raya I (1406-22): He was the third son of Harihar II. His greatest achievement was his irrigation works where a dam was built across the Tungabhadra, with canals leading to the city. Nicolao do Conti visited Vijayanagar during his reign.

Deva Raya II (1423-46): He was the grandson of Deva Raya I. Ahmad Shah I of Bahamani invaded Vijayanagar and exacted a war indemnity. Deva Raya II began the practice of employing Muslim cavalrymen and archers in the army.

The Saluva Dynasty: 1486-1505 AD

Saluva Narasimha (1486-91): He founded the Saluva dynasty.

Tirumal (1491) and Immadi Narasimha (1491-1505): Both were minors during the regency of Narsa Nayaka. Vosco Da Gama landed in Calicut during his reign in 1498.

The Tuluva Dynasty: 1505-70 AD

Vira Narasimha (1505-09): Vir Narasimha, the son of Narsa Nayaka, became the king after the assassination of Immadi Narasimha, the last Saluva ruler.

Krishna Deva Raya: 1509-29 AD

Saluva Timma, the chief minister of Vira Narasimha, placed Krishna Deva Raya, the brother of Vira Narasimha, on the throne.

Krishna Deva Raya maintained friendly relations with Albuquerqu, the Portuguese governor, whose ambassador Friar Luis resided in Vijayanagar. He won Orissa (Gajapti kingdom) for Vijayanagar and Vijayanagar emerged strongest during his reign.

He built the Vijaya Mahal (House of Victory), the Hazara Rama temple and the Vithal Swami temple.

He took the titles of Yavanaraja Sthapnacharya (restorer of the Yavana kingdom i.e. Bidar kingdom) and Abhinava Bhoja. He is also known as Andhra Bhoj and Andhra Pitamaha.

He was a gifted scholar in both Telugu and Sanskrit, of which only two works are extant: the Telugu work on polity 'Amuktaamayada' and Sanskrit drama 'Jambavati Kalyanam'.


Krishna Deva Raya, a contemporary of Babur, was the most illustrious ruler of the Deccan.

Duarte Barbosa and Domingo Paes, Portuguese travellers, visited Vijaya-nagar during the time of Krishna Deva Raya.

Achyuta Deva Raya (1529-42): Krishna Deva Raya nominated his brother Achyuta Deva Raya as the successor. During his reign, Farnaun Nuni, a Portuguese horse trader, visited Vijayanagar.

Venkata I (1542) and Sadashiva Raya (1543-76): Real power was exercised by Rama Raja/Raya and his two brothers. The five successor states of the Bahamani empire were divided through Rama Raja’s diplomacy. The Battle of Talikota (also called the Battle of Rakshasa-Tangadi) was fought on 23 Jan., 1565. Rama Raja was taken prisoner and executed by Hussain Nizam Shah I.
The city of Vijayanagar, which was the pride of medieval world, was mercilessly destroyed. Caesar Frederick, a Portuguese traveller, visited Vijayanagar in 1567-68 during the reign of Sadashiva Raya.

**The Aravidu Dynasty: 1570-1650 AD**
- Tirumala Raya, the brother of Rama Raya, ruled in the name of Sadashiva Raya. On his failure to repopulate Vijayanagar, he shifted the capital to Penugonda. He divided his empire into three practically linguistic sections.
- The empire slowly shrunk and the Aravidu dynasty ended in 1646.

**Administration**
- **Nayyarkar System** was the special feature of provincial administration.
  - Administrative unit: Mandal (i.e. Province), Nedu (i.e. District), Gram (i.e. Village)
  - Head: Mandal Swaraj, Nedu Prabha, Gauda
- **Aayngar System** was the special feature of village administration. A body of 12 functionaries, known as ayyangars, conducted village affairs.
- They were granted tax free lands 'Manyams' which they used to enjoy in perpetuity.
- The Vijayanagar rulers issued gold coins called Varahas or Pagodas. The Peta was half a Varaha. The Fanam was one-tenth of Peta. All were of gold mixed with alloy. The Tanka was a silver coin. The Jital was a copper coin.

**Society**
- It was the only empire in Medieval India which employed women in the state services. Women even went to battles. Also, it was only state that promoted widow remarriage. Status of women improved during this time.

**Architecture**
- The Vijayanagar rulers produced a new style of architecture called as *Provida* style. The large number and prominence of pillars and piers are some of the distinct features. Horse was the most common animal on the pillars.
- Another important features were the *Mandapa* or open pavilion with a raised platform, meant for seating deities and *Amman Shrine*.
- Important temples were *Vithalswami* and *Hazar Rama Temple* at Hampi, *Tadapatri* and *Parvati temples* at Chidambaram and *Varadraja* and *Ekambaram temples* at Kanchipuram.
- The Vijayanagar rulers started the practice of inscribing the stories of the Ramayana and the Mahabharata on the walls of the various temples. Vithalswami and Hazara Rama Temple are examples of this type of wall inscription.

**Bahmani Kingdom**
- **Alaiddin Hasan Bahman Shah (1347-58)**: He was also known as *Hasan Gangu*. He founded the Bahmani kingdom with its capital at Gulbarga (First capital).
- **Tajuddin Firoz Shah (1397-1422)**: The greatest among them all. He was determined to make Deccan the cultural centre in India. He inducted large number of Hindus in the administration on large scale. He paid much attention to the ports of his kingdom, Chaul and Dabhol which attracted trade ships from Persian Gulf and Red Sea.

**Ahmad Shah Wali (1422-35)**: Transferred the capital from Gulbarga to Bidar.

**Break up of Bahmani Empire into 5 Kingdoms**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Founder</th>
<th>Dynasty</th>
<th>Annexation (by)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deccan</td>
<td>1484</td>
<td>Fatullah Imad Shah</td>
<td>1574 (Ahmadnagar)</td>
</tr>
<tr>
<td>Bidar</td>
<td>1489</td>
<td>Yusuf Adil Shah</td>
<td>1486 (Aurangzeb)</td>
</tr>
<tr>
<td>Bijapur</td>
<td>1490</td>
<td>Malik Ahmad</td>
<td>1633 (Shahjahans)</td>
</tr>
<tr>
<td>Ahmadnagar</td>
<td>1518</td>
<td>Quli Qutub Shah</td>
<td>1687 (Aurangzeb)</td>
</tr>
<tr>
<td>Golconda</td>
<td>1526-27</td>
<td>Amir Ali Barid</td>
<td>1610 (Bijapur)</td>
</tr>
</tbody>
</table>

**Ibrahim Adil Shah**, the greatest ruler of Adil Shahi dynasty, introduced *Dakhini* in place of Persian as court language.

- **Gol Gumbaz** was built by *Muhammad Adil Shah*, it is famous for the so-called 'Whispering Gallery'.
- **Quli Qutub Shah** built the famous *Golconda Fort*.
- *Muhammad Quli Qutub Shah* was the greatest ruler of Qutub Shahi dynasty and it was he who founded the city of *Hyderabad* originally known as Bhagyanagar after the name of the Sultan's favourite, Bhagyaswami and he also built the famous *Charminar*.

**Other Provincial Kingdoms**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Capital</th>
<th>Founder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jaunpur</td>
<td>Jaunpur</td>
<td>Malik Sarwar (Khwaja Jaha)</td>
</tr>
<tr>
<td>Malwa</td>
<td>Dhar, Mandu</td>
<td>Dilawar Khan Chori</td>
</tr>
<tr>
<td>Gujarat</td>
<td>Ahmadabad</td>
<td>Ahmad Jafar Khan, Muzaffar shah</td>
</tr>
<tr>
<td>Bengal</td>
<td>Lakhnauti, Pandua, Ekdala</td>
<td>Shamsuddin Ilyas Shah</td>
</tr>
<tr>
<td>Khandesh</td>
<td>Budhanpur and Asirnag</td>
<td>Malik Raza Faruqui</td>
</tr>
</tbody>
</table>

**10. Religious Movements in 15th-16th Centuries**

**I. Bhakti Movement**
- The Bhakti movement was based on the doctrine that the relationship between God and man is through love and worship rather than through performing any ritual or religious ceremonies.
- It was in South India for the first time that Bhakti movement grew from a mere religious doctrine to a broad based popular movement based on social and religious equality. It was led by popular saint poets called *Alvars*, who represented emotional side of Vaishnavism through collective songs called *Prabandhas*. It declined after the 10th century.
- But it was revived as a philosophical and ideological movement by *Acharyas* (who represented intellectual side of Vaishnavism in the 11th century). Most important among them was *Ramanuja*, whose disciple *Ramananda* took it to North India.
- **Main Features**: 1. Discarded rituals and sacrifices 2. Emphasised purity of heart and mind, humanism and devotion 3. Monotheistic in nature 4.God has
a long commentary on the Bhagavad Gita called the ‘Bhavartadvipika’, more commonly known as ‘Jnaneshwari’.

Namadeva (1270-1350) was a contemporary of Jnanesvar. He was a tailor by caste and was opposed to all caste distinctions. The object of his devotion was Vithoba or Vishnu (identified with Vishnu) of Panshur. The cult of Vithoba or Vishnu known as Varkari sect was founded by Namadeva.

Ekball (1533-1599) was a great scholar saint from Maharashtra who wrote a commentary on the Ramayana called the ‘Bhavarttha Ramayana’ and another commentary on the eleventh book of the Bhagavata Purana.

Tukaram (1598-1650): The greatest Bhakti poet from Maharashtra, wrote devotional poems, known as Abhangas which are the glory of devotional poetry.

Ramdas (1608-1681): The last great saint poet from Maharashtra. ‘Dasabodha’ is the compilation of his writings and sermons.

II. Sufi Movement

Sufism is the mystical movement in Islam. The sufis while accepting the Shariat did not confine their religious practice to formal adherence and stressed religious experience aimed at direct perception of God.

The sufis doctrine was based on union with God which can be achieved through love of God, prayers, fasts and rituals, without reference to Hindu or Muslim.

Main Features: 1. Organised in different Sufis (orders) 2. Absorbed variety of ideas and practices from Hinduism, Christianity, Buddhism and Zoroastrianism. 3. Sufis aimed at service of mankind through spiritual self development 4. Eager for Hindu-Muslim unity and cultural synthesis 5. Opposed to orthodoxy, they preached faith and devotion to God. 6. Discouraged materialistic life but not in favour of complete renunciation.

Sufi Saints

Khwaja Ali Hujwiri (11th Century): Also Known as Dara Ganj Baksh the earliest Sufi saint of eminence known to have settled in India, the author of the celebrated manual of Sufism entitled ‘Kashaf-ul-Mahjub’.

Shahbahauddin Zakariya (1182-1262): The founder of the Suhara-wardi order who founded the first leading Khangah in India at Multan.

Khwaja Muinuddin Chisti (1141-1236): The founder of the Chisti order, the first and most popular liberal Sufi order in India. He settled down at Ajmer about 1206. Other Chisti Sufi saints who followed khwaja Muinuddin Chisti or Khwaja Ajmeri were: Sheikh Hamiduddin Naqauri (1192-1274); Khwaja Qutubuddin Bakhtiyar Kaki (died 1236) in whose memory Qutub Minar was built by Iltutmish; Baba Faquiruddin Ganji-i-Shakar (1175-1265) popularly known as Baba Farid built his Khangah at Ajodan (Punjab) and was the first great Punjabi poet of Sufism; Shaikh Nizamuddin Auliya (1236-1325) who gained the popular title Mehboob-i-Ilahi (the beloved of the God), built his Khangah in Delhi and was one of the most famous Sufi saint of the Chisti Order; Shaikh Nasiruddin Mahmud (d.1365), the charismatic Chisti saint, who was later known as Chirag-i-Delhi (the Lamp of Delhi); Syed Muhammad Gesu Daraz (d.1421) who settled down at Gulbarga (Karnataka) was popularly
Humayun: 1530-40 and 1555-56
- He was the son of Babur and ascended the throne in 1530. His succession was challenged by his brothers Kamran, Hindal and Askari along with the Afghans.
- He fought two battles against Sher Shah at Chausa (1539) and at Kannaui/Bilgram (1540) and was completely defeated by him.
- He escaped to Iran where he passed 12 years of his life in exile.
- After Sher Shah's death Humayun invaded India in 1555 and defeated his brothers the Afghans. He once again became the ruler of India.
- He died while climbing down the stairs of his library (at Din Panah) in 1556 and was buried in Delhi.
- His sister, Gulbadan Begun, wrote his biography Humayunama.
- He built Din Panah at Delhi as his second capital.

Sur Empire (Second Afghan Empire): 1540-55
Sher Shah: 1540-45
- He was the son of Hasan Khan, the Jagirdar of Sasaram. Ibrahim Lodhi transferred his father's jagir to him.
- In 1527-28, he joined Babur's service and then returned to South Bihar as deputy governor and guardian of the minor king Jalal Khan Lohan, son of Bahar Khan Lohan.
- Sher Shah usurps throne as Hazarat-i-Ala. He gained Chunar by marrying Lad Malika, the widow of governor of Chunar Fort.
- In 1539, he defeated Humayun in the battle of Chausa and assumed the title Sher Shah as emperor.
- In 1540, he defeated Humayun in the battle of Kannaui/Bilgram and annexed Kannaui.
- As an emperor, he conquered Malwa (1542), Ranthambhor (1542), Raisin (1543), Rajputana-annexation of Marwar (1542), Chittor (1544) and Kalinjar (1545). He died in 1545 while conquering Kalinjar.
- During his brief reign of 5 years he introduced a brilliant administration, land revenue policy and several other measures to improve the economic conditions of his subjects.
- He issued the coin called Rupia and fixed standard weights and measures all over the empire.
- He also improved communications by building several highways. He built the Grand Trunk Road (G.T. Road), that runs from Calcutta to Peshawar.
- He set up cantonment in various parts of his empire and strong garrison was posted in each cantonments.
- He introduced the principle of local responsibility for local crimes. Muqaddams were punished for failure to find culprits.
- Land was measured and 1/3rd of the average was fixed as land tax. The peasant was given a patta (title deed) and a qabulliat (deed of agreement) which fixed...
the peasant's rights and taxes. Zamindar were removed and the taxes were directly collected.

- He built Purana Quilla at Delhi.
- He was buried in Sasaram.
- Sher Shah was succeeded by Islam Shah (1545-54); Islam Shah by Muhammad Adil Shah (1554-55).

Akbah: 1556-1605

- Akbar, the eldest son of Humayun, ascended the throne under the title of Jalaeddin Muhammad Akbar Badshah Ghazi at the young age of 14 at Kalaun, Punjab and his tutor Bairam Khan was appointed as the regent.
- Second Battle of Panipat (5 Nov. 1556) was fought between Hemu (the Hindu General of Muhammad Adil Shah) and Bairam Khan (the regent of Akbar). Hemu was defeated, captured and slain by Bairam Khan.
- This war ended the Mughal-Afghan contest for the throne of Delhi in favour of the Mughals and enabled Akbar to reoccupy Delhi and Agra.
- Akbar ended the regency of Bairam Khan in 1560 and at the age of 18 assumed the reins of the kingdom.
- Akbar was under the influence of Maham Anga and Adham Khan junta from 1560 to 1562. [Petticoat Govt.: 1560-62]
- In his bid to expand his empire he conquered various provincial states.
- The Rajput kingdom of Mewar put up a fierce defence under Rana Uday Singh (1537-72) and his son Rana Pratap (1572-97).
- Akbar tried to win over the Rajputas wherever possible and inducted Rajputa kings into Mughal service and treated them at par with Mughal nobility. By marrying Harakha Bai, daughter of Bharma / Bhimar (Kutchhwa Raja Rajputa Ruler of Amer, Capital - Jaipur) in 1562. Akbar displayed his secular policy with the Hindus. Most of the Rajputa Kings recognised the supremacy of Akbar except Rana Pratap Singh and his son Amar Singh (Sisodiya Rajputas of Mewar, Capital - Chittor).
- The Battle of Haldighati (1576) was fought between Rana Pratap of Mewar and Mughal army led by Man Singh of Agra. Rana Pratap was defeated but he did not submit and continued the struggle.

Akbah's Conquests

<table>
<thead>
<tr>
<th>Year</th>
<th>Province</th>
<th>From</th>
</tr>
</thead>
<tbody>
<tr>
<td>1560-62</td>
<td>Malwa</td>
<td>Baz Bahadur</td>
</tr>
<tr>
<td>1561</td>
<td>Chunar</td>
<td>Afghan</td>
</tr>
<tr>
<td>1562</td>
<td>Merata</td>
<td>Jaisal</td>
</tr>
<tr>
<td>1564</td>
<td>Gondwana (Gaith Katanga)</td>
<td>Rani Durgawati (regent of Bir Narayan)</td>
</tr>
<tr>
<td>1568</td>
<td>Chittor</td>
<td>Rana Uday Singh</td>
</tr>
<tr>
<td>1569</td>
<td>Ranthambhore</td>
<td>Surjan Hada</td>
</tr>
<tr>
<td>1569</td>
<td>Kalinjar</td>
<td>Ram Chandra</td>
</tr>
<tr>
<td>1570</td>
<td>Marwar</td>
<td>Chandrasena, Kalyanmal, Raj Singh, Rawal Harirai</td>
</tr>
<tr>
<td>1572</td>
<td>Gujarat</td>
<td>Bahadur Shah</td>
</tr>
</tbody>
</table>

- As a revolt against the orthodoxy and bigotry of religious priests, Akbar proclaimed a new religion, Din-i-Ilaahi in 1581. The new religion was based on a synthesis of values taken from several religions like Hinduism, Islam, Jainism and Christianity. It did not recognize the prophet, Birbal was the only Hindu who followed this new religion. Din-i-Ilaahi, however, did not become popular.
- Akbar built Fatehpur Sikri, Agra Fort, Lahore Fort and Allahabad Fort and Humayan's Tomb at Delhi. Fatehpur Sikri, place near Agra-it is said that Akbar had no son for a long time. Sheikh Salim Chisti a Sufi saint blessed Akbar with a son who was named Salim / Sheikho Baba (Jahangir). In honour of Salim Chisti, Akbar shifted his court from Agra to Fatehpur Sikri.
- He was a patron of the arts and in his court many persons flourished.
- Tulsi das (Ramcharitmanas) also lived during Akbar's period.
- When Akbar died, he was buried at Sikandara near Agra.
- Akbar is considered the real founder of the Mughal empire in India.
- He was the first Mughal ruler who divorced religion from politics.
Lucent's General Knowledge

> Birbal was killed in the battle with Yusufzai Tribe (1586).
> Abul Fazl was murdered by Bir Singh Bandela (1601).
> Akbar gave Mughal India one official language (Persian).

Jahangir : 1605-27
> Salim, son of Akbar, came to the throne after Akbar's death in 1605. He issued 12 ordinances.
> He is known for his strict administration of justice. He established Zanjir-i-Adal (i.e. Chain of Justice) at Agra Fort for the seekers of royal justice.
> In 1611, Jahangir married Mihr-un-Nisa, widow of Sher Afgha, a Persian nobleman of Bengal. Later on she was given the title Nurjahan. Nurjahan exercised tremendous influence over the state affairs. She was made the official Padshah Begum.
> Jahangir issued coins jointly in Nurjahan's name and his own.
> Jahangir also married Manmati/Jagat Gosai/Jodha Bai of Marwar, and a Kachhwaha princess.
> In 1608, Captain William Hawkins, a representative of East India Company came to Jahangir's court. He was given the mansab of 400. In 1615 Sir Thomas Roe, an ambassador of King James I of England also came to his court. Though initially Jahangir resisted, later on he granted permission to the English to establish a trading port at Surat.
> A political triumph during Jahangir reign was the submission of Rana Amar Singh of Mewar (1615). Jahangir captured the strong fort of Kangara (1620). A part of Ahmadnagar was also annexed. Malik Amber ceded back to the Mughal the territory of Balaghat (Maharashtra).
> His reign was marked by several revolts. His son Khusrav, who received patronage of 5th Sikh Guru Arjun Dev, revolted against Jahangir (1605). Arjun Dev, was later sentenced to death for his blessing to the rebel prince (1606). During his last period, Khurram (Shahjahan), son of Jahangir, and Mahavat Khan, military general of Jahangir also revolted (Khurram : 1622-25 and Mahavat Khan : 1626-27).
> He wrote his memoirs Tuzuk-i-Jahangiri in Persian.
> He was buried in Lahore.

Shahjahan : 1628-58
> Mother's name Jagat Gosai/Jodha Bai (daughter of Raja Jagat Singh).
> Shahjahan ascended the throne in 1628 after his father's death.
> He was best known for his Deccan and foreign policies.
> The first thing that he had to face was revolts in Bundelkhand (Jujhar Singh Bundela of Orchha : 1628-35) and the Deccan (Khan-i-Jahan Lodhi, the governor of Deccan : 1629-31).
> Three years after his accession, his beloved wife Mumtaj Mahal (original name Arzumand Bano) died in 1631. To perpetuate her memory he built the Taj Mahal at Agra in 1632-53.
> In 1631-32, he defeated the Portuguese.
> In addition to Jahangir's empire, Nizam Shahi's dynasty of Ahmadnagar was brought under Mughal control (1633) by Shahjahan. The Deccan Sultanate of Bijapur and Golconda accepted his suzerignty in 1636.
> Shahjahan, who had recovered Kandhar (Afghanistan) in 1638 from the Iranians lost it again in 1647 despite three campaigns under prince Murad, Aurangzeb and Dara.
> Shahjahan's reign is described by French traveller Bernier and Tavernier and the Italian traveller Nicolai Manucci. Peter Mundy described the famine that occurred during Shahjahan's time.
> Shahjahan's reign is said to have marked the pinnacle of the Mughal dynasty and empire. He is known for the promotion of art, culture and architecture during his time. The Red Fort, Jama Masjid and Taj Mahal are some of the magnificent structures built during his reign.
> Shahjahan's failing health set off the war of succession among his four sons in 1657. Aurangzeb emerged the victor who crowned himself in July 1658. Shahjahan was imprisoned by his son Aurangzeb in the Agra Fort where he died in captivity in 1666. He was buried at Taj (Agra).

<table>
<thead>
<tr>
<th>War of Succession</th>
<th>Year of Beginning</th>
<th>Leaders</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>War of Bahadurpur, near Banaras</td>
<td>Feb. 1658</td>
<td>Dara and Shah Shuja</td>
<td></td>
</tr>
<tr>
<td>War of Dharat, near Ujjain</td>
<td>April 1658</td>
<td>Dara and Aurangzeb-Murad</td>
<td></td>
</tr>
<tr>
<td>War of Sumagarh, near Agra</td>
<td>May 1658</td>
<td>Dara and Aurangzeb-Murad</td>
<td></td>
</tr>
<tr>
<td>War of Khajur, near Allahabad</td>
<td>Dec. 1658</td>
<td>Aurangzeb and Shah Shuja</td>
<td></td>
</tr>
<tr>
<td>War of Deorai, near Ajmer</td>
<td>Mar. 1659</td>
<td>Aurangzeb and Dara</td>
<td></td>
</tr>
</tbody>
</table>

Aurangzeb : 1658-1707
> Aurangzeb defeated Dara at Dharat (1658), Sumagarh (1658) and Deorai in which Samugarh was decisive one and Deorai was last one.
> After victory, Aurangzeb was crowned at Delhi under the title Alamgir. He ruled for 50 years till his death in Feb., 1707 in Ahmadnagar.
> During the first 23 years of the rule (1658-81) Aurangzeb concentrated on North India. During this period the Marathas under Shivaji rose to power and were a force to reckon with.
> Aurangzeb captured Guru Teg Bahadur, the 9th Guru of Sikhs in 1675 and executed him when he refused to embrace Islam. The 10th and last Sikh Guru, Guru Gobind Singh, son of Guru Teg Bahadur, organised his followers into community of warrior called Khalsa to fight the Muslim tyranny and avenge the killing of his father. Guru Gobind Singh was, however, assassinated in 1708 by an Afghan at Nander in Deccan. Banda Bahadur, a trusted disciple of Guru Gobind Singh continued the war against Mughals.

<table>
<thead>
<tr>
<th>Revolts</th>
<th>Year of Beginning</th>
<th>Leaders</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>North India</td>
<td>1658-81</td>
<td>Gokula, Rajaram, Churamani</td>
<td>Agrarian policy</td>
</tr>
<tr>
<td>Jat</td>
<td>1669</td>
<td>Gokula, Rajaram, Churamani</td>
<td>Agrarian policy</td>
</tr>
<tr>
<td>Bundela</td>
<td>1671</td>
<td>Champat Rai, Chhatrasal</td>
<td>Political and religious</td>
</tr>
</tbody>
</table>
Later Mughals

Babur Shah (1707-1712): Original Name Muazzam, Title Shah Alam I.
Jahangir Shah (1712-1713): Ascended the throne with the help of Zulfikar Khan, Abolished Jaziya.
Farrukh Siyar (1713-1719): Ascended the throne with the help of Sayyid brothers—Abdual Khan and Hussain Khan.
Muhammad Shah (1719-1748): In 1738-39, Nadir Shah raided India and took away Thakht-i-Taus (the peacock throne) and Kohinoor diamond.
Alamgir II (1754-1759): Ahmed Shah occupied Delhi. Later, Delhi was plundered by Marathas.
Shah Alam II (1759-1806): Nazir Khan became very powerful in Delhi so much so that he could not enter Delhi for 12 years.
Akbar II (1806-1837): Pensioner of East India Company.
Bahadur Shah II (1837-1857): Last Mughal Emperor who was made premier during 1857 revolt. He was deported to Rangoon (Burma, now Myanmar) in 1858 where he died in 1862.

Administration

> Mughal empire was divided into Subas which were further subdivided into Sarkar, Pargana and Gram.
> However, it also had other territorial units as Khalisa (royal land), Jagirs (autonomous rajyas) and Inams (gifted lands, mainly waste lands).
> There were 15 Subas (provinces) during Akbar's reign, which later increased to 20 under Aurangzeb's reign.

Administrative Unit | Incharge
---|---
Suba (i.e. Province) | Sipahsalar/Subedar/Nizam—The Head Executive Diwan-Incharge of revenue department
Sarkar (i.e. District) | Fauzdar-Administrative Head Amal/Amalgazar-Revenue collection
Pargana (i.e. Taluka) | Siqdar-Administrative Head Amin, Qanungo-Revenue officials
Gram (i.e. Village) | Muzaffar-Headman, Patwari-Accountant

> Akbar introduced Mansabdar system. The term Mansab indicates the rank of its holder. Mansab dari was both civil and military. Almost the whole nobility, bureaucracy and military hold Mansabs.
> The Mughal Mansab was dual i.e. Zat (personal rank and pay status) and Sawar (number of horsemen to maintain).
> Mansabdars were of 3 categories: Mansabdars, Amirs and Amir-i-umda.
> According to pay mode they were of 2 types: Naqdi (paid through cash) and Jagirdar (paid through Jagirs).
> Jahangir added Duaspah Sihaspah system i.e. one's sawar rank can be raised without raising his zat rank.
> Shahjahan added Jama-Dami or Mahana Zagir (Monthly Scale) system.
> It ultimately caused Jagirdari and agrarian crisis, which was a major cause of decline of Mughals.
There were several methods of revenue collection in practice viz. Kangra (estimate), Raun (yield per unit area) and Zeb (based on the yields of crops).

Dahsala Bandobast or Zeb: A standard method of collection based on rates of crops determined after 10 years assessment. Todar Mal pioneered it.

Jagirdari system was the assignment of land in proportion to a Jagirdar's salary. Hence, every Mansabdar was entitled to a jagir if he was not paid in cash.

Madad-i-maosh or Suyur ghul or Inam were land grants to people of favour/religious assignment.

Mughal Culture

- Babur built two mosques, one at Kabolibagh in Panipat and the other at Sambhal in Rohilkhand.
- Humayun's tomb was built by his widow Haj Begum.
- An unusual building at Fatehpur Sikri is Panch Mahal. Panch Mahal has the plan of Buddhist vihara.
- The Mariam's palace, Diwan-i-Aam, Diwan-i-khas at Sikri are Indian in their plan.
- Buland Darwaza (built after Gujarat victory), formed the main entrance to Fatehpur Sikri.
- Salim Chishti's tomb (redone in Marble by Jahangir) is the first Mughal building in pure marble. Palace of Birbal, Palace of Tansen are also inside the Fatehpur Sikri.
- Akbar also began to build his own tomb at Sikandara which was later completed by Jahangir.

The architecture of Fatehpur Sikri is known as Epic in red sandstone.

- Nurjahan built Ilimad-ud-daula/Mirza Ghift Beg's marble tomb at Agra, which is notable for the first use of pietra dura (floral designs made up of semiprecious stones) technique.
- Jahangir introduced vigorous use of marble instead of red sandstone and use of pietra dura for decorative purpose.
- Jahangir built Moti Masjid in Lahore and his mausoleum at Shahdara (Lahore).
- Mosque building activity reached its climax in Taj Mahal. Shahjahan also built the Jama Masjid.

- Some of the important buildings built by Shahjahan at Agra are Moti Masjid (only Mosque of marble), Khaas Mahal, Mussman Burz (Jasmine Palace where he spent his last year in captivity) etc.
- He laid the foundations of Shahjahansabad in 1637 where he built the Red Fort and Takhti Taus (Peacock throne).
- Only building by Aurangzeb in the Red Fort is Moti Masjid.
- Only monument associated with Aurangzeb is Bibi ka Makbara which is the tomb of his wife Rabbia-ud-daula in Aurangabad.
- Aurangzeb also built the Badshahi Masjid in Lohore.

Humayun had taken into his service two master painter Mir Syed Ali and Abdus Samad.

---

<table>
<thead>
<tr>
<th>Title</th>
<th>Person</th>
<th>Field</th>
<th>Ruler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jagat-Guru</td>
<td>Harivijay Suri</td>
<td>Jain Religion</td>
<td>Akbar</td>
</tr>
<tr>
<td>Zari Kalam</td>
<td>Mohammad Husain</td>
<td>Literature</td>
<td>Akbar</td>
</tr>
<tr>
<td>Sirin Kalam</td>
<td>Abdus Samad</td>
<td>Literature</td>
<td>Akbar</td>
</tr>
<tr>
<td>Raj Kavi</td>
<td>Faizi</td>
<td>Literature</td>
<td>Akbar</td>
</tr>
<tr>
<td>Raj Priya</td>
<td>Birbal</td>
<td>Literature</td>
<td>Akbar</td>
</tr>
<tr>
<td>Nadir-ul-Aza</td>
<td>Ustad Mansur</td>
<td>Painting</td>
<td>Jahangir</td>
</tr>
<tr>
<td>Nadir-ul-Zaman</td>
<td>Abdul Hassan</td>
<td>Painting</td>
<td>Jahangir</td>
</tr>
<tr>
<td>Guna Samudra</td>
<td>Kalam</td>
<td>Literature</td>
<td>Shahjahan</td>
</tr>
<tr>
<td>Rai Kavi</td>
<td>Sundardas</td>
<td>Literature</td>
<td>Shahjahan</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Literature of Mughal Period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Book</strong></td>
</tr>
<tr>
<td>Tuzuk-i-Babur</td>
</tr>
<tr>
<td>Qanun-i-Humayun</td>
</tr>
<tr>
<td>Humayun Nama</td>
</tr>
<tr>
<td>Akbar Nama</td>
</tr>
<tr>
<td>Tobaqati-i-Akbar</td>
</tr>
<tr>
<td>Tuzuk-i-Jahangiri</td>
</tr>
<tr>
<td>Iqbalnama-i-Jahangiri</td>
</tr>
<tr>
<td>Chahar Chaman</td>
</tr>
<tr>
<td>Alamgir-nama</td>
</tr>
<tr>
<td>Massir-i-Alamgiri</td>
</tr>
<tr>
<td>Akbar Nama</td>
</tr>
<tr>
<td>Muntakhab-ul-Tawarikh</td>
</tr>
<tr>
<td>Tawarikh-i-Alli</td>
</tr>
<tr>
<td>Nuriyya-i-Sultanhya</td>
</tr>
<tr>
<td>Wajt-i-Hyderabad</td>
</tr>
<tr>
<td>Futuhat-i-Alamgiri</td>
</tr>
</tbody>
</table>
Indian History

under a viceroy. Provinces were divided into prants which were subdivided into parganas or tarafs. The lowest unit was village headed by Patel (Headman).

Shivaji was helped by the ashtapradhan (eight minister) which was unlike a collective of ministers, for there was no collective responsibility; each minister was directly responsible to Shivaji.

Shivaji’s Ashtapradhan

- Peshwa (Mukhya Pradhan): Finance and general administration, later he became Prime Minister and assumed great importance.
- Majumdar (AmatyA): Revenue and Finance Minister
- Wagenavis (Mantri): Home Minister
- Dahir (Sumant): Foreign Minister
- Suranvis (Sachiv): Head of Royal correspondence
- Pandit Rao (Sadar): Head of religious affairs
- Sari-Nauba (Senapati): Military commander. This is an honorary post with no real military powers.

Nyayadhish

- Justice

Shivaji: 1674-80

- Born at Shivneri Fort in 1627.
- Father-Shahji Bhonsle, Mother-Jija Bai, Religious Teacher-Samarth Ramdas.

Shivaji inherited the Jai of Poona from his father in 1637.

- After the death of his guardian, Dadaji Kondade, in 1647, he assumed full charge of his Jai.

- He conquered many forts viz. Singh Garh/Kondana (1643), Rohand and Chakan (1644-45), Toran (1646), Purandhar (1648), Rajgarh/Raigarh (1656), Supa (1656) and Panhala (1659).

- Afzal Khan was deputed by Adil Shah (Ruler of Bijapur) to punish Shivaji; but the later Afzal Khan was killed by Shivaji in 1659.

- Shaista Khan, governor of Deccan, was deputed by Aurangzeb to put down the rising power of Shivaji in 1660. Shivaji lost Poona and suffered several defeats till he made a bold attack on Shaista Khan (1663) and plundered Surat (1664) and later Ahmadnagar.

- Raja Jai Singh of Amber was then appointed by Aurangzeb to put down Shivaji (1665). Jai Singh succeeded in besieging Shivaji in the fort of Purandhar. Consequently the treaty of Purandhar (1665) was signed according to which Shivaji ceded some forts to the Mughals and paid a visit to the Mughal court at Agra.

- In 1674 Shivaji was coronated as capital Raigarh and assumed the title of Haidavat Dharmodharak (Protector of Hinduism).

- After that Chhatrapati Shivaji continued the struggle with Mughals and Siddis (Janjira). He conquered Karnataka during 1677-80.

Shivaji’s Administration

- Shivaji divided his territory under his rule (Swaraj) into three provinces, each
In an agreement with the Mughal emperor Ahmad Shah, the Peshwa was to protect the Mughal empire from internal and external enemies (like Ahmad Shah Abdali) in return for Chauth (1752).

Third battle of Panipat (Jan 14, 1761) resulted in the defeat of the Marathas by Ahmad Shah Abdali and the death of Viswas Rao and Sadashiv Rao Bhau. This event shocked the Peshwa Balaji Baji Rao and after six months he also died. This battle ended the Maratha power.

Successors of Balaji Baji Rao: Madhav Rao (1761-72), Narayan Rao (1772-73), Sawai Madhav Rao (1773-95) and Baji Rao II (1795-1818).

Anglo-Maratha Wars

First Anglo-Maratha War (1775-82): Favouring the cause of Raghunath Rao (Raghooba) for Peshwaship, English (Hastings) came in conflict with the Marathas. On being defeated, the British had to sign the humiliating Convention of Wadgaon (1779).

British later signed Treaty of Salbai (1782), renouncing the cause of Raghooba.

Second Anglo-Maratha War (1803-06): The Maratha Peshwa signed the Subsidiary Alliance Treaty of Bassein (1802).

The Maratha confederacy, which did not like the idea challenged the British power but were defeated by the British.

Third Anglo-Maratha war (1817-18): Lord Hastings was determined to proclaim British paramountcy in India. He moved against Pindaris transgressed the sovereignty of the Maratha chiefs and the war began.

The Marathas were decisively defeated.

13. The Advent of the Europeans

<table>
<thead>
<tr>
<th>Company</th>
<th>Estb.</th>
<th>Head Quarter/Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portuguese East India Company</td>
<td>1498</td>
<td>Cochin (1510-30), Goa (1530-1661)</td>
</tr>
<tr>
<td>English East India Company</td>
<td>1600</td>
<td>West coast: Surat (1608-87), Bombay (from 1687) East coast: Koromandal, Masulipattanam (1611-41), Madras (from 1641), Bengal: Under Madras (upto 1700) Calcutta (from 1700)</td>
</tr>
<tr>
<td>Dutch East India Company</td>
<td>1602</td>
<td>East coast: Koromandal, Pulicat (upto 1690), Negapattanam (from 1690), Bengal: Hugli (from 1655)</td>
</tr>
<tr>
<td>Danish East India Company</td>
<td>1616</td>
<td>Serampur (Bengal): 1676-1845</td>
</tr>
<tr>
<td>French East India Company</td>
<td>1664</td>
<td>Surat (1668-73), Pondicherry (1673-1954)</td>
</tr>
</tbody>
</table>

Note: Danish company were forced to sell all their settlements in India to the British in 1845.

Portuguese

The Cape route was discovered from Europe to India by Vasco da Gama. He reached the port of Calicut on May 17, 1498 and was received by the Hindu ruler of Calicut (Known by the title of Zamorin).

This led to the establishment of trading stations at Calicut, Cochin and Cannanore.

Cochin was the early capital of the Portuguese in India. Later Goa replaced it.

Francisco de Almeida was the first governor of Portuguese. Almeida (1505-09) introduced 'the policy of Blue water'.

Balaji Baji Rao: 1740-61

- Popularly known as Nana Sahib, he succeeded his father at the age of 20.
- After the death of Shahu (1749), the management of all state affairs was left in his hands.
Alfonso d'Albuquerque was the second governor of Portuguese. Albuquerque (1509-15) introduced the policy of Imperialism. He captured Goa from the ruler of Bijapur in 1510.

Nino da Cunha (1529-38) transferred his capital from Cochin to Goa (1530) and acquired Diu and Bassein (1534) from Bahadur Shah of Gujarat.

Martin Alfonso de Souza (1542-45): The famous Jesuit Saint Francis Xavier arrived in India with him.

The Portuguese power witnessed a decline by the end of the 16th century.

They lost Hugli in 1631 after being driven out by Asaf Khan, a Mughal noble of Shahjahan.

In 1661 the King of Portugal gave Bombay to Charles II of England as dowry when he married the King's sister.

The Marathas captured Salsette and Bassein in 1739.

In the end they were left only with Goa, Diu and Daman which they retained till 1961.

Dutch

Formation of the company in March, 1602, by a charter of Dutch parlimentary was formed with powers to make wars, conclude treaties, acquire territories and build fortresses.

The Dutch set up factories at Masulipatam (1605), Pulicat (1610), Surat (1616), Bimilipatam (1641), Karaikal (1645), Chinsura (1653), Kasimbazar, Baranagore, Patna, Balasore, Negapatam (all in 1658) and Cochin (1663).

The Dutch replaced the Portuguese as the most dominant power in European trade with the East, including India.

Pulicat was main centre in India till 1690, after which Negapatam replaced it.

The Dutch conceded to English after their defeat in the battle of Belderain 1759.

English

Before the English East India Company established trade in India, John Meldenhal, a merchant adventurer, was the first English man who arrived in India in 1599 by the over land route, ostensibly for the purpose of trade with Indian merchants.

The Governor and Company of Merchants of London Trading into the East Indies, popularly known as the English East India company, was formed in 1600.

Captain William Hawkins arrived at Jahangir's court (1609) to seek permission to open a factory at Surat. A Farman was issued by Jahangir permitting the English to build a factory at Surat (1613).

Sir Thomas Roe came to India as ambassador of James I to Jahangir's court in 1615 to obtain the permission to trade and erect factories in different parts of the empire.

The English East India Company acquired Bombay from Charles II on lease. Gerald Angier was its first governor from 1669 to 1677.

In 1690, Jao Chanock established a factory at Sutanati and the zamindari of the three villages of Sutanati, Kalikata and Belgundpr was acquired by the British (1698). These villages later grew into the city of Calcutta. The factory at Sutanati was fortified in 1696 and this new fortified settlement was named Fort William in 1700.

In 1694, the British parliament passed a resolution giving equal rights to all Englishmen to trade in the East. A new rival company, known as the English Company of Merchants Trading to the East Indies, was formed (1698).

The final amalgamation of the company came in 1708 under the title of 'The united Company of Merchants of England Trading to the East Indies'. This new company continued its existence till 1858.

French

The French East India Company was formed by Colbert under state patronage in 1664.

The first French factory was established at Surat by Francois Caron in 1668.

A factory at Masulipatam was set up in 1669.

The French power in India was revived under Lenoir and Dumas (governors) between 1720 and 1742. They occupied Malabar, Yanam in Coromandel and Karaikal in Tamil Nadu (1739).

The arrival of Dupleix as French governor in India in 1742 saw the beginning of Anglo-French conflict (Carnatic Wars) resulting in their final defeat in India.

Anglo-French Conflict/Carnatic Wars

An instance of Anglo French rivalry.

First Anglo-French war (1746-48): The French besieged Madras. At St. Thome battle the Nawab of Carnatic's army was defeated by French under Dupleix.

The Treaty of Aix-la-Chapelle (1748) ended the war of Austrian succession and First Anglo-French war in India.

Second Anglo-French war (1749-54): Dupleix aligned with Muzaffar Jung (Hyderabad) and Chanda Sahib (Carnatic/ Arcot). After initial reverses, Robert Clive emerged victorious.


Third Anglo-French war (1758-63): French Count de Lally captured Fort St. David. French were defeated at Wandiwash (1760). It was a decisive defeat of French.

The treaty of Paris (1763) ended the Third and Final Anglo-French war in India. Pondicherry was returned to French by this treaty.

Modern India

14. Expansion of British Power (In the context of Bengal, Mysore, Punjab etc.)

Bengal

Murshid Quli Khan (1717-27): In 1717, Murshid Quli Khan was appointed as Bengal's Subedar i.e. governor by Mughul emperor Farrukh Siyar. Grant of the Governorship of Orissa also was to him by Farrukh Siyar in 1719. He transferred the capital of Bengal from Daaca to Murshidabad.

Shujauddin (1727-39): He was the son-in-law of Murshid Quli Khan. He was granted the Governorship of Bihar by Mughul emperor Muhammad Shah 'Rangela' in 1733.
Dual Government of Bengal: 1765-72

- Dual Government of Bengal started in 1765.
- The Company acquired both Divani and Nizamat rights from Nazmuddaula, the Nawab of Bengal. But the company did not take over direct administration and revenue collection.
- Warren Hastings ended the dual system of government in 1772.

Mysore

Haidar Ali: 1761-82

- Haidar Ali began his career as a soldier in the service of the Mysore state, later he became the faujdar of Dindigul. He established a modern arsenal in Dindigul with the help of French.
- In 1761, he overthrew the Nanjarajar (the powerful Prime Minister of Wodeyar king Krishnara I) and usurped power, though continuing to recognise Krishnara I as the lawful ruler.
- Second Anglo-Mysore war (1780-84): Warren Hastings attacked French port Mahe, which was in Haidar Ali's territory.
- Haidar Ali led a joint front with Nizam and Maratha and captured Arcot (Capital of Carnatic state).
- In 1781, Haidar Ali was defeated at Porto Novo by Eyrecoat.
- He died during the Second Anglo-Mysore war.

Tipu Sultan 1782-99

- Haidar Ali was succeeded by his son Tipu Sultan in 1782.
- He continued the Second Anglo-Mysore war till 1784.
- The Treaty of Mangalore (1784) was signed by Tipu Sultan which ended the Second Anglo-Mysore war.
- Third Anglo-Mysore war (1790-92): Maratha and Nizam aided the British, Cornwallis capturred Bangalore. By the Treaty of Seringapatam (1792), Tipu ceded half of his territory.
- Fourth Anglo-Mysore war (1799): Lord Wellesly attacked and Tipu Sultan died.
- Tipu was the only Indian ruler who have understood the importance of economic strength as the foundation of military strength.
- Tipu established the embassies to France, Turkey, Iran and Pegu to develop foreign trade.
- Tipu planted a 'tree of liberty' at his capital Seringapatnam and became a member of Jacobin Club.

Punjab

- Guru Gobind Singh, the 10th and the last Guru of the Sikhs, transformed the religious sect into a military brotherhood.
- In the confusion and disorder that followed the invasion of Nadir Shah and Ahmad Shah Abdali, the sikhs increased their military strength and became a strong power.
Maharaja Ranjit Singh (1792-1839): He was the greatest Indian ruler of his time and founder of the Sikh rule in the Punjab. Born in 1780 at Gujranwala, he occupied Lahore in 1799 and made it his capital. He conquered Amritsar in 1802, occupied Ludhiana and after incessant wars, annexed Kangra, Attock, Multan, Kashmir, Hazara, Bannu, Derajat and Peshawar. He died in 1839.

Successors of Ranjit Singh: Khatrak Singh (1839-40), Naunihal Singh (1840), Sher Singh (1841-43), Dalip Singh (1843-49).

The Sikh power was broken by the British after the death of Ranjit Singh.

First Anglo-Sikh war (1845-46): Sikhs were defeated in all the four battles at Mudki, Ferozeshah, Aliwal and Sobraon. The Treaty of Lahore (1846) ended the war. Sir Henry Lawrence became the first resident.


<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Year</th>
<th>Founder</th>
<th>Annexation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nawab of Bengal</td>
<td>1713</td>
<td>Murshid Quli</td>
<td>1765 (Treaty of Allahabad)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jafar Khan</td>
<td></td>
</tr>
<tr>
<td>Maratha-confederacy</td>
<td>1720</td>
<td>Baji Rao I</td>
<td>1801 (Subsidiary Alliance)</td>
</tr>
<tr>
<td>Nawab of Carnatic/Accom</td>
<td>1720</td>
<td>Saadatulla Khan</td>
<td>1801 (Subsidiary Alliance)</td>
</tr>
<tr>
<td>Nawab of Avadh</td>
<td>1722</td>
<td>Mir Muhammad Amin Saadat Khan ‘Burhan-ul-Mulk’</td>
<td>1856 (Dalhousie)</td>
</tr>
<tr>
<td>Nizam of Hyderabad</td>
<td>1724</td>
<td>Mir Qamaruddin Chin Kili Khan ‘Nizam-ul-Mulk’</td>
<td>1798 (Subsidiary Alliance)</td>
</tr>
<tr>
<td>Mysore</td>
<td>1761</td>
<td>Haidar Ali</td>
<td>1799 (Subsidiary Alliance)</td>
</tr>
<tr>
<td>Punjab</td>
<td>1792</td>
<td>Ranjit Singh</td>
<td>1849 (Dalhousie)</td>
</tr>
</tbody>
</table>

15. Economic Impact of British Rule

Three Stages of British Colonialism

First phase-The Mercantile phase (1757-1813)

- The East India Company used its political power to monopolize trade and dictate terms to traders of Bengal.
- Imposition of inflated prices of goods led to buccaneering capitalism whereby wealth flowed out of barrel of the British trader’s gun.
- Revenues of Bengal were used to finance exports to England.

Second phase-The Industrial phase (1813-1858)

- India was exploited as a market for British goods.
- Act of 1813 allowed one way trade for the British, as a result the Indian markets flooded with cheap and machine-made imports. Indian traders lost foreign as well as home market.
- Indians were forced to export raw materials and import finished goods.
- Heavy import duty on Indian products to England to discourage them in the market.

Third phase-Financial phase (1860 onwards)

- The British consolidated their position in India and made India a market for manufacturers and a supplier of foodstuffs and raw materials.

Introduction of Railways (1853), Post and Telegraph (1853), Banking System (Avadh Commercial Bank-1881).

- Heavy British investment in India and burden of public debt increases.
- Industries came into existence (Tata Iron and Steel in 1907).

Drain of Wealth

- Dadabhai Naoroji cited it in his book “Poverty And Un-British Rule in India” (1867). R C Datta in his “Economic History of India” (1901) blamed British policies for Indian economic ills.
- Drain of Wealth theory refers to a portion of national product of India which was not available for consumption to its people.

- Constituents of drain were:
  1. Extortion by company servants the fortunes from rulers, zamindars, merchants and common man and sending them home.
  2. Purchasing goods out of revenues of Bengal and exporting them. This was called investment.
  3. Duty free trade provided to the British gave them a competitive edge over Indian traders. These subsidies were financed from Indian treasury.
  4. Remittances or salaries and other incomes by company officials sent to England.
  5. Home charges or cost of salaries and pensions of company officials in India were paid from the treasury of India.
  6. Hefty interests were paid to British investors.

Effects

1. It stunted the growth of Indian enterprise and checked and retarded capital formation in India.
2. It financed capitalist development in Britain.
3. India was kept as a zone of free trade without allowing it to develop the ability to compete.
4. Plantations, mines, jute mills, banking, shipping, export-import concerns promoted a system of interlocking capitalist firms managed by foreigners. It drained resources from India.

Land Revenue Systems

Permanent Settlement/Istamarari (Sthayi) Bandobast

- Introduced in Bengal, Bihar, Orissa, and districts of Benaras and Northern districts of Madras by Lord Cornwallis in 1793.
- John Shore planned the Permanent Settlement.
- It declared zamindars as the owners of the land. Hence, they could keep 1/11th of the revenue collected to themselves while the British got a fixed share of 10/11th of the revenue collected. The zamindars were free to fix the rents.
- Assured of their ownership, many zamindars stilled in towns (absentee landlordism) and exploited their tenants.

Ryotwari System

- Introduced in Bombay and Madras. Munro (Viceroy) and Charles Reed recommended it.
In this, a direct settlement was made between the government and the (cultivator).

The revenue was fixed for a period not exceeding 30 years, on the basis of the quality of the soil and the nature of the crop. It was based on the scientific notion of Ricardo.

The position of the cultivator became more secure but the rigid system of revenue collection often forced him into the clutches of the moneylender.

Besides this, the government itself became a big zamindar and retained the right to enhance revenue at will while the cultivator was left at the mercy of its officers.

**Mahaliwari System**
- Modified version of zamindari settlement introduced in the Ganges valley, NWFP, parts of Central India and Punjab.
- Revenue settlement was to be made by village or estates with landlords. In Western Uttar Pradesh, a settlement was made with the village communities, which maintained a form of common ownership known as Bhachtan, or with Mahals, which were groups of villages.
- Revenue was periodically revised.

**Colonial Impact of Land Revenue Systems**
1. The land settlements introduced market economy and did away with customary rights. Cash payment of revenue encouraged money-lending activity.
2. It sharpened social differentiation. The rich had access to the courts to defend their property.
3. Forcible growing of commercial crops led the peasants to buy food grains at high prices and sell cash crops at low prices.
4. The stability of the Indian villages was shaken and the entire set up of the rural society began to break up.

**Peasant Movements**

<table>
<thead>
<tr>
<th>Movement</th>
<th>Place</th>
<th>Year</th>
<th>Leaders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigo Revolt</td>
<td>Bengal</td>
<td>1899</td>
<td>Bishnu and Digambar Biswas</td>
</tr>
<tr>
<td>Pabna</td>
<td>Bengal</td>
<td>1870</td>
<td>Ishwar Roy, Sabu Pal, Khoddi Mollah</td>
</tr>
<tr>
<td>Deccan Riots</td>
<td>Maharashtra</td>
<td>1875</td>
<td></td>
</tr>
<tr>
<td>Ramosi Movement</td>
<td>Maharashtra</td>
<td>1879</td>
<td>Vasudev Balwant Phadke</td>
</tr>
<tr>
<td>Bijolia</td>
<td>Rajasthan</td>
<td>1913</td>
<td>Sitaram Das, Vijay Pathik Singh</td>
</tr>
<tr>
<td>Champaran</td>
<td>Bihar</td>
<td>1917</td>
<td>Gandhiji</td>
</tr>
<tr>
<td>Kheda</td>
<td>Gujarat</td>
<td>1918</td>
<td>Gandhiji and Vallabh Bhai Patel</td>
</tr>
<tr>
<td>Moplah</td>
<td>Kerala</td>
<td>1921</td>
<td>Sayyid Ali and Sayyid Fazl</td>
</tr>
<tr>
<td>Bordoli/Borssad</td>
<td>Gujarat</td>
<td>1928</td>
<td>Vallabh Bhai Patel</td>
</tr>
<tr>
<td>Tebhaga</td>
<td>Bengal</td>
<td>1946</td>
<td>Kamparan Singh, Niyamat Ali</td>
</tr>
<tr>
<td>Punnapra-Waylar</td>
<td>Kerala</td>
<td>1946</td>
<td>Kumaraia and Sundaraiya</td>
</tr>
<tr>
<td>Telengana</td>
<td>Andhra P.</td>
<td>1946</td>
<td></td>
</tr>
<tr>
<td>UP Kisan Sabha</td>
<td>UP</td>
<td>1918</td>
<td>Indra Narayan Dwivedi and Gauri Shankar Mishra</td>
</tr>
</tbody>
</table>

**Movement**

<table>
<thead>
<tr>
<th>Movement</th>
<th>Place</th>
<th>Year</th>
<th>Leaders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arvad Kisan Sabha</td>
<td>Avadh</td>
<td>1920</td>
<td>Baba Ramachandra</td>
</tr>
<tr>
<td>Eka Movement</td>
<td>South India</td>
<td>1921</td>
<td>Madari Pasi</td>
</tr>
<tr>
<td>Forest Satyagrahi</td>
<td>Lucknow</td>
<td>1931</td>
<td>NV Rama Naidu, N G Ranga</td>
</tr>
<tr>
<td>All India Kisan Sabha</td>
<td>Lucknow</td>
<td>1936</td>
<td>Sahajanada Saraswati</td>
</tr>
</tbody>
</table>

**Tribal Revolts**

<table>
<thead>
<tr>
<th>Tribe</th>
<th>Year</th>
<th>Leaders</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuar</td>
<td>1817</td>
<td>Sewaram</td>
<td>Agrarian hardship</td>
</tr>
<tr>
<td>Bhils</td>
<td>1820</td>
<td></td>
<td>British occupation of Singhbhum</td>
</tr>
<tr>
<td>Hos</td>
<td>1822</td>
<td>Chittur Singh, Pratap Singh, Dattaraya Patkar</td>
<td>British Rule</td>
</tr>
<tr>
<td>Ramoni</td>
<td>1824</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kol</td>
<td>1829-32</td>
<td>Gomadhar Kunwar</td>
<td>British occupation of Singhbhum</td>
</tr>
<tr>
<td>Khadi</td>
<td>1831-32</td>
<td>Budhu Bhagat</td>
<td>British Rule</td>
</tr>
<tr>
<td>Sanhals</td>
<td>1855-56</td>
<td>Sidhu and Kanhlu</td>
<td>For Dharma Raj against ban Joria Bhagat on grazing and timber</td>
</tr>
<tr>
<td>Naikda</td>
<td>1858</td>
<td>Rup Singh</td>
<td>British Rule</td>
</tr>
<tr>
<td>Bhuyan and Jang</td>
<td>1867-68</td>
<td>Ratna Nayak</td>
<td>Excess Revenue demand, Bengal famine</td>
</tr>
<tr>
<td>Kachna Nagas</td>
<td>1891</td>
<td>Dharni Nayak</td>
<td>British occupation of Singhbhum</td>
</tr>
<tr>
<td>Munda (Ugulan)</td>
<td>1882</td>
<td>Sambhuden</td>
<td>British intervention of Singhbhum</td>
</tr>
<tr>
<td>Brills</td>
<td>1913</td>
<td>Govind Guru</td>
<td>Atenemperance and purification movement</td>
</tr>
<tr>
<td>Oromas</td>
<td>1914</td>
<td>Jatra Bhagat and other Bhagats</td>
<td>Religious Reason</td>
</tr>
<tr>
<td>Chenuchis</td>
<td>1921-22</td>
<td>Surat Singh</td>
<td>British control of forests</td>
</tr>
<tr>
<td>Keyas/Rampas</td>
<td>1922-24</td>
<td>Alluri Sitaram Raju</td>
<td>British Rule</td>
</tr>
<tr>
<td>Naga</td>
<td>1932</td>
<td>Jadunag (1905-31) A reformist movement later directed against excess of British rule</td>
<td></td>
</tr>
</tbody>
</table>

**Civil Revolts**

- **Sanyasi (Bengal, 1780)**: led by religious monks against British restrictions and ruin of peasantry.
  - **Kattabomman Revolt (1792-98)**: by Vira Pandya Kattabomman against imposition of British Suzzerainty.
  - **Paik Revolt (Orissa, 1804-06)**: led by Bakshi Jagbandhu against British occupation and revenue policy.
  - **Velu Thampi (Travancore, 1805)**: led by Velu Thampi against British extortions.
  - **Kittur Revolt (Karnataka, 1824)**: by Chinnama and Ryappa against British interference in Kittur.
Upasika: Religious nature.

16. Socio-Religious Movements in 19th-20th Centuries

<table>
<thead>
<tr>
<th>Year</th>
<th>Place</th>
<th>Name of the Organisation</th>
<th>Founder</th>
</tr>
</thead>
<tbody>
<tr>
<td>1815</td>
<td>Calcutta</td>
<td>Atmiya Sabha</td>
<td>Rammohan Roy</td>
</tr>
<tr>
<td>1828</td>
<td>Calcutta</td>
<td>Brahmo Samaj</td>
<td>Rammohan Roy</td>
</tr>
<tr>
<td>1829</td>
<td>Calcutta</td>
<td>Dharma Sabha</td>
<td>Radhakant Dev</td>
</tr>
<tr>
<td>1839</td>
<td>Calcutta</td>
<td>Tattwabodhini Sabha</td>
<td>Debendranath Tagore</td>
</tr>
<tr>
<td>1840</td>
<td>Punjab</td>
<td>Nirankaris</td>
<td>Dayal Das, Darbara Singh, Rattan Chandi etc.</td>
</tr>
<tr>
<td>1844</td>
<td>Surat</td>
<td>Manav Dhharma Sabha</td>
<td>Durgaram Mancharam</td>
</tr>
<tr>
<td>1849</td>
<td>Bombay</td>
<td>Ramakrishna Mission</td>
<td>Paramahansa Mandali, Dadoo Pandurang</td>
</tr>
<tr>
<td>1850</td>
<td>Punjab</td>
<td>Nanakshahi</td>
<td>Ram Singh</td>
</tr>
<tr>
<td>1861</td>
<td>Agra</td>
<td>Radha Swami Sat singh</td>
<td>Tulsi Ram</td>
</tr>
<tr>
<td>1866</td>
<td>Calcutta</td>
<td>Brahmo Samaj of India</td>
<td>Keshab Chandra Sen</td>
</tr>
<tr>
<td>1866</td>
<td>Deoband</td>
<td>Dar-ul-Ulum</td>
<td>Maulana Hussain Ahmed</td>
</tr>
<tr>
<td>1867</td>
<td>Bombay</td>
<td>Prarthana Samaj</td>
<td>Atmaram Pandurang</td>
</tr>
<tr>
<td>1873</td>
<td>Bombay</td>
<td>Arya Samaj</td>
<td>Swami Dayanand Saraswati</td>
</tr>
<tr>
<td>1875</td>
<td>New York (USA)</td>
<td>Theosophical Society</td>
<td>Madam H.P. Blavatsky and Col. H.S. Olcott</td>
</tr>
<tr>
<td>1878</td>
<td>Calcutta</td>
<td>Sadharan Brahmo Samaj</td>
<td>Anand Mohan Bose</td>
</tr>
<tr>
<td>1884</td>
<td>Pune (Poona)</td>
<td>Deccan Education Society</td>
<td>G.G. Agarkar</td>
</tr>
<tr>
<td>1886</td>
<td>Aligarh</td>
<td>Muhammadan Educational Conference</td>
<td>Syed Ahmad Khan</td>
</tr>
<tr>
<td>1887</td>
<td>Bombay</td>
<td>Indian National Conference</td>
<td>M.G. Ranade</td>
</tr>
<tr>
<td>1887</td>
<td>Lahore</td>
<td>Deva Samaj</td>
<td>Shivnarayan Agnihotri</td>
</tr>
<tr>
<td>1894</td>
<td>Lucknow</td>
<td>Nadwah-ul-Ulama</td>
<td>Maulana Shibli Numani, Swami Vivekanand</td>
</tr>
<tr>
<td>1905</td>
<td>Belur</td>
<td>Ramakrishna Mission</td>
<td>Gopal Krishna Gokhale, Mrs. Ramabai Ranade, G.K. Devadhar, N.M. Joshi, H.N. Kunkru</td>
</tr>
<tr>
<td>1909</td>
<td>Pune (Poona)</td>
<td>Poona Seva Sanstha</td>
<td></td>
</tr>
</tbody>
</table>

Lower Caste/Caste Movements and Organisations

<table>
<thead>
<tr>
<th>Movement/Organisation</th>
<th>Year</th>
<th>Place</th>
<th>Founder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satya Shodhak Samaj</td>
<td>1873</td>
<td>Maharashtra</td>
<td>Jyotiba Phule</td>
</tr>
<tr>
<td>Aravippuram Movement</td>
<td>1888</td>
<td>Kerala</td>
<td>Shri Narayan Guru</td>
</tr>
<tr>
<td>Shri Narayan Dharma Paripalana</td>
<td>1902-03</td>
<td>Kerala</td>
<td>Shri Narayan Guru, Dr. Palpu and Kumaran Asan</td>
</tr>
<tr>
<td>Yogam (S.N.D.P.) Movement</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
17. Freedom Struggle

I. The Revolt of 1857

The Revolt of 1857 is an important landmark in the history of India which occurred during the governor-generalship of Lord Canning.

Causes of the Revolt: The revolt of 1857 was a combination of political, economic, socio-religious and military causes.

Political: Nana Sahib was refused pension, as he was the adopted son of peshwa Baji Rao II. Avadh was annexed in 1856, on charges of mal-administration. Satara, Jhansi, Nagpur and Sambhalpur were annexed owing to Doctrine of Lapse.

Economic: Heavy taxation, forcibly evictions, discriminatory tariff policy against Indian products and destruction of traditional handicrafts that hit peasants and artisans.

Socio religious: British social reforms (abolition of sati, 1829; legalisation of widow remarriage, 1856 etc.) hurted the sentiments of orthodox and conservative People.

Military: Discrimination with Indian soldiers.

Immediate cause: The introduction of Enfield rifles whose cartridges were said to have a greased cover made of beef and pork sparked off the revolt.

The Beginning and Spread of the Revolt: On March 29, 1857, an Indian sepoys of 34 Native Infantry, Mangal Pandey, killed two British officers—Hughes and Baugh—on parade at Barrackpore (near Calcutta). The Indian soldiers refused to obey orders to arrest Mangal Pandey. However, he was later on arrested, put to and hanged.

The mutiny really started at Merrut on 10th May 1857. The occasion was the punishment of some sepoys for their refusal to use the greased cartridges. The soldiers along with other groups of civilians, went on a rampage shouting ‘Mar Giri kar’. They broke open jails, murdered Europeans, burnt their houses and marched to Delhi after sunset.

The appearance of the marching soldiers next morning (i.e. 11th May) in Delhi was a signal to the local soldiers, who in turn revolted, seized the city and proclaimed the 82-year-old Bahadur Shah ‘Zafar’, as Shahenshah-i-Hindustan (i.e. Emperor of India).

Note:
1. Bahadur Shah II: was Deported to Rangoon, where he died in 1862. His sons were dead; Nana Sahib (original name—Dhundhu Pant), Begum Hazrat Mahal and Khan Bahadur Khan: Escaped to Nepal; Tantiya Tope (Original name—Ramchandra Pandurang) was captured and executed on 15th April, 1859; Rani Lakshmi Bai: Died in the battle-field; Kuer Singh: was wounded and died on 26 April, 1858.
2. Sir Hugh Rose described Lakshmi Bai as the best and bravest military leader of the rebel.
3. Other Important Leaders: Khan Bahadur Khan (Bareilly), Maulavi Ahmadullah (Fairbairn), Azimullah Khan (Fathead), Devi Singh (Mathura), Kadam Singh (Merrut) etc.
4. English authority re-established in India during July-Dec. 1858.

Causes of Failure: The Revolt of 1857 was an unsuccessful but heroic effort to eliminate foreign rule. The main causes were: 1. Disunity of Indians and poor organisation. 2. Lack of complete nationalisation—Scindias, Holkars, Nizam and others actively helped the British. 3. Lack of coordination between sepoys, peasants, zamindars and other classes. 4. Many had different motives for participating in the revolt.

Significance: The important element in the revolt lay in Hindu-Muslim unity. People exhibited patriotic sentiment without any touch of communal feelings. It no doubt began as a mutiny of soldiers, but soon turned into a revolt against British rule in general.

Nature of the Revolt of 1857

There are two main views about the nature of the Revolt of 1857:
1. Sepoy Mutiny: Syed Ahmed Khan, Munshi Jeevan Lal and Durgadas Bandyopadhyaya (Contemporary Historians); Stanley (Secretary of state for India), John Lowenmore, John Seeley, Malleson, R.C. Mazumdar.

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Place</th>
<th>Year</th>
<th>Founder(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>British India Society</td>
<td>London</td>
<td>1839</td>
<td>William Adam</td>
</tr>
<tr>
<td>British India Association (Result of the merger of 1 and 2)</td>
<td>Calcutta</td>
<td>1851</td>
<td>Devendra Nath Tagore</td>
</tr>
<tr>
<td>Madras Native Association</td>
<td>Madras</td>
<td>1852</td>
<td>C.Y. Mudaliar</td>
</tr>
<tr>
<td>Bombay Association</td>
<td>Bombay</td>
<td>1852</td>
<td>Jagannath Shanker Sheth</td>
</tr>
<tr>
<td>East India Association</td>
<td>London</td>
<td>1866</td>
<td>Dadabhai Naoroji</td>
</tr>
<tr>
<td>Poona Sarvajanik Sabha</td>
<td>Poona</td>
<td>1870</td>
<td>S.H. Chipulkar, G.V. Joshi, M.G. Ranade</td>
</tr>
<tr>
<td>Indian Society</td>
<td>Calcutta</td>
<td>1872</td>
<td>Anand Mohan Bose</td>
</tr>
<tr>
<td>Indian League</td>
<td>Calcutta</td>
<td>1875</td>
<td>Shishir Kumar Ghosh</td>
</tr>
<tr>
<td>Indian Association</td>
<td>Calcutta</td>
<td>1876</td>
<td>Surendra Nath Bannerji and Anand Mohan Bose</td>
</tr>
<tr>
<td>India National Conference</td>
<td>Calcutta</td>
<td>1883</td>
<td>-do-</td>
</tr>
<tr>
<td>Madras Mahajan Sabha</td>
<td>Madras</td>
<td>1884</td>
<td>P. Rangia Naydu, V. Raghava-chari, Anand Charlu, G.S. Aiyer</td>
</tr>
<tr>
<td>Bombay Presidency Association</td>
<td>Bombay</td>
<td>1885</td>
<td>Ferozshah Mehta, K.T. Tallang, Badruddin Tyebji</td>
</tr>
</tbody>
</table>

**Indian National Congress (I.N.C.) : Bombay, 1885, A.O. Hume**

- The Indian National Union was formed in 1884 by A.O. Hume, an Englishman and a retired civil servant, in association with various national leaders who called for a conference in Pune in December 1885.
- The conference received the unanimous support of all Indian leaders, but the venue was shifted to Bombay for various reasons (esp. outbreak of cholera in Pune).
- Further, the leaders decided to rename the Indian National Union as Indian National Congress.
- The first session of the Indian National Congress was held at Gokuldas Tejpal Sanskrit College in Bombay under the presidency of W.C. Bannerji, a veteran lawyer of Calcutta.
- It was attended by 72 delegates from all over India.
- From 1885 onwards the INC met every year and its cause spread rapidly among middle class Indians.
- With the foundation of INC in 1885, the struggle for India’s independence was launched in a small, hesitant and mild but organized manner.
- The first two decade of INC are described in history as those of moderate demands and a sense of confidence in British justice and generosity. Their aim was not to be aggressive for attaining independence lest the British should suppress this. This resulted in Indian Council Act in 1892 which allowed some members to be indirectly elected by Indians but keeping the official majority intact.

**Moderate Leaders :** Dada Bhai Naoroji, A.O. Hume, Badruddin Tayebji, M.G. Ranade, W.C. Bannerji, Ferozshah Mehta, Surendra Nath Bannerji, C. Shankaran Naiyar, Madan Mohan Malviya, V.S. Shrivas Shastri, Tej Bahadur...

people. Naoroji in his presidential address declared that the goal of the INC was 'self government of Swaraj like that of United Kingdom'. The differences between the moderates and the extremists, esp. regarding the pace of the movement and the techniques of the struggle to be adopted, came to head in 1907 at the Surat Session of the congress where the party split with serious consequences for the Swadeshi movement.

**Surat Split (1907)**: The INC split into two groups—the extremists and the moderates, at the Surat session in 1907 held on the banks of the river Tap. The extremists were led by Tilak, Lajpat Rai and Bipin Chandra Pal and the moderates were led by Gopal Krishna Gokhale. At the Surat session, the moderate and extremist delegates of congress met in an atmosphere surcharged with excitement and anger.

The suddenness of the Surat fiasco took the extremist leaders by surprise and they offered their cooperation to the working committee of the congress by accepting presidency of Ras Bihari Ghose. But the moderates would not relent as they found themselves on firm ground. The government observing the opportunity launched a massive attack on the extremists by suppressing the newspaper and arresting their main leader, Tilak, and sending him to Mandalay Jail (Burma) for 5 years. The extremists were not able to organise an effective alternative party or to sustain the movement. Aurobindo Ghosh gave up politics and left for Pondicherry. Bipin Chandra Pal also left politics temporarily. Lajpat Rai left for Britain. After 1908, the national movement as a whole declined.

**Morley-Minto Reforms (1909)**: Morley-Minto Reforms were introduced in 1909 during the period when Lord Minto was the Viceroy of India. The reforms envisaged a separate electorate for Muslims besides other constitutional measures. The government thereby sought to create a rift within the Congress by winning the support of the moderates on the one hand, and favour of Muslims against Hindus on the other. To achieve the latter objective, the reforms introduced the system of separate electorates under which Muslims could only vote for Muslim candidates. This was done to encourage the notion that the political, economic and cultural interests of Hindus and Muslims were separate and not common. Indian political leaders were however dissatisfied by these reforms.

**Home Rule Movement (1915-16)**: B.G. Tilak founded Indian Home Rule League at Pune on 28 April, 1916. Annie Besant, inspired by the Irish rebellion started Home Rule Movement in India in September, 1916. The movement spread rapidly and branches of the Home Rule League were established all over India. B.G. Tilak wholeheartedly supported this movement. He joined forces with Annie Besant and persuaded the Muslim League to support this programme.

**Lucknow Pact—Congress-League Pact (1916)**: An important step forward in achieving Hindu-Muslim unity was the Lucknow pact (1916). Anti-British feelings were generated among the Muslims following a war between Britain and Turkey which opened the way for the Congress and Muslim League unity. Both the Congress and the Muslim League held session at Lucknow in 1916 and concluded the famous Lucknow pact. The congress accepted the separate electorate and both organisations jointly demanded 'dominion status' for the country.

Hindu-Muslim unity alarmed the British and forced the government to announce its future policy. In 1916, a British policy was announced whereby association of Indians was in government increased and there was to be a gradual development of local self-governing institutions.
17. IV. The Gandhian Era (1917-47)

Mahatma Gandhi (1869-1948): Chronological Overview

In South Africa: 1893-1914
- 1893: Departure of Gandhi to South Africa.
- 1894: Foundation of Natal Indian Congress.
- 1899: Foundation of Indian Ambulance Corps during Boer Wars.
- 1904: Foundation of Indian Opinion (magazine) and Phoenix Farm at Phoenix near Durban.
- 1906: First Civil Disobedience Movement (Satyagraha) against Asiatic Ordinance in Transvaal.
- 1907: Satyagraha against Compulsory Registration and Passes for Asians (The Black Act) in Transvaal.
- 1908: Trial and imprisonment-Johannesburg Jail (First Jail Term).
- 1910: Foundation of Tolstoy Farm (Later Gandhi Ashrama) near Johannesburg.
- 1913: Satyagraha against discrimination of non-Christian marriages in Cape Town.
- 1914: Quits South Africa forever and returns to India, Awarded Kaisar-i-Hind for raising an Indian Ambulance Corps during Boer wars.

In India: 1915-18
- 1915: Arrived in Bombay (India) on 9 Jan, 1915; Foundation of Satyagraha Ashrama at Kothari near Ahmedabad (20 May). In 1917, Ashrama shifted at the banks of Sabarmati; All India tour.
- 1916: Abstain from active politics (though he attended Lucknow session of INC held at 26-30 Dec, 1916, where Raj Kumar Shukla, a cultivator from Bihar, requested him to come to Champaran.)
- 1917: Gandhi entered active politics with Champaran campaign to redress grievances of the cultivators oppressed by Indigo planters of Bihar (April 1917). Champaran Satyagraha was his first Civil Disobedience Movement in India.
- 1918: In Feb. 1918, Gandhi launched the struggle in Ahmedabad which involved industrial workers. Hunger strike as a weapon was used for the first time by Gandhi during Ahmedabad struggle. In March 1918, Gandhi worked for peasants of Kheda in Gujarat who were facing difficulties in paying the rent owing to failure of crops. Kheda Satyagraha was his first Non-Cooperation Movement.
- 1919: Gandhi gave a call for Satyagraha against the Rowlatt Act on April 6, 1919 and took the command of the national movement for the first time (First All-India Political Movement). Gandhi returns Kaisar-i-Hind gold medal as a protest against Jallianwala Bagh massacre-April 13, 1919; The All India Khilafat Conference elected Gandhi as its president (Nov 1919, Delhi).


1924: Belgium (Karnataka) session of INC for the first time and the last time Gandhi was elected the president of the Congress.

1925-27: Gandhi retires from active politics for the first time and devotes himself to 'constructive programme' of the Congress; Gandhi resumes active politics in 1927.

1928-34: Gandhi launches the Civil Disobedience Movement with his Dandi march/Salt Satyagraha (First Phase: March 12, 1930 - March 5, 1931; Gandhi--Irwin Pact: March 5, 1931; Gandhi attends the Second Round Table Conference in London as sole representative of the Congress: Sep. 7 - Dec. 1, 1931; Second Phase: Jan. 3, 1932 - April 17, 1934).

1934-38: Gandhi retires from active politics, sets up Sevagram (Vidisha Ashram).

1938: Gandhi resumes active politics.

1941-44: Gandhi launches Individual Satyagraha Movement.

1942: Call to Quit India Movement for which Gandhi raised the slogan, 'Do or Die' (We shall either free India or die in the attempt), Gandhi and all Congress leaders arrested (Aug. 9, 1942).

1942-44: Gandhi kept in detention at the Aga Khan Palace, near Pune (Aug. 9, 1942 - May 1944) Gandhi lost his wife Kasturba (Feb. 22, 1944) and private secretary Mahadev Desai; this was Gandhi's last prison term.

1945: Gandhi's influence on the congress wanes perceptively after 1945.

1948: Deeply distressed by the orgy of communal violence, as a result Muslim League's Direct Action call, Gandhi travelled to Noakhali (East Bengal--now Bangladesh) and later on to Calcutta to restore communal peace.

1947: Gandhi, deeply distressed by the Mountbatten Plan/Partition Plan (June 3, 1947), while staying in Calcutta to restore communal violence, observes complete silence on the dawn of India's Independence (Aug. 15, 1947). Gandhi returns to Delhi (Sep. 1947).

1948: Gandhi was shot dead by Nathu Ram Godse, a member of RSS, while on his way to the evening prayer meeting at Birla House, New Delhi (Jan. 30, 1948). He died, with 'Hey Ram' on his lips.

Note: Gandhi has suggested the winding up of Indian National Congress after India attained independence and converting it into Lok Sevak Samaj.

Facts about Gandhi
- Date and Place of Birth: Oct. 2, 1869 and Porbandar, Gujarat.
- Father: Karamchand Gandhi, Mother: Putali Bai, Political Guru: Gopal Krishna Gokhale, Private Secretary: Mahadev Desai.
- Literary Influences on Gandhi: John Ruskin's Unto This Last, Emerson, Thoreau, Leo Tolstoy, the Bible and the Gita.
- As an Editor: Indian Opinion: 1903-15 (in English and Gujarati, for a short period in Hindi and Tamil), Harijan: 1919-31 (in English, Gujarati and Hindi), Young India: 1933-42 (in English and Gujarati—named Navjeevan)
Main Events during the Gandhian Era

Rowlatt Act (1919): During the viceroyalty of Lord Chelmsford, a sedition committee was appointed by the government in 1918 with Justice Rowlatt which made certain recommendations to curb seditious activities in India. The Rowlatt Act of 1919, gave unbridled powers to the government to arrest and imprison suspects without trial. The act caused a wave of anger among the people. Even before the act was passed, popular agitation began against it. Gandhi decided to fight against this act and he gave a call for Satyagraha on April 6, 1919. He was arrested on April 8, 1919. This led to further intensification of the agitation in Delhi, Ahmedabad and Punjab.

Jallianwala Bagh Massacre (April 13, 1919): The arrest of Dr. Sairuddin Kitchlu and Dr. Satyapal on April 10, 1919, under the Rowlatt Act in connection with Satyagraha caused serious unrest in Punjab. A public meeting was held on April 13, 1919 in a park called Jallianwala Bagh in Amritsar where thousands of people including women and children assembled. Before the meeting could start, General Reginald Edward Harry (R.E.H.) Dyer ordered indiscriminate heavy firing on the crowd and the people had no way out to escape. As a result, hundreds of men, women and children were killed and more than 1200 people wounded. At that time, Michael O'Dwyer was the lieutenant governor of the Punjab. The massacre was turning point in Indo-British relations and inspired the people to provide a more unrelenting fight for freedom.

Note: Saradar Uddham Singh, an Indian patriot from Punjab, shot down Michael O'Dwyer in London in 1940.

Khilafat Movement (1920-22): The Caliph (or, Khalifa) Sultan of Turkey, was looked upon by the Muslims as their religious head. During the First World War, when the safety and welfare of Turkey were threatened by the British, weakening the Caliph's position, Indian Muslims adopted an aggressive and anti-British attitude. The Ali Brothers-Mohammad Ali and Shaukat Ali-launched an anti-British movement in 1920-the Khilafat Movement for the restoration of the Caliph. Maulana Abul Kalam Azad also led the movement. It was supported by Gandhi and INC which paved the way for Hindu-Muslim unity.

Non-Cooperation Movement (1920-22): At the Calcutta session in Sep. 1920, the Congress resolved in favour of the Non-cooperation Movement and defined Swaraj as its ultimate aim (according to Gandhi). The movement envisaged the following: (i) the surrender of titles and honorary offices and resignations from nominated offices; (ii) refusal to attend government darbars and official functions and boycott of British courts by the lawyers; (iii) refusal of general public to offer themselves for military and other government jobs, and boycott of foreign goods etc. Gandhi, along with the Ali Brothers (of Khilafat Movement fame) undertook a nationwide tour during addressing of meetings. The educational boycott was specially successful in Bengal with Punjab too, responding under the leadership of Lala Lajpat Rai. Apart from educational boycott, there was boycott of law courts which saw major laws like Motilal Nehru, C.R. Das, C. Rajagopalachari, Sairuddin Kitchlu, Vallab Bh.

Beti Aruna Asaf Ali, etc. gave up their lucrative practices in their fields. The non-cooperation movement also saw picketing of shops selling foreign cloth and boycott of foreign cloth by the followers of Gandhiji. Another dramatic event during which the visit of the prince of Wales. The day he landed in India (in Bombay on Nov. 17, 1921) he was greeted with empty streets and downed shutters wherever he went.

The attack on a local police station by angry peasants at Chauri-Chaura in Garhmpur district of UP, on Feb. 5, 1922, changed the whole situation. Gandhi, shocked by Chauri-Chaura incident, withdrew the Non-Cooperation Movement on Feb. 12, 1922.

Swaraj Party (1923): Gandhi's decision to call off the agitation caused frustration among masses. His decision came in for severe criticism from his colleagues like Motilal Nehru, C. R. Dasand N.C. Kelkar, who organised the Swaraj Party. The foundations of the Swaraj party were laid on Jan. 1, 1923, as the 'Congress Khilafat-Swaraj Party'. It proposed then an alternative programme of diverting the movement from widespread civil disobedience programme to restrictive one which would encourage its member to enter into legislative councils (established under Mont-Ford Reforms of 1919) by contesting elections in order to wrack the legislature from within and to use moral pressure to compel the authority to concede to the popular demand for self-government. In the election held in 1923 the Swaraj Party captured 45 of the 145 seats. In provincial elections they secured few seats but in the Central Province they secured a clear majority. In Bengal, the Swaraj Party was the largest party. They followed the policy of undiluted opposition. The Swarajists demanded the release of all the political prisoners, provincial autonomy, repealing of the repressive laws imposed by the government. However, after the death of C.R. Das in 1925 they drifted towards a policy of cooperation with the government. This led to dissension and the party broke up in 1926.

Simon Commission (1927): The activities of the Swaraj Party had induced the British government to review the working of the dyarchy system introduced by the Montague-Chelmsford Reforms of 1919 and to report as to what extent an autonomous government could be introduced in India. The British government appointed the Simon Commission in Nov. 1927 for the task. All members of this commission were Europeans (Whites). Indian political leaders felt insulted and decided to boycott the commission. Wherever the commission went there were cries of 'Simon Go Back'. It was while leading a demonstration against the Simon Commission in Lahore that a fatal lathi-club was dealt to Lala Lajpat Rai. It was his death and his comrades were seeking revenge when they killed a white police official, Saunders in Dec. 1928.

Nehru Committee Report (1928): The Committee was set up under the chairmanship of Motilal Nehru to determine the principles of the constitution before actually drafting it. The chief architects of the report were Motilal Nehru and Taj Bahadur Sapru. The recommendation evoked a lively debate concerning the goal of India-Dominion Status or Complete Independence.

14 Points of Jinnah (March 9, 1929): Jinnah, the leader of Muslim League, did not accept the Nehru Report. Jinnah thereafter drew up a list of demands, which was called '14 points of Jinnah.'
Lahore Session (Dec., 1929): At its annual session held in Lahore in Dec. 1929, under the presidency of Jawaharlal Nehru, the Indian National Congress passed a resolution declaring ‘Poona Swaraj’ (Complete Independence) to be the goal of the national movement.

On Dec. 31, 1929, the newly adopted tricolour flag was unfurled and Jan. 26 was fixed as the Independence Day which was to be celebrated every year, please to the people not to submit to British rule any longer.

Dandi March/Salt Satyagraha (1930): To achieve the goal of ‘Complete Independence’, Gandhi launched another civil disobedience movement. Along with 78 followers, Gandhi started his famous march from Sabarmati Ashram on March 12, 1930 for the small village Dandi (Navsari District) to break the Salt Law. Gandhi covered a distance of 240 miles in 24 days (March 12 – April 5). On reaching the seaside on April 6, he broke the Salt Law by picking up salt from the seashore. By picking a handful of salt, Gandhi inaugurated the Civil Disobedience Movement – a movement that was to remain unsurpassed in the history of Indian National Movement for the countrywide mass participation it unleashed. The movement soon became so powerful that it sparked off patriotism even among the Indian soldiers in the army. The Carriol soldiers refused to fire on the people at Peshawar. Gandhi was arrested on May 5, 1930. This was followed by another round of boycott of foreign goods and it took the shape of a nationwide Civil Disobedience Movement in which ladies also participated. Soon thereafter followed repressive measures such as mass arrests, lathi-charge, police-firing etc. About 1,00,000 people went in jail.

The First Round Table Conference (1930): It was held in London on Nov 11, 1930, to discuss the Simon Commission, but was totally boycotted by the Indian National Congress. The Commission had proposed self-government in the provinces and federation of the provinces and federation of India and the princely states at the Centre. However, the representative of the Muslim League, Liberals and other parties had assembled for the discussion on the commission report. But in absence of the premier political party, the First Round Table Conference had to be adjourned to Jan. 2, 1931.

Gandhi–Irwin Pact/Delhi Pact (March 5, 1931): Early in 1931 two moderate statesmen, Subhas Chandra Bose and Jyotirindra, initiated efforts to bring about rapprochement between Gandhi and the government. Six meeting with Viceroy Lord Irwin finally called off the meeting and agreed to join the Second Round Table Conference. Regarding Gandhi–Irwin Pact, J. L. Nehru remarks, ‘This is the way the world ends with a bang, but a whimper’.

The Second Round Table Conference (1931): It was held in London during the presidency of Lord Willingdon during Sept. – Dec. 1931 and Gandhi attended Conference for the imperialist political forces, which ultimately controlled the British government in London, were opposed to any political or economic concession being failed as Gandhi could not agree with British Prime Minister Ramsay Mac Donald on his policy of communal representation and refusal of the British government on the basic Indian demand for freedom. The conference closed on Dec. 1, 1931.

The Communal Award/Mac Donald Award (Aug. 16, 1932): While Gandhi was arrested on his return from London after the Second Round Table Conference, British Prime Minister Ramsay Mac Donald announced his Award on communal representation in Aug. 16, 1932. Besides containing provisions for representation of Muslims, Sikhs and Europeans, it envisaged communal representation of Depressed Classes also. Gandhi was deeply grieved by this and underwent a fast in protest against this Award since it aimed to divide India on communal basis. While many political leaders saw the fast as a diversion from the ongoing political movement, all were deeply concerned and emotionally shaken. Almost everywhere in India mass meetings took place, political leaders of different persuasions, like Madan Mohan Malviya, B. R. Ambedkar and M. C. Raja became active. In the end the succeeded in hammering out an agreement, known as the Poona Pact.

Poona Pact/Gandhi–Ambedkar Pact (Sep. 24, 1932*): As discussed, the Communal Award created immense dissatisfaction among Hindus. Gandhi who was on fast in protest staked his life to get the Award repudiated. According to the pact, the idea of separate electorate for the Depressed Classes was abandoned but seats reserved for them in the provincial legislatures were increased from 71 in the Act to 148, and in the central legislature to 18% of the total. Ultimately the fast ended with the Poona Pact which annulled the Award. The leaders of the various groups and parties among Hindus, and B. R. Ambedkar on behalf of the harijans signed the pact. The Poona Pact between caste Hindus and the Depressed Classes agreed upon a joint electorate.

The Third Round Table Conference (Nov. 17–Dec. 24, 1932): It was held in 1932 but again proved fruitless since the national leaders were in prison.

The Government of India Act, 1935: The Simon Commission reported in 1930 formed the basis for the Government of India Act, 1935. The new Government of India Act received the royal assent on Aug. 4, 1935. The Act continued and extended all the existing features of earlier constitutional reforms. But in addition there were certain new principles introduced. It provided for a federal type of government. Thus, the act (i) Introduced provincial autonomy (ii) Abolished dyarchy in provinces (iii) Made ministers responsible to the legislature and federation at the centre. The Act of 1935 was condemned by nearly all sections of Indian public opinion and was unanimously rejected by the Congress. The Congress demanded itself the convening of a Constituent Assembly elected on the basis of adult franchise to frame a constitution for an independent India. Regarding the Government of India Act, 1935 J. L. Nehru remarks, ‘It was a new charter of Slavery’.

Although the Congress opposed the Act, yet it contested the elections when the constitution was introduced on April 1, 1937, and formed ministries, first in 6 provinces and then in another 2. The Muslim League was however, not happy with this constitution and was unanimously rejected by the Congress. The Congress demanded itself the convening of a Constituent Assembly elected on the basis of adult franchise to frame a constitution for an independent India. Regarding the Government of India Act, 1935 J. L. Nehru remarks, ‘It was a new charter of Slavery’.

Congress Ministries Resign (Dec. 22, 1939): The Second World War broke out in Europe on Sep. 3, 1939 that brought Britain also within its fold. Without consulting in India, the Viceroy declared India also as a belligerent country. This evoked sharp criticism from Indians and the Congress took the stand that India should not associate herself in a war said to be for democratic freedom when the Congress was drunk with power and was oppressive against Muslims.

Gazetteer of India (V–II) P.577
declared an independent nation. Then only would the country help Britain in the war. The Viceroy in his reply dated Oct. 17, 1939 rejected the Congress demand as impracticable and took the stand that the Government could think over the entire constitutional scheme after the war. The Congress condemned the Viceroy’s reply and the Congress ministries everywhere resigned on Dec. 22, 1939. Jinnah was happy over this and he called upon the Indian Muslims to celebrate the resigning day of Congress ministries as ‘the day of deliverance’.

Pakistan Resolution/Lahore Resolution (March 24, 1940): It was in 1930 that Iqbal suggested the union of the Frontier Province, Baluchistan, Sindh and Kashmir as Muslim state within the federations. This proved to be a creative idea which germinated during the early thirties to burst into vigorous life with the advent of the new reforms. The idealist Chaudhry Rehmat Ali developed this conception at Cambridge, where he inspired a group of young Muslims and invented the term ‘Pakistan’ (later ‘Pakistan’) in 1935. His ideas seemed visionary during that time, but within 7 years they turned into a political programme by Jinnah with the new name as its slogan or banner. The ideology of Iqbal, the vision of Rehmat Ali, and the fears of Muslims were thus united by the practical genius of Jinnah to blind Muslim together as never before during the British period and ultimately led to the vivisection of India and creation of Pakistan. Pakistan Resolution was an important landmark in this context. The Lahore session of the Muslim League, held on March 24, 1940, passed Pakistan Resolution and rejected the Federal scheme as envisaged in the government of India Act, 1935.

August Offer/Linlithgow Offer (Aug. 8, 1940): On Aug. 8, 1940, the Viceroy Linlithgow came out with certain proposals, known as August Offer declaring that the goal of British Government was to establish Dominion Status in India. It accepted that framing of a new constitution would be the responsibility of the Indians. It also laid down that full weight would be given to the views of minorities in the constitution. Maulana Abul Kalam Azad, President of the Congress, rejected the August Offer which aimed at bringing the Congress in the ongoing world war. The Muslim League, however welcomed the offer as it ensured that no further constitution would be adopted without the prior approval of Muslims. The League declared that the most difficult problem of India's future constitution could be solved only by the partition of India. In brief, the August Offer failed in gaining India’s cooperation for war and, in fact, further widened the gulf between the Congress and the Britishers as well as between the Congress and the Muslim League.

Individual Civil Disobedience/Individual Satyagraha (Oct., 1940 - Dec., 1941): The Congress Working Committee decided to start individual civil disobedience on Oct. 17, 1940. Vinoba Bhave was the first Satyagrahi who was arrested on Oct. 21, followed soon by many more including Nehru and Patel. But the movement created little enthusiasm and Gandhi suspended it.

The Cripps Mission (March-April 1942): In 1942, the British Government realized that it could not ignore the Indian problems any more. As a result of the World War, the situation worsened for the British with Japanese advance towards Indian borders. By March 7, 1942, Rangoon fell and Japan occupied the entire South-East Asia. The British government, with a view of getting cooperation from Indians sent Sir Stafford Cripps, a member of the British cabinet to India to settle terms with Indian leaders who were forthwith released. Cripps proposed Dominion Status after the war but his proposal was rejected by all the political leaders. As no party agreed to accept these proposals, the Cripps Mission ended in failure. Regarding the Cripps Mission proposal, Mahatma Gandhi remarks ‘A post-dated cheque on a crumbling bank’.

Quit India Movement (1942): On Aug. 8, 1942, the Congress in its meeting at Gawaliya Tank, Bombay passed a resolution known as ‘Quit India resolution’, whereby Gandhi asked the British to quit India and gave a call for ‘Do or die’ (We shall either free India or die in the attempt) to the countrymen. On Aug. 9, 1942 all the prominent leaders like Gandhi, Nehru, Patel, etc. were arrested but the rest most of (J.P., Lohiya, Aruna Ashaf Ali, Usha Mehta etc.) continued the revolutionary struggle. Violence spread throughout the country, several government offices were destroyed and damaged, the telegraph wires were cut and communication paralyzed. Parallel government were established in some places viz. 1. Ballia, U.R. (by Chittu Pandey) - first parallel govt. 2. Tamuluk, Midnapur Distt., Bengal (by Satis Samant) 3. Satara, Maharashtra (by Y.B. Chavan and Nana Patil) - the longest (term) parallel govt. 4. Talcher, Orissa. The movement was, however, crushed by the government.

Gandhiji’s Fast (Feb. 10 – March 7, 1943): Gandhi undertook a 21-day fast in jail. His condition deteriorated after 13 days and all hopes of his survival were given up. However, as a result of his moral strength and spiritual stamina, he survived and completed the 21-day fast. This was his answer to the government which had been constantly exhorting him to condemn the violence of the people in the Quit India Movement. Gandhi not only refused to condemn people resorting to violence but unequivocally held the government responsible for it.

C.R. Formula (1944): In 1944, Chakravarti Rajagopalachari (C.R.) proposed to appoint a commission to demarcate the districts in North-West and East where Muslims were in majority. In such areas, a plebiscite was proposed to be held on the basis of adult suffrage to decide the issue of separation. They would be given freedom if they favoured a sovereign state. In case of acceptance of partition, agreement was to be made jointly for safeguarding defence, commerce, communications etc. Muslim League was to endorse Congress demand for independence and cooperate in the formation of provisional government. Jinnah objected, as he wanted Congress to accept two-nation theory and wanted only Muslims of the North-West and East of India to vote in the plebiscite. Hindu Leaders led by V.D. Savarkar condemned the plan.

Wavell Plan and Shimla Conference (June 14–July 14, 1945): The war situation in Europe improved in the beginning of the year 1945. India's goodwill was, however, needed as the war against Japan was expected to last for about two years. The situation within the country was worsening day by day as a result of deteriorating economic situation and famines. The British Government was compelled to come forward with some sort of plan to satisfy the Indians. After consultations with the British Government on the Indian problem, Lord Wavell, chiefly concerned Viceroy's Executive Council, proposed certain changes in the structure of the council. One of the main proposals was that the Executive Council be constituted giving a balanced representation to the main communities in the country, including equal representation to Muslims and Hindus.
Soon after the Wavell Plan was issued the members of the Congress Working Committee were released from jails. A conference of 22 prominent Indian leaders called at Shimla to consider the Wavell Plan, reached no decision. What scuttled the conference was Mr. Jinnah's unflinching stand that the Muslim members approved only by the Muslim League should be included in the Executive Council. Communism thus again became a stumbling block. For the British, however, the dissension between the Congress and the Muslim League was a source of happiness.

**INA Trial (Nov., 1945):** P. K. Sehgal, Shah Nawaj Khan and Gurubaksh Singh Dhillion were put on trial at the Red Fort in Nov., 1945. To elucidate, despite the best efforts of the Congress to win the legal battle the trial of INA prisoners led to their outright conviction on the charge of waging war against the King Emperor. The pressure of the Indian public opinion against this conviction however, soon mounted high. This shook the British Government and it was compelled to suspend the sentences imposed on the INA convicts. Further, dissatisfaction spread fast among the soldiers. The chief defence advocate during the INA trial was Bhopalbhai Desai. Other defence lawyers were Tej Bahadur Sapru, Jawaharlal Nehru, Asaf Ali, and Md. Ali Jinnah.

**Azad Hind Fauj (Indian National Army - INA):**

The Japanese after defeating the British in South-East Asia, took a number of Indian soldiers as prisoners of war. In March, 1942, a conference of Indians was held in Tokyo, and they formed the Indian Independence League. At the Bangkok conference (June, 1942) Subhas Chandra Bose was elected President of the League. INA was a brain-child of Mohan Singh. INA was formed by Ras Behari Bose in 1942. In 1943, INA was reorganised by Subhas Chandra Bose. Subhas Chandra Bose had escaped to Berlin in 1941 and set up an Indian League there. In July, 1943, he joined the INA at Singapore. There Ras Behari Bose handed over the leadership to him. Provisional Government of Free India and INA was formed by Subhas Chandra Bose in Singapore on Oct. 21, 1943.

INA had 3 fighting brigades named after Subhas, Gandhi and Nehru. Rani Jhansi Brigade was an exclusively women force.

But with the defeat of Japan in 1945, the INA also died out.

Bose is said to have been killed in air crash over Taipei, Taiwan on his way to Tokyo in Aug., 1945.

**Royal Indian Navy (RIN)/Ratings Mutiny (Feb. 18, 1946):** On Feb. 18, 1946 Bombay Ratings of HMS Talwar struck work due to flagrant racial discrimination, unpuntable food and after the arrest of B.C. Dutt who had scrawled Quit India on the ship. On Feb. 19, HMS Hindustan, in Karachi also mutinied. Vallabh Bhai Patel and Jinnah jointly persuaded the Ratings to surrender on Feb. 23, 1946. The Britishers for the first time seriously realized that with this awakening among the Indians and revolt in armed forces, it could not perpetuate its hold on India any more.

**Cabinet Mission (March - June, 1946):** The British Prime Minister, Lord Attlee, made a declaration on March 15, 1946, that British Cabinet Mission would visit India to make recommendations regarding constitutional reforms to be introduced in India. The Cabinet Mission which included of Lord Patrick Lawrence, Stafford Cripps and A.V. Alexander visited India and met the representatives of different political parties, but a satisfactory solution to the constitutional difficulties could not be found. The mission envisaged the establishment of a Constituent Assembly to frame the constitution as well as an interim government. The Muslim League was to frame the plan on June 6, 1946, while maintaining its rights of striving for a separate Muslim state. The Congress also partially accepted the plan.

**Direct Action Campaign (Aug. 16, 1946):** Provoked by the success of the Congress in the voting for Constituent Assembly, the Muslim League launched a direct action campaign on Aug. 16, 1946, which resulted in widespread communal riots in the country.

**Interim Government (Sep. 2, 1946):** On Sep. 2, 1946, an interim government was formed. Congress members led by Pt. Jawaharlal Nehru joined it but the Muslim League did not, on the contrary it withdrew its earlier acceptance of the Cabinet Mission Plan.

**Formation of Constituent Assembly (Dec. 9, 1946):** The Constituent Assembly met on Dec. 9, 1946, and Dr. Rajendra Prasad was elected its President. The Muslim League did not join the Assembly.

**Attlee’s Announcement (Feb. 20, 1947):** On Feb. 20, 1947, British Prime Minister Attlee announced that the British would withdraw from India by June 30, 1948 and that Lord Mountbatten would replace Wavell.

**Mountbatten Plan (June 3, 1947):** In March, 1947, Lord Mountbatten replaced Lord Wavell. He announced his plan on June 3, 1947. His earlier Plan Balkan was abandoned for this June 3, Plan. It offered a key to the political and constitutional deadlock created by the refusal of Muslim League to join the Constituent Assembly formed to frame the constitution of India. Mountbatten's formula was to divide India but retain maximum unity. The country would be partitioned but so would be Punjab and Bengal, so that the limited Pakistan that emerged would meet both the Congress and the League's position to some extent. The League's position on Pakistan was conceded in that it would be created, but the Congress position on unity would be taken into account to make Pakistan as small as possible. He laid down detailed principles for the partition of the country and speedy transfer of political powers in the form of dominion status to the newly formed dominions of India and Pakistan. Its acceptance by the Congress and the Muslim League resulted in the birth of Pakistan.

**The Indian Independence Act, 1947:** The Bill containing the provisions of the Mountbatten Plan of June 3, 1947, was introduced in the British Parliament and passed as the Indian Independence Act, 1947. The Act laid down detailed measures for the partition of India and speedy transfer of political powers to the new governments of India and Pakistan.

**Integration of States:** By Aug. 15, 1947, all states except Kashmir, Junagadh and Hyderabad had signed the Instrument of Accession with India. The Maharaja of Kashmir acceded to India in Oct., 1947 when irregular Pakistani troops invaded his state. The Nawab of Junagadh was a Muslim whereas most of its people were Hindus. In Feb. 1948, through a referendum the people of this state decided to join India. The Nawab of Junagadh, therefore, left for Pakistan. The Nizam of Hyderabad was forced to accede to the Indian Union under the pressure of internal anarchy and military action against him in Sep., 1948.

**French Colonies:** By the end of 1954, French colonial rule in Pondicherry, Chandranagar, Mahe, Karaikal and Yanam came to an end. These territories were integrated with India.
**Miscellaneous Important Dates**

### I. Ancient

- BC 2500-1750: Indus Valley Civilization.
- 327-326: Alexander's invasion of India. It opened a land route between India and Europe.
- 322: Accession of Chandragupta Maurya.
- 305: Defeat of Seleucus at the hands of Chandragupta Maurya.
- 261: Conquest of Kalinga.
- 58: Beginning of Vikram era.

### AD

- 78: Beginning of Saka era.
- 78-101: Kanishka's reign.
- 319-320: Commencement of Gupta era.
- 380: Accession of Chandragupta II 'Vikramaditya'.
- 405-411: Visit of Chinese traveller Fa-hien.
- 415: Accession of Kumaragupta I.
- 455: Accession of Skandagupta.
- 608-647: Harshavardhan's reign.

### II. Medieval

- 712: First invasion in Sind by Arabs (Mod. Bin Qasim).
- 836: Accession of King Bhoja of Kannaaj.
- 985: Accession of Rajaraja, the Chola ruler.
- 998: Accession of Sultan Mahmud Ghazni.
- 1191: First Battle of Tarain.
- 1192: Second Battle of Tarain.
- 1206: Accession of Qutubuddin Aibak to the throne of Delhi.
- 1210: Death of Qutubuddin Aibak.
- 1221: Chengiz Khan invaded India (Mongol invasion).
- 1236: Accession of Razia Sultan to the throne of Delhi.
### Important Places

**Ahichhatra** : Originally *Ahikshetra* in Bareilly district of Uttar Pradesh was once the capital of Panchalas.

**Ahole** : In Karnataka contains chief sites of Chalukyan architecture—nearly 70 structural stone temples important in the development of Hindu architecture and sculpture.

**Ajanta Caves** : 66 miles north of Aurangabad in Maharashtra State. These are rock-cut Buddhist caves, 29 in number. These caves represent a record of unique painting, sculpture and architecture of the period from about the 2nd century B.C. to about 7th century A.D.

**Amaravati** : It is the legendary capital of Svarga. Also a historical site near modern Vijaywada, believed to have flourished under the Satavahana dynasty.

**Arikamedu** : It was a sea-port near Pondicherry in Chola times.

**Ayodhya** : A few miles from modern Faizabad, near Lucknow, was capital of the Kosala and the Solar kings of ancient India. Rama was the most prominent among them.

**Badami (or Vatapi)** : In Karnataka is well-known for Chalukyan sculpture found in the cave temples here. These are groups of Hindu temples dating back to 7th or in the cave temples here. These are groups of Hindu temples dating back to 7th or 8th century and are examples of pure Dravidian architecture. Besides cave temples and rock-cut pillared halls, there is also the famous Malegitti Shivalaya temple.

**Belur** : In Karnataka is famous for its elaborately sculptured Cheena Kesava temple of the Hoysala period.

**Bhubaneswar** : In Orissa is known for ancient temples viz., Rajarani; Lingraja; Brahmesvara.

**Bodh Gaya** : It is situated 6 miles south of Gaya in Bihar State on the western bank of the Falgu river and connected by two metalled roads. It is famous as the
Madurai: Popularly known as the “City of Festivals”, was till the 14th century the capital of the Pandyan kingdom which had sea-borne trade with Rome and Greece. It is famous for Minakshi temple.

Mambalam (now Mahabalipuram): Situated 53 miles from Chennai, it is known for rock-cut temples, monolithic figures and carvings of the 7th and 8th centuries A.D. The chief points of interest here are the Five Rathas or temples modelled as chariots—“Arjuna Ratha”, “Draupadi Ratha”, “Dharmaraja Ratha” etc. Also famous for Shore temple.

Mandu: In Madhya Pradesh. It is one of the largest mediaeval city sites. It has extensive remains—fortifications and palaces—a synthesis of Hindu and Muslim styles in architecture and painting; Jama Masjid (of Mandu).

Mithila: It was the home of the three scholar sages—Gargi, Maitrey and Kapila. It was the capital town of Raja Janak’s territory.

Mohenjodaro: In the Larkana district of Sind (now in Pakistan) is the site of excavation revealing Indus Valley Civilization.

Nalanda: In Bihar was the seat of an ancient Buddhist University. It contains a group of Buddhist temples and monasteries.

Patan: In Saurashtra is famous for its holly hill Shatrunjaya. It is the most sacred place for Shvetambara Jains.

Pandharpur: It is in Sholapur district (Maharashtra State). It stands on Bhima river and is one of the most sacred places of pilgrimage in the State.

Paharpur (or Somnath): In Gujarat is the site of the famous Somnath temple which was destroyed by Mahmud Ghaznavi.

Pragjyotishpur: Was the capital of an ancient tribal kingdom in Kamarupa or modern Assam.

Rajgar: 8 miles south-west of Nalanda by road is an important place of pilgrimage for Buddhists. It was the capital of Bimbisara in ancient times. The Buddha preached at Rajgir, and so did Mahavira, the great preceptor of the Jains.

Sanchi: In Madhya Pradesh is famous for the largest and the most well-preserved Buddhist Stupa (108-foot in diameter and 42-foot in height).

Sarnath: Near Varanasi is the place where the Buddha delivered his first sermon after he became the “Enlightened One”. The place is known for Buddhist temples and remains.

Seringapatam: In Karnataka was the ancient capital of Tipu Sultan. (Now known as Seringapatnam.)

Somnathpuram: In Karnataka is known for temples of Hoysala period, Kesava temple.

Sravanbelgola: In Karnataka is famous for its Jain temples and the colossal statue of Gomateswara (Bahubali)—65-foot high erected in A.D. 983, the tallest monolithic in the world.

Sringeri: In Karnataka is a place of pilgrimage on the banks of Tung river where the great philosopher Shankara founded one of the principal maths (monasteries).

Tamralipti: A flourishing sea port in ancient India.
Tanjore: Was the capital of Cholas. It is situated in the delta of the Cauvery in Tamil Nadu. Also known for Brihadeeswara temple.

Taxila: Ancient capital of Gandhara and one of the most renowned cities of ancient north-west India.

 Tirupati: In Andhra Pradesh State, situated about 100 miles to the north-west of Chennai is one of the holiest places in South India. This hill temple of Sri Venkateswara is an example of early Dravidian architecture and is one of the finest in the south.

Ujjain: Known to be the seat of king Vikrama, it is situated on the bank of Sipri river in Madhya Pradesh. It is one of the seven sacred cities also known as Avanti. The Oriental Museum here has some valuable manuscripts and pieces of sculpture. Mahakaleshwar temple here is known as a pilgrimage centre.

Vaishali: In the district of Vaishali in Bihar was the capital of famous Vajji kingdom in ancient times.

 Vallapi: See Badami.

Vikramasila: Was a great Tantrik University established by the Pala King Dharmapala in A.D. 810. It was a hotbed of moral corruption, sorcery and idolatry, and killed all the monks in the university.

**Association of Places**

<table>
<thead>
<tr>
<th>Place</th>
<th>Associated with</th>
<th>Place</th>
<th>Associated with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bardoli</td>
<td>Sandar Patel</td>
<td>Pondicherry</td>
<td>Aurobindo Ghosh</td>
</tr>
<tr>
<td>Belur</td>
<td>Rama Krishna Paramhans</td>
<td>Porbandar</td>
<td>Mahatma Gandhi</td>
</tr>
<tr>
<td>Chittur</td>
<td>Rana Pratap</td>
<td>Raigat</td>
<td>Mahatma Gandhi</td>
</tr>
<tr>
<td>Fatehpur Sikri</td>
<td>Akbar the Great</td>
<td>Sabarmati</td>
<td>Mahatma Gandhi</td>
</tr>
<tr>
<td>Jallianwala</td>
<td>on April 13, 1919</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haldighati</td>
<td>Rana Pratap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kapilvastu</td>
<td>Mahatma Buddha</td>
<td>Shanti Van</td>
<td>Jawahar Lal Nehru</td>
</tr>
<tr>
<td>Lumbini</td>
<td>Mahatma Buddha</td>
<td>Shantiiketan</td>
<td>Rabindranath Tagore</td>
</tr>
<tr>
<td>Macedonia</td>
<td>Alexander the Great</td>
<td>Talwandi</td>
<td>Guru Nanak</td>
</tr>
<tr>
<td>Mecca</td>
<td>Prophet Mohammad</td>
<td>Ujjain</td>
<td>Mahavira</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vindabhan (U.P.)</td>
<td>Lord Krishna</td>
</tr>
</tbody>
</table>

**Important Foreign Travellers/Envoys**

Megastrhenes (302-298 BC): An ambassador of Seleucus Nikator, who visited the court of Chandragupta Maurya. He wrote an interesting book 'Indica' in which he gave a vivid account of Chandragupta Maurya's reign.

Fa-Hien (405-411 AD): He came to India during the reign of Chandragupta II of the Maurya Dynasty. The object of his visit was to see the holy places of Buddhism and to collect Buddhist books and relics. He was the first Chinese pilgrim to visit India.

Hiuen-Tsang (630-645 AD): He visited India during the reign of Harshavardhana.

I-Tsing (671-685 AD): A Chinese traveller, he visited India in connection with Buddhism. His work 'Biographies of Eminent Monks' provides us useful information about the social, religious and cultural life of the people of this country.

Al-Masudi (957 AD): An Arab traveller, he has given an extensive account of India in his work 'Muruj-ul-Zahab'.

Al-beruni (1024-1030 AD): His real name was Abu Rehan Mahamud and he travelled around with Mahmud of Ghazni during one of his Indian raids. He came to India and wrote a book 'Tahqiq-i-Hind'. The book deals with the social, religious and political conditions in India.

Marco Polo (1292-1294 AD): A Venetian traveller, he visited South India in 1294 during the reign of Pandyan ruler of Madurai, Madverman Kulsekhara (1272-1311 AD). His work 'The Book of Sir Marco Polo' gives an invaluable account of the economic history of India.

Ibn Batuta (1333-1347 AD): A Morrist traveller, he visited India during the reign of Muhammad-bin-Tughlaq. His book 'Rehla' (the Travels) throws a lot of light on the reign of Muhammad-bin-Tughlaq and the geographical, economic and social conditions in India.

Shihbuddin al-Umar (1348 AD): He came from Damascus. He gives a vivid account of India in his book, 'Masalik albsar fi-namalik al-ansar'.

Niccolò Conti (1420-1421 AD): A Venetian traveller, he gives a comprehensive account of the Hindu kingdom of Vijayanagar.

Abdur Razzaq (1443-1444 AD): He was a Persian traveller, who came to India and stayed at the court of the Zamorin of Calicut. He gives a vivid account of the Vijayanagar empire, especially of the city. He describes the wealth and luxurious life of the king and the nobles.

Athanasius Nikitin (1470-1474 AD): He was a Russian merchant, who visited South India in 1470. He describes the condition of the Balami kingdom under Muhammad III (1463-82).

Duarte Barbosa (1500-1516 AD): He was a Portuguese traveller. He has given a valuable narrative of the government and the people of the Vijayanagar empire.

Domíngo Paes (1520-1522 AD): He was Portuguese traveller, who visited the court of Krishnadeva Raya of the Vijayanagar Empire.

Fernão Nuniz (1535-1537 AD): A Portuguese merchant, who visited the Vijayanagar empire. He wrote the history of the empire from its earliest times of the closing years of Achyutadeva Raya's reign.

John Hughen Von Linschotten (1583 AD): He was a Dutch traveller, who has given a valuable account of the social and economic life of South India.

William Hawkins (1608-1611 AD): He was English ambassador of the British King James I to the court of Jahangir (1609).

Sir Thomas Roe (1615-1619 AD): He was an ambassador of James I, King of England, at the court of Jahangir, the Mughal emperor.

Francisco Palsaert (1620-1627 AD): He was a Dutch traveller, who stayed at Agra and gave a vivid account of the flourishing trade at Surat, Ahmedabad, Broach, Cambay, Lahore, Multan etc.

Peter Mundy (1630-34 AD): He was an Italian traveller to the Mughal empire in the reign of Shahjahan. He gives valuable information about the living standard of the common people in the Mughal Empire.

John Albert de Mendesto (1638 AD): He was a German traveller, who reached Surat in 1638.
Jeen Baptiste Tavernier (1638-1663 AD): He was a French traveller, who visited India six times. His account covers the reign of Shahjahan and Aurangzeb.

Nicolao Manucci (1633-1708 AD): He was an Italian traveller, who got service at the court of Dara Shikoh.

Franois Bernier (1656-1717 AD): He was French physician and philosopher.

Danishmand Khan, a noble of Aurangzeb was his patron.

Jean de Thevenot (1666 AD): He was French traveller, who has given a good account of cities like Ahmedabad, Cambay, Aurangabad and Golconda.

John Fryer (1672-1685 AD): He was an English traveller, who has given a vivid account of Surat and Bombay.

Gemelli Careri (1695 AD): He was an Italian traveller who landed at Daman. His remarks on the Mughal emperor's military organisation and administration are important.

### Abbreviated or Alternative Names

<table>
<thead>
<tr>
<th>Abbreviated/Alternative Name</th>
<th>Original Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhras Kesari</td>
<td>T. Prakasam</td>
</tr>
<tr>
<td>Amru</td>
<td>C.N. Annadurai</td>
</tr>
<tr>
<td>Badshah Khan</td>
<td>Abdul Ghafir Khan</td>
</tr>
<tr>
<td>Bapu, Mahatma Gandhi</td>
<td>Mohan Das Karam Chand Gandhi</td>
</tr>
<tr>
<td>Beacon of Light of Asia</td>
<td>Subhash Chandra Bose</td>
</tr>
<tr>
<td>Chachi</td>
<td>Jawahar Lal Nehru</td>
</tr>
<tr>
<td>C.R.</td>
<td>C. Rajagopalanchari</td>
</tr>
<tr>
<td>Deenbandhu</td>
<td>C.F. Andrews</td>
</tr>
<tr>
<td>Deshbandhu</td>
<td>C.R. Das</td>
</tr>
<tr>
<td>Enlightened One, The</td>
<td>Mahatma Buddha</td>
</tr>
<tr>
<td>Father of Indian Unrest</td>
<td>Bal Gangadhar Tilak</td>
</tr>
<tr>
<td>Father of the Local Self-government</td>
<td>Lord Ripon</td>
</tr>
<tr>
<td>Father of the Nation (India)</td>
<td>Mahatma Gandhi</td>
</tr>
<tr>
<td>Frontier Gandhi</td>
<td>Abdul Ghafir Khan</td>
</tr>
<tr>
<td>Grand Old Man of India</td>
<td>Dadabhai Naoroji</td>
</tr>
<tr>
<td>Gurunder</td>
<td>Rabindranath Tagore</td>
</tr>
<tr>
<td>Indian Bismarck</td>
<td>Surdar Vallabhba Patel</td>
</tr>
<tr>
<td>Indian Einstein</td>
<td>Nagarjuna</td>
</tr>
<tr>
<td>Indian Napoleon</td>
<td>Samudragnaptu</td>
</tr>
<tr>
<td>J.P. Lokkenayak</td>
<td>Jayapradaksh Narayan</td>
</tr>
<tr>
<td>Lal, Bal, Pal</td>
<td>Lala Leipat Rai, Bal Gangadhar Tilak and Bipin Chandra Pal</td>
</tr>
<tr>
<td>Liberator of the Indian Press</td>
<td>Sir Charles Metcalfe</td>
</tr>
<tr>
<td>Lion of Punjab (Sher-i-Punjab)</td>
<td>Lala Leipat Rai</td>
</tr>
<tr>
<td>Lokmnaya</td>
<td>Bal Gangadhar Tilak</td>
</tr>
<tr>
<td>Maharana</td>
<td>Pt. Mian Mohan Malaviya</td>
</tr>
<tr>
<td>Martin Luther of India</td>
<td>Dayanand Saraswati</td>
</tr>
</tbody>
</table>

### Important Sayings

- Dayanand Saraswati: "Back to Vedas."
- Mahatma Gandhi: "Dharma Chakra Pravartana."
- Mahatma Gandhi (while launching Quit India movement in 1942): "Do or Die."
- Mahatma Gandhi (in his address to soldiers of Azad Hind Fauj): "Give me blood and I will give you freedom."
- Subhash Chandra Bose: "My ultimate aim is to wipe every tear from every eye."
- Jawahar Lal Nehru: "Swaraj is my birthright and I will have it."
- Jawahar Lal Nehru: "Every blow that is hurled on my back will be a nail in the coffin of the British Empire."
- Bal Gangadhar Tilak: "The Congress is tottering to its fall and one of my greatest ambitions while in India is to assist it to a peaceful demise."

### Important Battles

<table>
<thead>
<tr>
<th>Name of the Battle</th>
<th>Year</th>
<th>Battle between</th>
<th>Won by</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battle of Hydaspes</td>
<td>326 BC</td>
<td>Alexander and Porus</td>
<td>Alexander</td>
<td>Fought on the bank of the Jhelum, which is called 'Hydaspes' in Greek; opened relations between India and the West.</td>
</tr>
<tr>
<td>Kalinga War</td>
<td>260 BC</td>
<td>Ashoka and King of Kalinga</td>
<td>Ashoka</td>
<td>Vast destruction and bloodshed changed the attitude of Ashoka and the embraced Buddhism.</td>
</tr>
<tr>
<td>First Battle of Tarain or Thaneswar</td>
<td>1191 AD</td>
<td>Prithviraj Chauhan and Mohd Ghori</td>
<td>Prithviraj Chauhan</td>
<td>Establishment of an Islamic empire in India</td>
</tr>
<tr>
<td>Second Battle of Tarain</td>
<td>1192 AD</td>
<td>— do —</td>
<td>Mohd. Ghori</td>
<td>Onset of the Mughal empire in India.</td>
</tr>
<tr>
<td>First Battle of Panipat</td>
<td>1526 AD</td>
<td>Ibrahim Lodhi and Babur</td>
<td>Babur</td>
<td></td>
</tr>
<tr>
<td>Battle of Khanwa</td>
<td>1527 AD</td>
<td>Babur and Rana Sanga</td>
<td>Babur</td>
<td></td>
</tr>
<tr>
<td>Name of the Event</td>
<td>Year</td>
<td>Battle between</td>
<td>Won By</td>
<td>Significance</td>
</tr>
<tr>
<td>-------------------</td>
<td>------</td>
<td>----------------</td>
<td>--------</td>
<td>--------------</td>
</tr>
<tr>
<td>Battle of Chausa</td>
<td>1539 AD</td>
<td>Sher Shah and Humayun</td>
<td>Sher Shah</td>
<td>Sher Shah became emperor of India.</td>
</tr>
<tr>
<td>Secound Battle of Panipat</td>
<td>1556 AD</td>
<td>Akbar and Hemu</td>
<td>Akbar</td>
<td>Ending Afghan rule, strengthened Mughal rule.</td>
</tr>
<tr>
<td>Battle of Talikota</td>
<td>1565 AD</td>
<td>Combined forces of Muslim rulers of Deccan and Ramraj of Vijayanagar</td>
<td>Akbar</td>
<td>Destroyed Hindu kingdom of the Deccan; sealed the fortunes of Vijayanagar empire.</td>
</tr>
<tr>
<td>Battle of Haldighati</td>
<td>1576 AD</td>
<td>Rana Pratap and Akbar</td>
<td>Akbar</td>
<td>Rana Pratap fought gallantly and took refuge in a remote fortress.</td>
</tr>
<tr>
<td>Battle of Samugarh</td>
<td>1659 AD</td>
<td>Aurangzeb and Imperial forces led by Dara</td>
<td>Aurangzeb</td>
<td>Aurangzeb captured the Mughal throne.</td>
</tr>
<tr>
<td>Battle of Plassey</td>
<td>1757 AD</td>
<td>Sirajuddaula and English forces under Clive</td>
<td>Clive</td>
<td>Fought at Plassey. The English became masters of Bengal; foundation of British rule.</td>
</tr>
<tr>
<td>Third Battle of Plassey</td>
<td>1761 AD</td>
<td>Ahmed Shah Abdali and Marathas</td>
<td>Ahmed Shah Abdali</td>
<td>Gave a setback to Marathas in the north; sealed destiny of Mughal empire and made British entry easier.</td>
</tr>
<tr>
<td>Battle of Buxar</td>
<td>1764 AD</td>
<td>Joint forces of Muslim and English forces</td>
<td>English forces</td>
<td>Led to English occupation of India.</td>
</tr>
<tr>
<td>Third Mysore War</td>
<td>1790-1792 AD</td>
<td>Tipu Sultan and English forces</td>
<td>Tipu Sultan</td>
<td>Tipu Sultan had to sign treaty of Seringapatam.</td>
</tr>
<tr>
<td>Fourth Mysore War</td>
<td>1799 AD</td>
<td>English forces and Tipu Sultan</td>
<td>English forces</td>
<td>Fought at Malavalli and brought the Mohammedan dynasty of Mysore to end.</td>
</tr>
<tr>
<td>Second Sikh War</td>
<td>1848-1849 AD</td>
<td>Sikh forces and English forces</td>
<td>English forces</td>
<td>Sikh kingdom came under the British.</td>
</tr>
</tbody>
</table>

### Reforms/Acts

<table>
<thead>
<tr>
<th>Nomenclature of the Acts</th>
<th>Year</th>
<th>During the term of</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prohibition of Sati &amp; Female infanticide</td>
<td>1829</td>
<td>Lord Bentick</td>
<td>Supported by Raja Rammohan Roy.</td>
</tr>
<tr>
<td>Doctrine of Lapse</td>
<td>1848</td>
<td>Lord Dalhousie</td>
<td>Adoption of sons by rulers in the absence of their natural heirs was banned.</td>
</tr>
<tr>
<td>Widow Remarriage Act</td>
<td>1856</td>
<td>Lord Canning</td>
<td>Legalized the marriage of Hindu widow, Supported by Ishwarchandra Vidyasagar.</td>
</tr>
<tr>
<td>Indian Councils Act</td>
<td>1861</td>
<td>Lord Canning</td>
<td>Envisaged association of Indians with the administration at higher level.</td>
</tr>
<tr>
<td>Albert Bill</td>
<td>1883</td>
<td>Lord Ripon</td>
<td>To bring Indian and European magistracy on equal footing.</td>
</tr>
</tbody>
</table>

### Educational Committees/Commissions

<table>
<thead>
<tr>
<th>Year</th>
<th>Chairman</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1882</td>
<td>William Hunter</td>
<td>To study the development in education.</td>
</tr>
<tr>
<td>1902</td>
<td>Thomas Raleigh</td>
<td>To study the Universities and introduce reforms.</td>
</tr>
</tbody>
</table>
### Viceroy
<table>
<thead>
<tr>
<th>Viceroy</th>
<th>Committee/Commission</th>
<th>Year</th>
<th>Chairman</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lord Chelmsford</td>
<td>Calcutta University Commission</td>
<td>1917</td>
<td>Michael Sadler</td>
<td>To study the condition of the University.</td>
</tr>
<tr>
<td>Lord Reading</td>
<td>Indian Disbandment Committee</td>
<td>1923</td>
<td>Lord Itcheap</td>
<td>To discuss the Central Committee of Education.</td>
</tr>
<tr>
<td>Lord Wavell</td>
<td>Sargeant Plan</td>
<td>1944</td>
<td>John Sargeant</td>
<td>To raise the standard of Education like Britain.</td>
</tr>
</tbody>
</table>

#### Famine Commissions
<table>
<thead>
<tr>
<th>Viceroy</th>
<th>Commission</th>
<th>Year</th>
<th>Chairman</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lord Lyttel</td>
<td>Famine Commission</td>
<td>1880</td>
<td>Richard Strachey</td>
<td>To give relief of famine stricken.</td>
</tr>
<tr>
<td>Lord Elgin</td>
<td>Famine Commission</td>
<td>1897</td>
<td>James Lyall</td>
<td>To give suggestion on earlier reports.</td>
</tr>
<tr>
<td>Lord Curzon</td>
<td>Famine Commission</td>
<td>1900</td>
<td>Anthony McDonnell</td>
<td>To give the suggestion on famine report.</td>
</tr>
<tr>
<td>Lord Wavell</td>
<td>Famine Inspection Commission</td>
<td>1943-44</td>
<td>John Woodhood</td>
<td>To investigate in the events of Bengal Famine.</td>
</tr>
</tbody>
</table>

#### Economic Committees/Commissions
<table>
<thead>
<tr>
<th>Viceroy</th>
<th>Commission</th>
<th>Year</th>
<th>Chairman</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lord Lansdown</td>
<td>Harshell Committee</td>
<td>1893</td>
<td>Herschell</td>
<td>To give suggestion regarding currency.</td>
</tr>
<tr>
<td>Lord Lansdown</td>
<td>Opium Commission</td>
<td>1893</td>
<td></td>
<td>To investigate about the effect of opium on health.</td>
</tr>
<tr>
<td>Lord Elgin</td>
<td>Henry Fowler Commission</td>
<td>1898</td>
<td>H. Fowler</td>
<td>To give suggestion on currency.</td>
</tr>
<tr>
<td>Lord Curzon</td>
<td>Irrigation Commission</td>
<td>1901</td>
<td>Sir Wolvin Scott Monkaj</td>
<td>To plan for the expenditure on Irrigation.</td>
</tr>
<tr>
<td>Lord Hardinge</td>
<td>Macclagan Committee</td>
<td>1914-15</td>
<td>Macclagan</td>
<td>To advise for cooperative finances.</td>
</tr>
<tr>
<td>Lord Irwin</td>
<td>Linlithgow Commission</td>
<td>1928</td>
<td></td>
<td>To study the problem in agriculture. (Report by Linlithgow).</td>
</tr>
<tr>
<td>Lord Irwin</td>
<td>Whitlay Commission</td>
<td>1929</td>
<td>J.H. Whitlay</td>
<td>To study the condition of labour in Industries and gardens.</td>
</tr>
<tr>
<td>Lord Welligdon</td>
<td>Indian Measurement Committee</td>
<td>1935</td>
<td>Lary Hamand</td>
<td>To arrange for inclusion of labour in Federal Assembly.</td>
</tr>
<tr>
<td>Lord Linlithgow</td>
<td>National Planning Committee</td>
<td>1938</td>
<td>Jawaharlal Nehru</td>
<td>To prepare economic plan.</td>
</tr>
</tbody>
</table>

#### Administrative Committees/Commissions
<table>
<thead>
<tr>
<th>Viceroy</th>
<th>Committee</th>
<th>Year</th>
<th>Chairman</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lord Dufferin</td>
<td>Etkinson Commission</td>
<td>1886</td>
<td>Charles Etkinson</td>
<td>To involve more Indians in Civil Service.</td>
</tr>
</tbody>
</table>

### Indian History
<table>
<thead>
<tr>
<th>Year</th>
<th>Chairman</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1902</td>
<td>Fraser Commission</td>
<td>Fraser</td>
</tr>
<tr>
<td>1912</td>
<td>Lord Islington</td>
<td>Royal Commission on Civil Service</td>
</tr>
<tr>
<td>1924</td>
<td>Lord Lee</td>
<td>Royal Commission</td>
</tr>
<tr>
<td>1926</td>
<td>Andrews Skeen</td>
<td>Sandhurst Committee</td>
</tr>
<tr>
<td>1927</td>
<td>Hercourt Butler</td>
<td>Butler Committee</td>
</tr>
</tbody>
</table>

#### Important Congress Session
<table>
<thead>
<tr>
<th>Year</th>
<th>Place</th>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1906</td>
<td>Bombay</td>
<td>At Gokuldas Tejpal Sanskrit College, 72 delegates.</td>
</tr>
<tr>
<td>1908</td>
<td>Calcutta</td>
<td>436 delegates.</td>
</tr>
<tr>
<td>1907</td>
<td>Madras</td>
<td>Tayabji became first Muslim President.</td>
</tr>
<tr>
<td>1908</td>
<td>Allahabad</td>
<td>George Yule became first English President.</td>
</tr>
<tr>
<td>1910</td>
<td>Bombay</td>
<td>Congress represented all areas of British India.</td>
</tr>
<tr>
<td>1913</td>
<td>Calcutta</td>
<td>Decision taken to organise a session of Congress in London.</td>
</tr>
<tr>
<td>1915</td>
<td>Poona</td>
<td>Demand for a representative body only for educated class.</td>
</tr>
<tr>
<td>1918</td>
<td>Madras</td>
<td>Social reform was set as the main goal.</td>
</tr>
<tr>
<td>1918</td>
<td>Surat</td>
<td>Congress split.</td>
</tr>
<tr>
<td>1918</td>
<td>Madras</td>
<td>Constitution for the Congress.</td>
</tr>
<tr>
<td>1915</td>
<td>Lucknow</td>
<td>Congress merger. Pact with Muslim League, Gandhi attended.</td>
</tr>
<tr>
<td>1917</td>
<td>Calcutta</td>
<td>Annie Besant became 1st women President.</td>
</tr>
<tr>
<td>1920</td>
<td>Nagpur</td>
<td>Gandhian programme was adopted. Change in congress constitution.</td>
</tr>
<tr>
<td>1921</td>
<td>Ahmedabad</td>
<td>Hasrat Mohani demanded for complete independence.</td>
</tr>
<tr>
<td>1922</td>
<td>Gaya</td>
<td>Formation of Swaraj Party.</td>
</tr>
<tr>
<td>1924</td>
<td>Belgaum</td>
<td>Gandhi became President.</td>
</tr>
<tr>
<td>1925</td>
<td>Kanpur</td>
<td>Sarojini Naidu became 1st Indian women President.</td>
</tr>
<tr>
<td>1927</td>
<td>Madras</td>
<td>Nehru and S. C. Bose moved resolution for independence and it was passed for the 1st time.</td>
</tr>
<tr>
<td>1928</td>
<td>Calcutta</td>
<td>First All India Youth Congress.</td>
</tr>
<tr>
<td>1929</td>
<td>Lahore</td>
<td>'Poorna Swaraj' (Complete Independence) resolution and pledge for Independence day on 26 January 1930.</td>
</tr>
<tr>
<td>1936</td>
<td>Lucknow</td>
<td>Support for socialism through democracy.</td>
</tr>
<tr>
<td>1937</td>
<td>Faizpur</td>
<td>Demand for Constituent Assembly.</td>
</tr>
<tr>
<td>1938</td>
<td>Haripura</td>
<td>Purna Swaraj was to cover also princely states.</td>
</tr>
<tr>
<td>1939</td>
<td>Tripuri</td>
<td>S. C. Bose resigned due to difference with Gandhi, after resignaion Rajendra Prasad became President of INC.</td>
</tr>
</tbody>
</table>
Governors of Bengal (1757-74)

Robert Clive: Governor of Bengal during 1757-60 and again during 1765-72.

Vanistart (1760-65): The Battle of Buxar (1764).

Cartier (1769-72): Bengal Famine (1770).


Governor-Generals of Bengal (1774-1833)

Warren Hastings (1774-85): Became Governor-General in 1774 through the Regulating Act, 1773; Wrote introduction to the first English translation of the Gita by Charles Wilkins; Founded the Asiatic Society of Bengal with William Jones in 1784.

Revenue Reforms: Auctioned the right to collect land revenue to the highest bidder; Divided Bengal into districts and appointed collectors and other revenue officials.

Judicial Reforms: Started Diwani and Faujdari adalats at the district level and Sadar diwani and Nizamat adalats (appellate courts) at Calcutta; Redefined Hindu and Muslim laws; A translation of the code in Sanskrit appeared in 1776 under the title of "Code of Gentoo laws".

Wars: Rohilla War (1774); 1st Anglo-Maratha War (1776-82); 2nd Anglo-Mysore War (1780-84).

Lord Cornwallis (1786-93): First person to codify laws in 1793. The code separated the revenue administration from the administration of justice; Created the post of district judge; Introduced Permanent Settlement in Bengal (1793); Cornwallis is called "the father of civil service in India".

Wars: 3rd Anglo-Mysore War (defeat of Tipu and the Treaty of Seringapatam, 1792)

Sir John Shore (1793-98): Introduced the 1st Charter Act (1793).

Wars: Battle of Khurda between Nizam and the Marathas (1795)

Lord Wellesley (1798-1805): Started Subsidiary Alliance system to achieve British paramountcy in India. Nizam Ali (Nizam of Hyderabad) was the first Indian native ruler to accept the system of subsidiary Alliance (1798); Madras Presidency was formed during his tenure.

Wars: 4th Anglo-Mysore War (1799)—defeat and the death of Tipu Sultan; 2nd Anglo-Maratha War (1803-05)—defeat of the Scindia, the Bhonsle and the Holkar.

George Barlow (1805-1807): Vellore Mutiny (1806)

Lord Minto I (1807-1813): Concluded Treaty of Amritsar with Ranjit Singh (1809); Charter Act of 1813 was passed.

Lord Hastings (1813-1823): Adopted the policy of intervention and war.

Wars: Anglo-Nepalese War (1816-23); 3rd Anglo-Maratha War (1817-18). Hastings forced humiliating treaties on Peshawa and the Scindia; Introduced the Ryotwari settlement in Madras by Thomas Munro, the Governor-General.

Indian History

Lord Amherst (1823-28): Wars: 1st Burmese War (1824-26); Acquisition of territories in Malay Peninsula; Capture of Bharatpur (1826).

Lord W. Bentick (1828-33): Most liberal and enlightened Governor-General of India; Regarded as 'the Father of Modern Western Education in India'; Abolished Sati and other cruel rites (1829); Annexation of Mysore (1831). Concluded a treaty of perpetual friendship with Ranjit Singh (1831); Passed the Charter Act of 1833, of which provided that no Indian subject of Company was to be debarred from holding an office on account of his religion, place of birth, descent and colour.

Governor Generals of India (1833-58)

Lord W. Bentick (1833-35): Macaulay's minutes on education were accepted declaring that English should be the official language of India; Abolished provincial courts of appeal and circuit set up by Cornwallis, appointment of commissioners of revenue and circuit.

Wars: Annexed Coorg (1834), Central Cachar (1834) on the plea of misgovernment.

Sir Charles Metcalfe (1834-1836): Passed the famous Press Law, which liberated the press in India.

Lord Auckland (1836-42): 1st Anglo-Afghan War (1836-42)—great blow to the prestige of the British in India.

Lord Ellenborough (1842-44): Brought an end to the Afghan War; Annexation of Sindh (1843); War with Gwalior (1843); Abolished slavery (1843).

Lord Hardinge (1844-48): 1st Anglo-Sikh War (1845-46) and the Treaty of Lahore, 1846 (marked the end of Sikh sovereignty in India); Gave preference to English educated in employment.


Wars: Introduced Doctrine of Lapse (Captured Satara (1848), Jaitpur and Sambhalpur (1849), Baghat (1850), Udaipur (1852), Jhansi (1853) and Nagpur (1854); Fought 2nd Anglo-Sikh War (1848-49) and annexed the whole of the Punjab; 2nd Anglo-Burmese War (1852) and annexation of Lower Burma or Pegu; Annexation of Berar in 1853; Annexation of Awadh in 1856 on charges of mal-administration.

Administrative Reforms: Introduced the system of Centralized control in the newly acquired territories known as Non-Regulation system; Raised Gurkha regiments.

Educational Reforms: Recommended the Thomsonian system of Vernacular education for whole of the Northwestern Provinces (1853); Wood's Educational Despatch of 1854 and opening of Anglo-Vernacular Schools and Government Colleges; An Engineering College was established at Roorkee.

Public Works: Started the first railway line in 1853 (connecting Bombay with Thana); Started electric telegraph service. Laid the basis of the modern postal system; Started a separate public works department was set up for the first time (1854); A separate public works department and developed the harbours of Karachi, Bombay and Calcutta.
Indian History

Lyall Commission appointed after famine (1897), Assassination of two British officials—Rand and Amherst—by Chapekar Brothers in 1897.

Curzon (1899-1905): Appointed a Police Commission in 1902 under Andrew Fraser; Set up the Universities Commission and accordingly the Indian Universities Act of 1904 was passed; Set up the Department of Commerce and Industry; Calcutta Corporation Act (1899); Passed the Indian Coinage and Paper Currency Act (in 1899) and put India on a gold standard; Partition of Bengal took place in 1905 (it was cardinal blunder of Curzon); The idea to build Victoria Memorial (Calcutta) was conceived by Lord Curzon. The foundation stone of memorial was laid in 1906 and it was opened in 1921.

Minto II (1905-10): Swadeshi Movement (1905-08); Foundation of the Muslim League, 1906; Surat session and split in the Congress (1907), Newspapers Act, 1908; Morley-Minto Reforms, 1909.

Hardinge (1910-16): Annullment of the partition of Bengal (1911), Transfer of capital from Calcutta to Delhi (1911); Delhi Darbar and Coronation of King George V and Queen Mary (1911); Establishment of Hindu Mahasabha by Madan Mohan Malviya (1915).

Chelmsford (1916-21): Home Rule Movement launched by Tilak and Annie Besant (1916); Lucknow Pact between Congress and Muslim League (1916); Arrival of Gandhi in India (1915); Champaran Satyagraha (1917); Montague’s August Declaration (1917); Kheda Satyagraha and Satyagraha at Ahmedabad (1918); Government of India Act (1919), Repressive Rowlatt Act (1919); Jalianwala Bagh Massacre (April 13, 1919), appointment of Hunter Commission to probe Jalianwala Bagh Massacre (Oct. 19, 1919), Khilafat Movement (1920-22); Non-Cooperation Movement (1920-22).

Reading (1921-26): Criminal Law Amendment Act and abolition of cotton excise; Repeal of Press Act of 1910 and Rowlatt Act of 1919; Violent Moplah rebellion in Kerala (1921); Foundation of CPI (1921); Chauri Chaura incident (1922); Foundation of Swaraj Party (1923); Kakori Train Dacoity (1925); Foundation of RSS (1925); Murder of Swami Sharadanand (1926).

Irwin (1926-31): Simon Commission announced in 1927; Butler Commission (1927); Nehru Report (1928); 14 points of Jinnah (1929); Lahore session of Cogress and ‘Poorna Swaraj’ declaration (1929); Civil Disobedience Movement (1930); Dandi March (1930); Ist Round Table Conference (1930); Gandhi-Irwin Pact (1931).

Willingdon (1931-36): IInd Round Table Conference (1931); Civil Disobedience Movement (1932); Announcement of MacDonald’s Communal Award (1932); IInd Round Table Conference (1931); Government of India Act (1935); Burma separated from India Party — CSP (1934); Government of India Act (1935); All India Kisan Sabha (1936).

Linlithgow (1936-43): General Election (1936-37); Congress ministries in 1939; ‘Deliverance Day’ by Muslim Congress in 1937 and Resignation of Congress ministries in 1939; Congress resolution passed by S.C. Bose in 1939; Lahore Resolution League in 1939; Foundation of forward block by S.C. Bose (1939); Quit India Movement (1942).


Governor Generals of Free India (1947-50)

Lord Mountbatten (1947-48) : The first Governor General of free India, Kashmir acceded to India (Oct., 1947); Murder of Gandhi (Jan. 30, 1948).

C. Rajagopalachari (June 1948 - Jan. 25, 1950) : The last Governor General of free India; The only Indian Governor-General.

Ancient World : Down to 500 AD
Bronze Age Civilizations

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Name of the Civilization</th>
<th>Modern Area</th>
<th>River Valley</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mesopotamian Civilization</td>
<td>Iraq</td>
<td>Tigris and Euphrates</td>
</tr>
<tr>
<td></td>
<td>(4000 BC - 6th Cent. BC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Egyptian Civilization</td>
<td>Egypt</td>
<td>Nile</td>
</tr>
<tr>
<td></td>
<td>(3400 BC—1000 BC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Harappan Civilization</td>
<td>India and Pakistan</td>
<td>Indus</td>
</tr>
<tr>
<td></td>
<td>(2500 BC—1750 BC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Chinese Civilization</td>
<td>China</td>
<td>Hwang-Ho</td>
</tr>
<tr>
<td></td>
<td>(1765 BC—250 BC)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mesopotamian Civilization : The Oldest Civilization of the World

- *Mesopotamia* means 'land between the rivers'. Mesopotamia is the land between the *Tigris* and *Euphrates* rivers.
- Mesopotamia comprises four regions: *Sumer* (Southernmost region), Babylonia and Akkad (middle region) and Assyria (Northernmost region).
- *Hammurabi* (C.2100 BC), the greatest Babylonian ruler, united the whole of what is now called Iraq into a single Kingdom. Hamurabi gave his people a code of laws. His code covered every aspect of life. His code was based on the law of 'eye for eye' and 'tooth for tooth' i.e., the law of 'tit for tat'.
- Hittites, who came from Asia Minor (now Turkey) and destroyed the Babylonian kingdom, were the first to make regular use of horses for war chariots and to make iron implements.
- The potter’s wheel was perhaps first used in Mesopotamia.
- The Mesopotamians also seem to have been the first to make glass ware.
- The Sumerians were the first to evolve a proper system of writing. This system is called *cuneiform*. The cuneiform script was invented in C. 3400 BC. This script is found on clay tables. The cuneiform script was deciphered by *Henry Rawlinson*.
- The Mesopotamian system of counting is known as *sexagesimal* because the Mesopotamian people counted by sixties as we count by tens (decimal system). Their sexagesimal system is no longer in use but we still use it as the basis of division of time into minutes and seconds and of a circle into 360 degrees.
- In geometry, the Mesopotamians had discovered what was later called the *Pythagoras’ theorem*.
- In astronomy, the Mesopotamians made astonishing progress. They could calculate the length of the day and the night. They divided the whole day into 24 hours. They divided the sky into 12 parts, each assigned a name. This has come down to us as the 12 signs of *zodiac* or *rashis* as we call them in India. Another remarkable achievement of the Mesopotamians was the invention of a lunar calender, based on the moon.

**Egyptian civilization**

- Egypt is called the 'Gift of the Nile'.
Collectors divide the history of Egypt into three periods: the Old Kingdom, the Middle Kingdom, and the New Kingdom.

The Old Kingdom is also called the 'Age of the Pyramids'.

The Egyptian king was called the *pharaoh*.

The Egyptians were the worshipper of the nature and the sun was their most important god.

The Egyptians believed that after death both the body and the soul live while others believed that only the soul lives and body perishes. So Egyptians took great care in preserving the body of the dead. The body was embalmed in spices and then wrapped in strips of fine linen. Such a preserved body is called a *mummy*. The mummy was put in a wooden box and buried.

The *Pyramids* and the *Sphinx* are the two specimens of Egyptian architectural excellence.

The *Pyramids* were the tombs of kings and they contained the mummies of these monarchs. The most imposing of all is the *Great Pyramid* at Gizeh in *Cairo*, built by the king *Cheops* (Khufu) of the old kingdom. The Great Pyramid is one of seven wonders of the ancient world.

The *Sphinx* is a mythological animal with the body of a lion and the head of a man. Each Sphinx was carved out of a single solid stone.

The Egyptian script, known as hieroglyphic, was invented in C. 3100 BC. The script is found on papyrus sheets made of reeds. The Egyptian script—hieroglyphic script—was deciphered by *Champion*.

The Egyptians developed a decimal system of numeration.

The crowning achievement of the Egyptians was the solar calendar.

**Harappan civilization**

The Harappan Civilization extended over a bigger area than any of the contemporary civilizations.

**Note**: For details, see 'Indus Civilization'.

**Chinese civilization**

The earliest Chinese civilization is the *Shang* civilization.

The Shang dynasty was overthrown by the *Chou* dynasty.

The Chinese script is a pictographic script. It is remarkable that the Chinese script has changed very little since the earliest times.

The Chinese calendar—Solar-lunar calendar, was a combination of solar and lunar calendar. The Chinese were the first to calculate the length of the year as 365 1/4 days.

In 3rd century BC, the *Chin* dynasty became important. To keep out invaders from the north, they began construction of a wall known as the *Great Wall*.

The *Han* dynasty followed the Chin dynasty in 202 BC and the Han emperors ruled China for almost 400 years.

The political practices of the Han rulers were greatly influenced by the teachings of *Confucius*. During the Han rule, to qualify for appointment, the young men had to pass through an elaborate system of examination before they were chosen. Such 'scholar-officials' came to be known as *mandarins*. The Chinese was the first civilization in history to have a system of selecting public officials on the basis of education and competitive examination.

Under the Huns, silk was a principal item of export.

Two main roads were built across the Great Wall to carry on trade with the West.

The two major religions of ancient China are *Taoism* (based on the teachings of *Lao Tse*—b. 604 BC) and *Confucianism* (based on the teachings of *Confucius*—551 BC—479 BC). Confucius was a contemporary of *Mahavira* and *Buddha*.

Buddhism was brought into China by Indian during the Han rule.

The Great Wall is a mighty monument to the building skill of ancient China. This wall, built of stone and earth to a height of 6 metres and extending over 2400 km.

The Chinese script was standardized by the Chin ruler. The Chinese script spread to other countries also. It influenced the Japanese, Korean and Vietnamese scripts.

In the 1st century AD, paper was invented in China. The invention of paper and its importance in spreading knowledge within the outside China makes it one of the great contributions of China to the world.

Some of the first historical works in the world were written in China. Each dynasty compiled its own history. The pattern of these histories was set by *Ssu-ma Chien* (1st or 2nd cent. BC), and is commonly remembered as the 'Herodotus of China'.

The water clock, abacus, umbrella were invented by Chinese.

In the 2nd cent. AD, Chinese invented a seismograph.

**Iranian civilization**

In the middle of the 6th century BC, a powerful empire—*Achaemenid empire*—arose in Iran (Persia). The founder of this empire was *Cyrus* with his capital at Pasargad.

He was succeeded by *Darius I* (522 BC—486 BC). The empire reached its greatest extent under him and covered entire Iran, Mesopotamia, Syria, Egypt, Asia minor and north-western India. He built a new capital at Persepolis.

Darius I and his successors were involved in wars with the Greek states. They were defeated by Greeks. *Alexander* dealt the empire a final blow during the reign of *Darius III*.

In the 3rd century AD, a new and powerful empire—*Sassanid empire*—rose in Iran. This empire which was founded by *Ardashir* 226 AD held sway in Iran up to the middle of the 7th century AD.

The Arabs, who emerged as a strong power after the rise of Islam, conquered Iran in 651 AD.

The Achaemenids had introduced the use of money—coins of gold and silver—and on a large scale throughout the empire.

Iran in ancient times produced a number of famous sailors and explorers. One of them, *Sylax*, undertook a voyage from the mouth of Indus to Egypt on orders of Darius.
The main religion of the ancient Iranians was Zoroastrianism. This religion was founded by Zarathustra or Zoraster (628 BC — 551 BC) as the Greeks called him in 7th century BC. The teachings of Zarathustra are recorded in the Zend Avesta, the holy book of Parsees. Zarathustra said that the world consists of two forces: good and evil. The god Ahura Mazda represents the forces of good and Ahiman, the forces of evil. The sun and the fire came to be worshipped as visible symbols of Ahura Mazda, who represents light. Both Judaism and Christianity indebted to Zoroastrianism.

During the Achaemenid empire the official language was Aramaic. The Sasanids revived Old Persian and made it the official language of their empire. But then a new script called Pahlavi had also developed. The best known ancient literature of Iran is the Zend Avesta, which contains the work of Zarathustra.

Greek civilization

The early Greeks (or Hellens), like the Aryans in India, lived in tribes, each composed of a number of families under a leader. A group of tribes had a king. The main occupation was agriculture and herding.

The early Greeks had many gods whom they imagined to be like human beings, though more powerful and immortal. Zeus was the god of the sky and hence caused thunder. Poseidon, god of the sea, raised storms that sank ships.

Apollo, the sun god, could reveal the future. Athena, the goddess of victory and patroness of the arts. Dionysus was the god of wine and there were many others. The Greeks thought their gods lived on Mount Olympus.

Around 800 BC, groups of Greek villages began joining into larger units to form city-states. At the highest point in a city-state, an acropolis or citadel was built for defence and city spread out around the acropolis. Such cities were Sparta, Athens, Macedonia, Corinth, Thebes and others. Sparta and Athens were two most important city-states.

The Spartans' main concern was with militarism and war so much so that the word 'spartan' is often used to mean militaristic. Spartans were fine soldiers, but they contributed little else to Greek culture.

The city-state of Athens developed along lines quite different from Sparta. The territories it ruled had been occupied gradually and peacefully and militarism had not developed. Athens had excellent harbours and mineral deposits. Athenians built a prosperous trade and culture. Pericles (469 BC — 429 BC) was the most important ruler of Athens.

The Battle of Marathon (490 BC): The Greek defeated the Persian (Iranian) king Darius I at Marathon near Athens.

The Peloponnesian war, between Sparta and Athens, from 431 BC to 404 BC, ended in tragedy for Athens.

Philip of Macedonia conquered most of states in the years following Athens' defeat.

Then his son, Alexander, set out at the age of 20 — to conquer the world.

During the 13 years (336 BC — 323 BC), he compelled all Greece to accept his leadership and conquered the Achaemenid empire. This brought him to the borders of India where he defeated king Porus on the Jhelum in 326 BC. He sailed down the Indus and then returned to Mesopotamia where he died of fever in 323 BC at the age of 32.

Alexander's conquests brought many important changes to the world. Trade between Europe and Asia was developed. Many new cities were founded.

In the 2nd century BC, the Roman empire started expanding eastward. As a result of Roman attacks, almost the entire territory of the Greeks and their empire became a part of the Roman empire.

Contributions of Greek Civilization

The glory of Greece that the world has never forgotten was largely the glory of Athens at the time of Pericles.

The Olympic games were first held in 776 BC by the Greeks in honour of God Zeus at Mount Olympus (Olympia) in Greece, hence the name, and they continued till 394 AD. From 394 AD these games started degenerating and by 580 AD they altogether vanished. They were banned by the Roman Emperor Theodosius as Pagan manifestations.

It was the French Baron, Pierre de Coubertin, who (nearly over 1500 years after the last ancient Olympics) revived these games in 1894 and the modern series of the Olympic games started in 1896 at Athens and since then they are being held every fourth year.

Homer's 'Iliad' and 'Odyssey' are among the best epics of the world. The Iliad is the story of the siege and destruction of the city of Troy, as the western coast of Asia Minor. The Odyssey describes the adventures and home coming, from Troy, of a Greek hero, Odysseus.

The founder of Greek tragedy was Aeschylus, author of 'Prometheus Bound'. Sophocles is considered the greatest of Greek tragedians. His famous plays are Oedipus Rex, 'Antigone' and 'Electra'. Aristophanes is considered the master of Greek comedy.

Greek produced some of the world's earliest great historians e.g. Herodotus (known as 'the father of History'), Thucydides, Plutarch etc.

The most famous philosophers of Greece were Socrates, Plato (disciple of Socrates and author of 'Republic'), and Aristotle (disciple of Plato). Aristotle was both philosopher and scientist. He made important contribution to philosophy, medicine, biology and astronomy. He believed in the principle of the Golden Mean, that is, neither extreme luxury nor self-denial.

The Greek made many contributions to mathematics, especially to geometry as is seen in the work of Euclid and Pythagoras.

In medicine, Hippocrates laid the foundation of modern medicine. He is the known as the 'father of medicine'.

The most important astronomers were: Aristarchus, Ptolemy, Hipparchus, Eratosthenes etc. Ptolemy's belief that the earth was the centre of the universe was accepted as truth until the 16th century. Eratosthenes prepared a fairly accurate map of the globe and was the first to suggest that one could reach India from Europe by sailing west.

The temple of Athena, the Parthenon, is the best example of Greek architecture. It was Myron and Phidias are two best-known sculptors of ancient Greece. It was Myron and Phidias whom Pericles appointed to supervise the construction of the Acropolis in Athens.
Contributions of Roman Civilization

- Roman law and principles of government are Rome's greatest contribution to the world.
- So complete was Rome's system of roads linking all parts of empire that people could say 'All roads lead to Rome'.
- The Romans developed their own alphabet and Latin language became the language of all educated people in western Europe. Latin words are still widely used in science, and Latin is the basis of several European languages — esp. French, Spanish & Italian.
- *Lucretius, Cicero, Marcus Aurelius & Seneca* were the famous Roman philosophers.
- *Horace* (Odys & Virgil (Aeneid)) were the famous Roman poets.
- *Tacitus* (Annales & Histories) was the most famous Roman historian and *Pliny the Elder* was another famous Roman historian.
- The Romans were the inventors of concrete and could firmly cement bricks and stones together. They also introduced two architectural improvements — the arch and cupolas or domes.
- Fights between gladiators or between a gladiator and a wild animal, was a popular Roman amusement. Special arenas or amphitheatres were built for these contests. The ruins of the Colosseum, one of the greatest of arenas, can be seen in Rome.

Seven Wonders of Ancient World

1. Hanging garden of Babylon
2. Pyramids of Egypt
3. The Pharos at Alexandria
4. Statue of Zeus at Olympia
5. Colossus at Rhodes (91 ft. statue of Helios, the sun god, stands at one side of the harbour)
6. Temple of Diana at Ephesus (Rome)
7. Mausoleum of Mausolus (Ruler of Halicarnassus)

Medieval World: (500 AD–1500 AD)

Medieval Europe

- The Eastern Roman empire or Byzantine empire was a vast empire and its capital *Constantinople* was the largest city of that time.
- The Byzantines built beautiful churches. The most famous of these is the church of St. Sophia in Constantinople. This church was built during the reign of Byzantine emperor *Justinian* in the 6th century AD.
- The Ottoman Turks conquered the Byzantine territories in 1453.

Feudalism

- The word 'feudal' comes from *feud* which originally meant a fief or land held on condition or service. In a feudal society, land was the source of power.
- Feudalism originated in the 8th & 9th centuries.
- First of all in western Europe the feudal system developed.
- The main division in feudal society was between *feudal lords*, who either got a share of the peasants' produce or had peasants to work on their lands without any payment, and *Peasants*, who worked on the land.

Feudal Hierarchy:

2. Peasants: Three categories of peasants — freeholders, villeins & serfs. In feudal hierarchy, the king stood at the top and peasant stood at the bottom. The economic life under the feudal system was predominantly rural. The use of land, which was like a village-farm, was called ‘manor’.

Crusades: 1095 AD — 1291 AD

- Crusades means the military expeditions, under the banner of the cross, organised in western Christendom primarily to recover the Holy Places of Palestine from Muslim occupation.
- Four Crusades were fought by the European Christian to liberate Jerusalem from Seljuq Turks (Muslims) who did not permit Christian pilgrims to enter the holy land.
- The 1st Crusade (1095-99) was launched after the provoking preachings of Pope Urban II. Jerusalem was captured and the Crusader states of the Kingdom of Jerusalem, the country of Edessa, Antioch and Tripoli were created.
- The fall of Edessa (1144) inspired the unsuccessful 2nd Crusade (1147-48).
- The capture of Jerusalem by Saladin in 1187 led the inconclusive 3rd Crusade (1189-92), led by Philip II Augustus of France, Frederick I Barbarossa of Germany, and Richard I (the Lion Heart) of England.
- The 4th Crusade (1202-91) was diverted from its original objective, Egypt, and sacked Constantinople (1204). This Crusade failed to recover lost ground and Acre, the last foothold of West is Palestine, was lost in 1291.

Arab Civilization

- In the 7th century, a new religion, Islam, arose in Arabia, which led to the establishment of a big empire.
- Muhammad, the Prophet of Islam, was born in Mecca in 571 AD.
- When he was 40, he had visions of truth and became a prophet.
- Muhammad’s visions completely convinced him that Allah was the only god, to leave Mecca and take refuge in Medina. This event took place in 622 AD and (Hijira or migration), and from it Muslims date their era.
- The Quran, the holy book of Islam, is divided into a number of suras, or chapters, and contains the teachings of Muhammad. Besides the Quran, the Hadees, the sayings of Muhammad, and the Sunna, the practices of Muhammad, and the Caliphs, or Khalifas, who held both religious and political authority.
- Nearly all Arabia had accepted the new religion and become a unified state before the death of Prophet Muhammad in 632 AD.
- From Arabia, Islam spread very fast to many other parts of the world. Within Egypt, Central Asia, North Africa and Spain, The Arab empire was the largest

The first three Khalifas ruled from the city of Medina. Then the capital was shifted Kufah. By 660 AD, when the Omayyad dynasty took over the reins of government, the principal city was Damascus.

- About 750, the Omayyad were overthrown by Abbasids, who made Baghdad their capital. Harun Rashid, famous in many legends, was an Abbasid ruler.
- The Abbasids ruled for about 300 years, till the Seljuq Turks took Baghdad and ended the Arab rule. During the next four centuries, the Turks dominated the Islamic world.

- In the 15th century, most of these territories came under the domination of the Ottoman Turks. It was the Ottoman Turks who took Constantinople and ended the Eastern Roman empire in 1453.

Contributions of Arab Civilization

- The establishment of a vast empire facilitated the coming together of intellectual and scientific traditions of various civilizations, particularly Greek, Iranian & Indian. The Arabs made all knowledge their own and developed in further.
- Al Razi (Razes), an Arab scientist discovered the true nature of small pox, and Ibn Sina (Avicenna) discovered that tuberculosis is infectious.
- In Mathematics, the Arab learned the Indian numerals (Hindus) and spread their use far and wide, so that in the West they are to this day called Arabic numerals.
- Some of the famous literary work of the Arab civilization are the ‘Rubaiyat’ by Omar Khayyam, ‘Shahnama’ by Firdausi and the ‘Arabian Nights’, a collection of 1001 stories.
- The Arabs developed their own decorative designs. Their buildings had bulblike domes, small minarets, horse-shoe arches and twisted columns.
- The Arabs also developed a decorative style of writing called Calligraphy and made book-illumination an art.
- Arab carpets, leather work, beautiful swords, silks, inlays, metal-work, and enamelled glassware were prized everywhere.

Medieval China

- From the early 7th century, China was ruled by the Tang dynasty.
- The rule of Tang dynasty (618 AD — 906 AD) was followed by the Sung dynasty for about 300 years.
- After this, for about 100 years China was ruled by the Mongols.
- The rule of the Mongols in China was followed by that of Ming dynasty which continued for about 300 years.
- In 1644, China was conquered by the Manchus who continued to rule until 1911 AD.

Contributions of Medieval China

- To prevent drain on the country’s wealth the Sung rulers started the use of paper-money.
- The invention of gun-powder was made in China in the 10th century about 400 years before the knowledge reached the Western World.
- The Chinese made iron-chain suspension bridges as early as the 10th century.
Medieval Japan
- Japan consists of hundreds of small islands of which four are major islands, Hokkaido, Honshu, Kyushu & Shikoku.
- Almost the entire country was unified into a single state by around the 7th century AD.
- In the 8th century, Edo (modern Kyoto) became the capital and continued to be the seat of the emperors of Japan for over 1000 years. The real power, however, was in the hands of an aristocratic family.
- Towards the end of the 12th century, a new political institution, the Shogun or the General, became the commander of the army and ruled Japan, while the emperor remained at his capital at Edo (Kyoto).
- Until 1867, the Shoguns were the real rulers of Japan. Tokugawa Ieyasu was the founder of last Shogun dynasty.
- In 1867, the last Shogun of Tokugawa dynasty was overthrown and the power was restored to the emperor. Now Japan launched herself on the road of industrial development, modernization and expansion.

Samurai or the warriors were similar to the Knights of Western Europe.

The most unique contribution of medieval Japan to literature was a form of poetry called Haiku. Haiku poems are short poems of only 17 syllables.

The important contribution of medieval Japan to art was Ikebana or the art of flower arrangement, which is being imitated throughout the world.

Buddhism reached Japan early in the 6th century from China through Korea and during the course of centuries it became widespread. In certain periods it even eclipsed Shintoism, the old religion of Japan.

Gradually, the Japanese developed their own distinct schools of Buddhism, the most famous of which is Zen Buddhism. The word Zen is derived from Dhyana.

Modern World: (1500 AD Onwards)

Renaissance

The 16th century is commonly designated as the ‘Age of Renaissance’, also called the ‘Revival of learning’.

It is said to have started from the capture of Constantinople (now Istanbul) by the Turks in 1453 and the dispersal of the scholars throughout Europe, who sought asylum in Italy.

Italy practically became the home of the Renaissance and fundamental to the Renaissance was the revival of classical learning, art and architecture and the

Great Liteterateus of Renaissance

Italian: Dante (‘Divine Comedy’), Petrarch (founder of Humanism & known as the ‘father of Humanism’), Boccaccio (‘Decameron’), Machiavelli (‘The prince’).


French: Rabelais (‘Pantagruel’ & ‘Gargantua’), Montaigne (‘Essais’).

Spanish: Cervantes (‘Don Quijote’).

Portuguese: Camoes (‘The Lusiad’).

Dutch: Erasmus (‘In the praise of Folly’).

German: Thomas Kempis (‘The Imitation of Christ’).

Reformation

The Reformation was another movement that the 16th century witnessed.

- It was started by Martin Luther in Wittenburg, Germany in 1517 by publicly protesting against the sale of letters of Indulgences. (Indulgence: the letters which remitted punishments of the sinners who bought them and which began to be considered as passports to heaven.)
- It was a revolt against the control of conscience by the priests.
- Thanks to the inborn spirit of revolt against the Catholic Church, Henry VIII of England could take the bold step of breaking away from the papacy i.e., authority of the Pope on the issue of his first divorce in 1534. Henry VIII declared himself the head of the church when the Pope would not give him permission to divorce his wife, Catherine.
- With the breaking away from the Roman Catholic Church by such leaders as Luther of Germany and Calvin of Switzerland, Western Europe was split between Catholic & Protestant countries, a situation which developed enmities of the fiercest nature.
The movement which began within the Catholic Church to combat the effects of the Protestant Reformation, was known as the Counter-Reformation Movement.

Geographical Discoveries

<table>
<thead>
<tr>
<th>Discovery</th>
<th>Year</th>
<th>Discoverer (Nationality)</th>
<th>Sponsored by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape of Good Hope</td>
<td>1487</td>
<td>Bartholomew Diaz (Portuguese)</td>
<td>Portugal</td>
</tr>
<tr>
<td>America</td>
<td>1492</td>
<td>Christopher Columbus (Genoan, Italian)</td>
<td>Spain</td>
</tr>
<tr>
<td>Newfoundland</td>
<td>1497</td>
<td>John Cabot (Italian)</td>
<td>England</td>
</tr>
<tr>
<td>Sea-route of India via Cape of Good</td>
<td>1498</td>
<td>Vasco da Gama (Portuguese)</td>
<td>Portugal</td>
</tr>
<tr>
<td>Hope</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>1500</td>
<td>Pedro Alvarez Cabral (Portuguese)</td>
<td>Portugal</td>
</tr>
<tr>
<td>Strait of Magellan</td>
<td>1520</td>
<td>Magellan (Portuguese)</td>
<td>Spain</td>
</tr>
<tr>
<td>Island of Tasmania &amp; New Zealand</td>
<td>1642</td>
<td>Tasman (Dutch)</td>
<td>Holland</td>
</tr>
<tr>
<td>Sandwich Island / Hawaiian Island</td>
<td>1770</td>
<td>Captain James Cook (British)</td>
<td>England</td>
</tr>
<tr>
<td>North pole</td>
<td>1909</td>
<td>Robert Peary (American)</td>
<td>USA</td>
</tr>
<tr>
<td>South Pole</td>
<td>1911</td>
<td>Amundsen (Norwegian)</td>
<td>Norway</td>
</tr>
</tbody>
</table>

A great development which marked the beginning of the modern age in Europe was a series of geographical discoveries.

Helped by some remarkable inventions viz., the Compass and Astrolabe, daring sailors sailed from distant lands.

They were financed by rulers and merchants.

The main motivation behind these adventures was the lure of profits that trade with the East would bring.

During 1288-93, Marco Polo (1256-1326), Venetian traveller, travelled from Venice to China and Japan. He was the 'first European to visit China.' From his travels the Europeans learned about all round prosperity of the East.

The first great steps in the exploration of the earth were taken by the sailors under the patronage of Portuguese and Spanish rulers.

Prince Henry (1394-1460), the Navigator of Portugal, encouraged sailors by making maps based on trips to the African coast.

In 1487, Bartolomew Diaz reached the point which the Portuguese named Cape of Good Hope (the southern-most point of Africa).

Vasco da Gama followed this route and sailed on round the cape and reached Calicut in India in 1498.

Italian sailor Columbus' trip was financed by Spain from where he sailed in 1492 when he had reached land, he thought he had reached India; so he called the islands, the 'Indies'; but it was America.

The land discovered by Columbus was soon to be called the 'Americas' after the name of a later Italian explorer, Amerigo Vespucci.

Magellan, a Portuguese sailor, went beyond the lands that had stopped Columbus. He sailed on around the tip of South America, which is named after him—the straits of Magellan. He called the new ocean that he entered, 'The Pacific', because it seemed more quiet than the Atlantic. Magellan reached what is now called the Philippines Island where he died. Magellan was the first to sail round the world.

Other countries—England, France & Holland—also sent out their ships to join the race for explorations. Francis Drake of England sailed round the world in 1577.

These voyages laid the foundations for the almost complete geographical knowledge of the world.

Glorious Revolution: 1688, England

James II was a Roman Catholic. His tactless attempt to secure freedom of worship for Catholics united the Whigs and Tories of the Anglican Church against him.

People tolerated the rule of James II, because they thought that he would be succeeded by his daughter Mary who was a Protestant. But a son was born to James II. The knowledge that James' policies might be continued by a son to be brought up as a Catholic turned against him many Tories, hitherto loyal to him.

So a few leading men—Whigs as well as Tories—dispatched an invitation to William of Orange, ruler of Holland, to succeed to the English throne and save England from Catholic tyranny.

William accepted the invitation and came to England for his purpose.

James II, throwing the great seal into the Thames, fled to France.

This event is known as Glorious or Bloodless Revolution in England.

Effects: (1) The despotic rule of the Stuarts ended; the supremacy of Parliament was established. (2) The system of requiring estimates and accounts for supplies and, of specific appropriations—which is nucleus of modern budgetary system—now became fixed. (3) The Bill of Rights (1689): It settled down the problem of succession; it also laid the provision that no Roman Catholic can wear the crown. As William III and his wife, Mary II (daughter of James II and a Protestant by faith), the joint monarchs accepted the Bill of Rights.

Magna Carta (or The Great Charter), 1215: It was the Charter of Liberties which King John II of England was forced to sign in 1215 at Runnymede. It meant to put a check upon the arbitrary powers of king. The most important principle that it laid down was that English man should be governed by definite laws and not by the whims or the will of a despotic ruler.

Magna Carta was said to be the 'foundation-stone of rights and liberties of the English people'.

Habeas Corpus Act, 1679: This act during the reign of Charles II of England provided that no one was to be imprisoned without a writ or warrant stating the charge against him. It also gave facilities to a prisoner for obtaining either speedy trial or release on bail. The Act safeguarded the personal liberties of the people against arbitrary imprisonment by King's orders.

Industrial Revolution

The process of change that transformed Britain first and then other countries from agricultural to industrial economies.

The Industrial Revolution began about 1750 when the agricultural revolution was well under way. Inventions were made in the textile industry by such men
The American Revolution is the name given to the struggle by which 13 colonies of England in North America declared their independence from England and fought a war to make it a reality. By the middle of the 18th century, differences in thought and interests had developed between the colonies on the one hand and the mother country (England) on the other.

Attempts to collect new taxes such as the Stamps Act (1765) and Tax on tea (1767) angered the colonists who maintained that the British government was imposing ‘taxation without representation’ and that only the colonial representative assemblies could rightfully tax the Americans.

Boston Tea Party (1773): The tax on tea led to trouble. In 1773, several colonies refused to unload the tea coming in English ships. In Boston, when the governor ordered a ship to be unloaded, a group of citizens dressed as American Indians boarded the ship and dumped the crates of tea into the water. This incident is known as the ‘Boston Tea Party’.

The American Revolution started in 1775 and lasted until 1781.

On July 4, 1776, the Declaration of Independence was issued. Its author was Thomas Jefferson. The Declaration started that all men are created equal; that they have a natural and inalienable right to life, liberty and pursuit of happiness; and that they are justified in revolting when these rights are violated by any government.

The colonies won the war against England. The American Revolution made possible the establishment of a new nation, the United States of America (U.S.A.).
Unification of Italy: 1848-70

One of the major features of the history of Europe in 19th century was the struggle for the national unification and independence. Italy and Germany were the two important nations which emerged as united, independent states in the 19th century.

In the early 19th century, Italy was divided into a number of states in which the Kingdom of Sardinia was the most powerful.

The struggle for Italian independence and unification was organized by the two famous revolutionaries — Mazzini & Garibaldi. The movement led by them is known as the 'Young Italy' movement.

After the revolution of 1848, Count Cavour, the Prime Minister of Sardinia, took the initiative of uniting Italy under the leadership of Sardinia.

By the year of 1861, the entire states (except Rome) had been united and then Victor Emmanuel II, the king of Sardinia took the title of 'King of Italy'.

Rome was still outside the kingdom of Italy. It was ruled by the Pope. Italian soldiers liberated the city of Rome in 1870, and in 1871, Rome became the capital of united Italy.

Unification of Germany: 1848-71

Like Italy, Germany was also divided into a number of states. At the end of the Napoleonic wars (1792-1815) there were 38 independent states in Germany in which Prussia was the most powerful.

In 1815, the German states along with Austria were organized into a Germanic confederation.

In 1848 revolts occurred in every German state and the rulers were forced to grant democratic constitutions. To unite Germany and to frame a constitution for the united Germany, a constituent assembly met in Frankfurt.

The Frankfurt Assembly proposed the unification of Germany as a constitutional monarchy under the king of Prussia who would become the emperor of Germany. However, the king of Prussia declined the offer. Repression soon followed.

With the failure of the revolution of 1848 to unify Germany, one phase in the struggle for unification came to an end.

Now Germany was to be united not into a democratic country by the efforts of revolutionaries but by the rulers into militaristic empire. The leader of this policy was Bismarck who belonged to a Prussian aristocratic family. He wanted to achieve the unification of Germany under the leadership of the Prussian monarchy.

Bismarck described his policy of unification as one of "blood and iron". The policy of blood and iron meant a policy of war.

He defeated Austria and dissolved the Germanic confederation. Thus Austria was separated from other German states. In place of old confederation, he united 22 states of Germany into North German Confederation in 1866.

The unification of Germany was completed as a result of Prussia — France captured. This war enabled Bismarck to absorb the remaining German states into a united Germany.

First World War: July 28, 1914 — Nov. 11, 1918

Causes: The causes of First World War are as under:

1. Militarism: This means the dangerous and burdensome mechanization of great standing armies and large navies along with an espionage system.

2. Narrow Nationalism or Competitive Patriotism: The love of one's country demanded the hatred of the other. Love of Germany demanded the hatred of France and vice-versa.

3. Economic Imperialism: It led to international rivalries. Every country tried to capture markets in every nook and corner of the world. This led to bitterness and heart-burning.

4. Anglo-German Rivalry: The charter of William II: Anglo-German rivalry proved to be the main cause of World War I. Germany had become a great industrial country and wanted to have more markets for trade. Germany was jealous of the colonial and naval greatness of England. William II, emperor of Germany, was very ambitious and wanted to gain influence in Turkey by linking Berlin with Baghdad by a railway line. This gave rise to a great rivalry between England and Germany.

William II was arrogant, haughty and ambitious. He wanted Germany to be the strongest power in the world. He believed in the policy of 'world power or downfall'.

5. Lack of International Organisation: There was lack of International Organisation to control international relations.

Immediate Cause: The immediate cause of the war was the murder of Archduke Ferdinand who was the heir to the Austrian throne. He and his wife Sophie were killed at Sarajevo, the capital of Bosnia, an annexed territory of Austria, by a Serbian. The Austrians held Government of Serbia responsible for the murder and ultimately attacked Serbia. There was strong rivalry already between Austria-Hungary and Serbia in the Balkans.

Course of War: To begin with, Austria was in favour of local war but as time passed, the situation became more grave. Other countries jumped into the fray. Germany, Austria-Hungary, Turkey & others were on one side; they were called Central Powers. On the other side were the Allies or Entente Powers: Great Britain/England/United Kingdom (UK), France, Serbia, Belgium, Japan, Russia/SSR (USSR) (until Dec. 1917), Italy (entered in April 26, 1915), Romania (entered Aug. 1916), USA (entered April 6, 1917). etc.

WWI: Central Powers Vs Allied Powers

Central Powers:

Germany, Austria-Hungary, Turkey (entered Nov. 1914), Bulgaria (entered Oct. 1915). etc.

The Allies or Entente Powers:

Great Britain/England/United Kingdom (UK), France, Serbia, Belgium, Japan, Russia/SSR (USSR) (until Dec. 1917), Italy (entered in April 26, 1915), Romania (entered Aug. 1916), USA (entered April 6, 1917). etc.

Peace Settlement (1919-20): The Central Powers were completely defeated by the Allied Powers and an Armistice was signed on Nov. 11, 1918, followed by a Peace
The immediate cause of the event was however the suffering and confusion caused by Russian disastrous defeats during World War I. Her armies lacked arms and ammunition. Prices soared high and the economy was in shambles.

The Russian Revolution began with the March Revolution (February Revolution, according to old Russian Calendar). Disorders broke out in Petrograd (now Leningrad), the Russian capital, in March 1917. Czar Nicholas II was forced to abdicate. (He and his family were later killed by the revolutionaries).

A provisional government composed of liberal and democratic elements (Mensheviks) under the successive premierships of Prince Lvov and then Aleksandr Kerensky lost ground to the radical wing (Bolsheviks) of the Social Democratic Labour Party.

The Bolsheviks, led by Lenin, seized power in Petrograd on Nov. 7, 1917—November Revolution (October Revolution, according to the old Russian calendar). The Kerensky Government was overthrown and authority was vested in a council of Commissars (Ministers) with Lenin as Premier.

The new Government immediately decreed the abolition of private land ownership and set up a dictatorship of the Proletariat—actually of the communist Party, as the Bolsheviks came to called.

The Bolsheviks extended their authority over a large part of European Russia, but elsewhere they faced the resistance of the anti-Bolshevik Parties. The resulting civil war lasted till 1920 and was complicated by foreign intervention. The communists were ultimately in undisputed control of the country.

In the period between 1917 and 1920, the Communists took drastic action against internal enemies, or counter-revolutionaries, as they were called. Former landlords, capitalists, Czarist officers, etc. were arrested, exiled or executed, the Czar and his family were killed.

In 1923, the Union of Soviet Socialist Republics (U.S.S.R.) came into being. Its constitution declared the establishment of a ‘republic of workers and peasants’. Ownership of the means of production, including land, factories, mines, banks and railways, was vested in the state. The state which is known officially as the Union of Soviet Socialist Republics (U.S.S.R.), also commonly referred to as the Soviet Russia, or just Russia.

Lenin died in 1924 and was succeeded by Stalin (1924-53).

Note: In 1991, Communist Party rule in Soviet Union collapsed following the failure of an anti-Gorbachev coup by Communist hardliners. The constituent republics asserted their independence and the Soviet Union was officially dissolved on Dec. 25, 1991. In the same month the Commonwealth of Independent States (C.I.S.), a looser organisation with responsibility for economic & military co-operation, was formed by Russia, Ukraine & Belarus.
Chinese Revolution:

1911 (Republican Revolution); 1949 (Communist Revolution)

> In Oct., 1911, a revolution under the leadership of Sun Yat-sen ousted the Manchu or Ch'ing Dynasty and a republic was set up.
>
> However, the first President Sun Yat-sen resigned in 1912, in favour of strongman Yuan Shih-kai (1912-16).
>
> The period 1916-18, known as the Warlord Era, was one of great chaos, as a number of generals seized control of different provinces.
>
> A party known as the Kuomintang (KMT) or Nationalists (formed by Sun Yat-sen in 1912) was trying to govern China and control the generals who were busy fighting each other. The KMT leaders were Sun Yat-sen and after his death in 1925, General Chiang Kai-shek.
>
> The Chinese Communist Party (CCP) was founded in 1921, and at first it cooperated with the KMT in its struggle against the warlords.
>
> As the KMT gradually established control over more and more of China, it felt strong enough to do without the help of the communists, and it tried to destroy them.
>
> The communists, under their leader Mao Tse-tung (Mao Zedong), reacted vigorously, and after escaping from surrounding KMT forces, embarked on the 6000 mile Long March (Oct. 1934-Oct. 35) to form a new power base in northern China.
>
> Civil war dragged on, complicated by Japanese interference with culminated in a full-scale invasion in 1937.
>
> When the Second World War ended with defeat for Japan and their withdrawal from China, the KMT and the CCP continued to fight it out.
>
> Chiang Kai-shek had help from the USA, but in 1949 it was Mao Tse-tung and the communists who finally triumphed.
>
> Chiang Kai shek and his supporters fled to island of Taiwan (Formosa).
>
> Mao Tse-tung quickly established control over the whole of China, and he remained the leader until his death in 1976.

Turkish Revolution: 1923

Turkey was called ‘Sickman of Europe’.

> The disintegration of the Ottoman empire began in the 19th century and was completed after Turkey’s defeat in the First World War.
>
> The Allies wanted to establish their domination over Turkey itself and to give away parts of Turkey to Greece and Italy.
>
> The treatment meted out to Turkey by the Allies had led to a mass uprising in India directed against Britain. This uprising is known as the Khilafat Movement.
>
> The nationalist movement in Turkey was organised to prevent the domination of the country by the Allied Powers and the annexation of parts of Turkey agreed to the terms dictated by the Allied Powers.

Economic Depression of the World: 1929-34

> In economic terms, a decline in trade and general prosperity is called Depression.
>
> The Great Depression of 1929-34 was worldwide, starting with an agricultural recession followed by financial panic and collapse, known as the Wall Street Crash (Oct., 1929) in the USA.
>
> The effects on the USA were catastrophic: by 1933 almost 14 million people were out of work and American President Hoover’s efforts failed to make any impression on crisis.
>
> Nobody was surprised when the Republicans lost the presidential election of Nov., 1932. The new Democrat President, Franklin D. Roosevelt, introduced policies known as the New Deal to try and put the country on the road to recovery.
>
> The Great Depression is turn affected financial institutions and money markets in other parts of the world and caused a run on the pound in the UK. The result was a decline in internal consumption and exports in industrialized countries, factory closures and massive unemployment.

Fascism in Italy

> The unification of Italy was only completed in 1870, however, the new state suffered from economic and political weaknesses.
>
> The First World War (1914-18) was a great strain on her economy, and there was bitter disappointment at her treatment by the Versailles settlement.
>
> Between 1919 and 1922 there were five different governments, all of which were incapable of taking the decisive action that the situation demanded.
>
> In 1919 Benito Mussolini founded the Italian Fascist Party, which won 35 seats in the 1921 elections.
At the same time there seemed to be a real danger of a left-wing revolution; in an atmosphere of strikes and riots, the fascists staged a 'March on Rome' which culminated in King Victor Emmanuel inviting Mussolini to form a government (Oct., 1922); he remained in power until July 1943.

Gradually Mussolini took on the powers of a dictator and attempted to control the entire way of life of the Italian people.

At first it seemed as though his authoritarian regime might bring lasting benefits to Italy, and he won popularity with his adventurous and successful foreign policy. Later he made the fatal mistake of entering the Second World War on the side of Germany (June, 1940) even though he knew Italy could not afford involvement in another war.

After the Italians suffered defeats by the British, who captured her African possessions and occupied Sicily, they turned against Mussolini. He was deposed and arrested (July, 1943), but was rescued by the German (Sep., 1943) and set up as ruler in northern Italy, backed by German troops.

In April, 1945, as British and American troops advanced northwards through Italy towards Milan, Mussolini tried to escape to Switzerland but was captured and shot dead by his Italian enemies (known as partisans).

**Fascism**

The ideology and political system of Benito Mussolini, which encouraged militarism and extreme nationalism, organizing Italy along authoritarian lines fundamentally opposed to democracy and liberalism. The term is also applied to any ideology or movement inspired by such principles, e.g., Germany's National Socialism.

**Nazism in Germany**

As Germany moved towards defeat in 1918, public opinion turned against the government, and in Oct., the Kaiser, in a desperate bid to hang on to power, appointed **Prince Max** as Chancellor. He was known to be in favour of more democratic form of government in which parliament had more power.

But it was too late; in Nov., revolution broke out, the Kaiser escaped to Holland and abdicated, and **Prince Max** resigned. **Friedrich Ebert**, leader of the left-wing Social Democrat Party, became head of the government.

In Jan., 1919, a general election was held, the first complete democratic one ever to take place in Germany. The Social Democrats emerged as the largest single party and Ebert became first President of the Republic. They had some Marxist ideas but believed that the way to achieve socialism was through parliamentary democracy.

The new government was by no means popular with all German: even before the elections the communist had attempted to seize power in the **Spartacist Rising** (Jan., 1919).

In 1920 right-wing enemies of the republic occupied Berlin (the Kapp Putsch). The government managed to survive these threats and several later ones, including Hitler's Munich Beer Hall Putsch (1923).

By the end of 1919 a new constitution had been agreed by the National Assembly (Parliament), which was meeting at Weimar because Berlin was still torn by political unrest. This Weimar constitution, gave it’s name to the Weimar Republic and lasted until 1933, when it was destroyed by Hitler. The Great Depression, beginning with the Wall Street Crash in Oct., 1929, had disastrous effects on Germany, producing massive 6.5 million unemployed. The government was unable to cope with the situation and by the end of 1932 the Weimar Republic seemed on the verge of collapse.

Meanwhile **Adolf Hitler** and his National Socialists (Nazis) had been carrying out a great propaganda campaign blaming the government for all the ills of Germany, and setting out Nazi solutions to the problems.

In Jan., 1933, President Hindenburg appointed Hitler as Chancellor, and in the same year he was able to persuade President Hindenburg to appoint him as Chancellor. In Jan., 1933, President Hindenburg appointed Hitler as Chancellor, and in the same year he was able to persuade President Hindenburg to appoint him as Chancellor. In Jan., 1933, President Hindenburg appointed Hitler as Chancellor, and in the same year he was able to persuade President Hindenburg to appoint him as Chancellor. In Jan., 1933, President Hindenburg appointed Hitler as Chancellor, and in the same year he was able to persuade President Hindenburg to appoint him as Chancellor.

**Militarism in Japan**

Immediately after Mussolini’s March on Rome (1922), many other countries, faced with severe economic problems, followed the examples of Italy and Germany and turned to fascism or right-wing nationalism. In Japan the democratic government, increasingly embattled by economic, financial and political problems, fell under the influence of the army in the early 1930s.

The army decided to involve Japan in war with China, and later took the country into the Second World War with its attack on Pearl Harbor (1941).

After a brilliant start, the Japanese eventually suffered defeat and devastation when the two atomic bombs were dropped.

After the Second World War, Japan returned to democracy and made a remarkable recovery, soon becoming one of the world’s most powerful states economically.

**SECOND WORLD WAR : Sep. 1, 1939 — Sep. 2, 1945**

**Causes:** The causes of Second World War as under —

1. **The Treaty of Versailles (1919):** The treaty of Versailles had in itself the germs of the Second World War. The Germany was very badly treated. She was forced to sign the treaty at the point of a bayonet, in a spirit of revenge. To tear away the treaty of Versailles, Hitler joined hands with Mussolini of Italy.

2. **Nationalist Movements of Germany & Italy:** The rise of the nationalist movement in Germany & Italy added fuel to the fire. Although Hitler tried to assure the world that he meant peace, he could not conceal his ambition for long. He embarked on a career of aggression which ultimately led to war. The same was the case with Mussolini who had established his dictatorship in Italy in 1922.

3. **Conflict of Ideology between Dictatorship & Democracy:** Countries like Germany, Italy & Japan represented the ideology of dictatorship while Great Britain, France & USA represented the ideology of democracy. Mussolini described the conflict between the two ideology thus: 'The struggle between the two camps can permit no compromise. Either we or they'.

4. **Inefficiency of League of Nations:** Unfortunately, when hostility was growing between the two camps there was no effective international organisation which could bring the leaders of the two camps on a common platform and bring about a reconciliation between them. The League of Nations was practically dead.
5. Colonial & Commercial Rivalry: The colonial and commercial rivalry between England and France on one side, and Germany and Italy on the other brought them in conflict with each other.

6. Aggressiveness of Berlin-Rome-Tokyo Axis: Hitler had become very aggressive. He annexed the Saar Valley, occupied Rhinel and Austria, captured Checoslovakia etc. Mussolini attacked Abyssinia (Ethiopia) Japan attacked China. This aggressive mood of the Fascist Powers got its fullest expression when they formed an Axis providing for mutual aid in the international sphere.

Immediate Cause: The immediate cause of the war was the refuse of Poland to surrender. Germany gave an ultimatum to Poland regarding: (i) surrender the port of Dazieg, (ii) the right of establishing a rail link between Germany and East Prussia through the Polish corridor. These two demands were rejected by Poland. So Germany invaded Poland on Sep. 1, 1939. Britain and France as they were under treaty obligations to aid Poland, declared war against Germany on Sep. 3, 1939.

Course of War: On one side were Germany, Italy and Japan, called the Axis Powers (or Central Powers), and on the other were Great Britain, France, USA, China etc. called the Allied Powers (or Allies).

Germany had to face defeat once again. Hitler, Goebbels & Himmler committed suicide (April 30, 1945) and their successors surrendered unconditionally on May 7, 1945. After the fall of Germany, USA and UK concentrated their forces against Japan. On Aug. 6, 1945, an atom bomb, 'Little Boy', was dropped on the city of Hiroshima. Japan was asked to surrender and when she refused another atom bomb, 'Fat Man', was dropped on Aug. 9, 1945, on the city of Nagasaki. It is estimated that more than one lakh persons were killed and leaving thousands more slowly dying by radiation poisoning. On Aug. 14, 1945, Japan conveyed its acceptance of the Allied demand to surrender but the actual surrender took place on Sep. 2, 1945. With the Japanese surrender, the Second World War came to an end.

Effects of WW II: 1. After about 15 months of preparatory work, the peace treaties were given a final shape by the 21 participating countries and they were signed on Feb. 10, 1947, in Paris by the representatives of the five enemy states and the Allied Powers. As regards Germany she was occupied by the Big Four. After its fall in May, 1945, it was divided into four zones, each of which was administered separately by one of the occupying powers. Berlin came under joint occupation. Ultimately out of one Germany came two countries — West Germany and East Germany. Italy was also deprived of her colonies. As regards Japan, a peace treaty was signed with her at San Francisco in 1951. 2. The United Nations Organisation (UNO) was established in Oct. 24, 1945. 3. The USA and USSR emerged as the two most powerful nations in the world. 4. The emergence of Russia (USSR) gave rise to the desire for freedom in colonies under European control in Asia. 5. The British empire thus rapidly lost its leadership as more and more colonies won independence. 6. France also lost much of their past glory.

T. Nearly all the East European countries embraced communism and communist rule was established in the Chinese mainland also.

Important Axis Leaders of WW II: Adolf Hitler (Nazi dictator of Germany), Benito Mussolini (Prime Minister of Italy) and Hirohito (Emperor of Japan) & his Prime Ministers Hideki Tojo & Fumimaro Konoe.

Important Allied Leaders of WW II: Franklin D. Roosevelt — upto April 12, 1945 & Harry Truman — after April 12, 1945 (Presidents of USA), Winston Churchill (Prime Minister of Britain), Joseph Stalin (Premier of USSR), Paul Reynaud & Charles De Gaulle (Prime Ministers of France) and Chiang Kai-shek (Head of the Nationalist Government of China).

Miscellaneous

Important Dates

R.C.
776
First Olympiad in Greece.
753
Rome founded.
480
Battle of Marathon; the Greeks defeated the Iranians/Persians.
337-32
Invasion of India by Alexander, Battle of Hydaspes.
221
Chin-Hung Ti ‘Universal Emperor’ in China, Great Wall of China completed.
25
Invasion of Britain by Julius Caesar, the Great Roman General.
44
Assassination of Julius Caesar by Brutus.
4
Birth of Jesus Christ.
A.D.
29
Crucifixion of Jesus Christ.
63
Roman conquest of Britain.
622
Birth of Prophet Muhammad at Mecca.
622
Migration of Muhammad from Mecca to Medina (Hijira), Beginning of Hijra Era (Muhammadan calendar) on July 15.
800
Charlemagne crowned Roman Emperor at St. Peter’s.
871
Accession of Alfred the Great to the throne of Britain.
1066
Death of king Alfred the Great.
1066
1215
Magna Carta or the Great Charter signed by king John II at Runnymede in England on June 15.
1280
Gunpowder invented by Roger Bacon.
1358
The Hundred Years War broke out; it lasted upto 1453.
1358
Joan of Arc, a brave French peasant girl, obtained victory over the English at Orleans. She was burnt alive at the stakes.
1483
The Black death i.e., plague broke out in England.
1483
The capture of Constantinople (the home of classical learning) by the Ottoman Turks compelled the Greek scholars to flee to Italy and other West European countries, where they spread the knowledge of Greek philosophy and literature. This was the beginning of Renaissance in Europe.
1456  **Bartholomew Diaz** rounded the Cape of Good Hope.

1492  **Columbus** sailed on his first expedition to the West Indies which later led to the discovery of America (the New World).

1498  **Vasco da Gama**, a Portuguese, discovered the sea-route to India via the Cape of Good Hope.

1512  Beginning of Reformation.

1529-36  Reformation in England under **Henry VIII**.

1564  Birth of **Shakespeare**.

1571  Battle of Lepanto; Turks defeated by the Christian League.

1577  **Drake**, the famous English Admiral, started his voyage round the world for the first time and plundered Spanish ships and ports in South America.

1588  Admiral **Drake** defeated the Spanish ‘Armada’; England became the ‘Mistress of the Seas’.

1600  Establishment of the British East India Company in India (31st Dec.)

1605  Gunpowder plot in England to blow up the English Parliament.

1616  **Shakespeare** passes away.

1649  Trial and execution of **Charles I**, beginning of Commonwealth.

1649-60  The Commonwealth and the Protectorate in England.

1660  Restoration of Monarchy in England.

1665  The Great Plague in London.

1679  Habeas Corpus Act.


1704  Battle of Blenheim; Marlborough and Eugene inflicted a crushing defeat on the French army.

1707  Union of England and Scotland.

1763  Treaty of Paris; it ended the Seven Years’ War (1756-63); weakened France, made England a great colonial power.

1776  Declaration of American Independence and formation of a Federal Republic of 13 states called the United States of America (July 4).

1783  Treaty of Versailles; England recognised the independence of the United States of America.

1789  **George Washington** elected First President of USA. Beginning of French Revolution.

1798  Battle of the Nile; The English under Nelson gained victory over the French.

1805  Battle of Trafalgar; Death of Nelson.

1815  Battle of Austerlitz — **Napoleon Bonaparte** routed a combined army of the Russians and the Austrians.

1815  Battle of Waterloo — **Napoleon** was defeated and exiled to St. Helena.

1821  Death of **Napoleon** at St. Helena (May 5).

__World History__

1828  Battle of Navarino; the allied fleets of England, Russia and France destroyed the Turkish fleet; This victory practically secured the independence of Greece.

1828  Reforms Bill passed; French captured Antwerp.

1828  Emancipation Act of 1833; It abolished slavery in the British dominions.

1837  Accession of **Queen Victoria** to the throne of England.


1839  The Crimean War began; Russia attacked Turkey; England and France came to the rescue of Turkey.

1861  American Civil War started. **Abraham Lincoln** elected 16th President of USA.

1863  Slavery abolished in America.

1869  Suez Canal opened for traffic.

1885  General Gordon captured and slain at Khartoum.

1899  Beginning of the Boer War.

1904  Outbreak of the Russo-Japanese War.

1905  Battle of the sea of Japan; Japan inflicted a crushing naval defeat on Russia; a wave of nationalism spread in Asia.

1911  Chinese Republican Revolution; Amundsen reached South Pole (Dec. 14).

1914  Outbreak of World War I (July 28).

1916  Battle of Jutland (Naval Battle). The British Grand Fleet under Admiral Jellicoe defeated the German Fleet under Admiral Scheer.

1917  March / Feb. Revolution in Russia: the Czar abdicated and later assassinated; reformist Mensheviks came into power (Prince Lvov, Kerensky).

1918  Nov./Oct. Revolution in Russia; Revolutionary Bolsheviks came into power (Lenin).

1918  End of World War I (Nov. 11).

1919  The Paris Conference; the Treaty of Versailles.

1921  Foundation of the League of Nations (Jan. 10).

1922  The Irish Free State established with the status of a Dominion like Canada (Dec. 6).

1923  Turkish Republic proclaimed with Kemal Ataturk as its First President.

1924  Lenin died, and power passed into the hands of Stalin in Russia.

1925  Treaty of Locarno (between Great Britain, France, Germany, Italy and Belgium).

1928  Kellogg Pact (signed in Paris by the principal powers of the world for the prevention of war; it had no effect).

1933  Hitler became the Chancellor of Germany.

1935  War between Italy and Abyssinia (Ethiopia); Italy annexed Abyssinia (Ethiopia); Plebiscite in Saar.

1939  Germany invaded Poland: Outbreak of World War II (Sep. 1).

1940  Fall of France after German invasion (June 5); Italy entered World War II (June 11).

1941  Hitler invades Russia (June 22); Signing of the Atlantic Charter (Aug. 14); Japan attacked Pearl Harbour (Hawaii Islands) (Dec. 7); USA entered World War II (Dec. 8); China entered World War II (Dec. 10); Air raids by Japan on Rangoon (Dec. 22).

1942  Capture of Singapore by Japanese forces (Feb. 15); Battle of Coral Sea, Japanese fleet suffered heavy losses at the hands of the American fleet (May 3); Battle of Stalingrad (Sep. 19).
### Assocations of Places

<table>
<thead>
<tr>
<th>Place</th>
<th>Associated with</th>
<th>Place</th>
<th>Associated with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corsica</td>
<td>Napoleon Bonaparte</td>
<td>Medina</td>
<td>Prophet Muhammad</td>
</tr>
<tr>
<td>Hiroshima</td>
<td>Dropping of first atom bomb</td>
<td>Pearl Harbour</td>
<td>Japan's attack during World War II</td>
</tr>
<tr>
<td>Jerusalem</td>
<td>Jesus Christ</td>
<td>St. Helena</td>
<td>Napoleon Bonaparte</td>
</tr>
<tr>
<td>Macedonia</td>
<td>Alexander the Great</td>
<td>Trafalgar</td>
<td>Nelson</td>
</tr>
<tr>
<td>Mecca</td>
<td>Prophet Muhammad</td>
<td>Waterloo</td>
<td>Napoleon Bonaparte</td>
</tr>
</tbody>
</table>

### Abbreviated or Alternative Names

<table>
<thead>
<tr>
<th>Abbreviated/Alternative Name</th>
<th>Original Name</th>
<th>Abbreviated/Alternative Name</th>
<th>Original Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apostle of Free Trade</td>
<td>Richard Cobden</td>
<td>Li-Kwan</td>
<td>Pearl Buck</td>
</tr>
<tr>
<td>Bangabandhu</td>
<td>Sheikh Mujibur Rahman</td>
<td>Little Corporal</td>
<td>Napoleon</td>
</tr>
<tr>
<td>Father of English Poetry</td>
<td>Geoffrey Chaucer</td>
<td>Maid of Orleans</td>
<td>John of Arc</td>
</tr>
<tr>
<td>Man of Blood and Iron</td>
<td>Bismarck</td>
<td>Man of Destiny</td>
<td>Napoleon</td>
</tr>
<tr>
<td>G.B.S.</td>
<td>George Bernard Shaw</td>
<td>Mark Twain</td>
<td>Samuel Clemens</td>
</tr>
<tr>
<td>Grand Old Man of Britain</td>
<td>Gladstone</td>
<td>Scourge of God</td>
<td>Chengiz Khan</td>
</tr>
<tr>
<td>Great Communicer</td>
<td>Fitt, the Younger</td>
<td>Uncle Ho</td>
<td>Ho Chi Minh</td>
</tr>
<tr>
<td>King Maker</td>
<td>Earl of Warwick</td>
<td>Bard of Avon</td>
<td>Shakespeare</td>
</tr>
<tr>
<td>Lady of the Lamp</td>
<td>Florencio Nightingale</td>
<td>Maiden Queen</td>
<td>Elizabeth I</td>
</tr>
<tr>
<td>Voltaire</td>
<td>Sir Walter Scott</td>
<td>Sir Walter Scott</td>
<td>D. Eisenhower</td>
</tr>
</tbody>
</table>

### Name of the Battle

<table>
<thead>
<tr>
<th>Name of the Battle</th>
<th>Year</th>
<th>Countries Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battle of Marathon</td>
<td>490 BC</td>
<td>Athenians and Persians, King Darius of Persia defeated. Greeks defeated.</td>
</tr>
<tr>
<td>Battle of Thermopylae</td>
<td>480 BC</td>
<td>Spartans led by Leonidas and Persians led by Xenophon; Greeks defeated.</td>
</tr>
<tr>
<td>Battle of Salamis</td>
<td>480 BC</td>
<td>Athenian fleet and Persian fleet in Bay of Salamis; Persian fleet defeated.</td>
</tr>
<tr>
<td>Battle of Platae</td>
<td>479 BC</td>
<td>Greek and Persians forces; Persian forces defeated.</td>
</tr>
<tr>
<td>Battle of Mycale</td>
<td>479 BC</td>
<td>Greek and Persian fleets; Persian fleet defeated.</td>
</tr>
</tbody>
</table>

### Important Battles

<table>
<thead>
<tr>
<th>Name of the Battle</th>
<th>Year</th>
<th>Countries Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battle of Marathon</td>
<td>490 BC</td>
<td>Athenians and Persians, King Darius of Persia defeated. Greeks defeated.</td>
</tr>
<tr>
<td>Battle of Thermopylae</td>
<td>480 BC</td>
<td>Spartans led by Leonidas and Persians led by Xenophon; Greeks defeated.</td>
</tr>
<tr>
<td>Battle of Salamis</td>
<td>480 BC</td>
<td>Athenian fleet and Persian fleet in Bay of Salamis; Persian fleet defeated.</td>
</tr>
<tr>
<td>Battle of Platae</td>
<td>479 BC</td>
<td>Greek and Persians forces; Persian forces defeated.</td>
</tr>
<tr>
<td>Battle of Mycale</td>
<td>479 BC</td>
<td>Greek and Persian fleets; Persian fleet defeated.</td>
</tr>
</tbody>
</table>

### Wars and Battles

- **Spartan War I (Peloponnesian War)**: 431 BC, Sparta and Athens; Spartans victorious.
- **Spartan War II**: 421 BC, Sparta and Athens; Spartans victorious.
- **Battle of Magnesia**: 331 BC, Greek and Persian forces; Greeks victorious.
- **Battle of Arbela**: 331 BC, Syriam and Persian forces; Syrian forces defeated (northwest Lydia).
- **Battle of Pharsalus**: 48 AD, Caesar defeated Pompey.
- **Battle of Hastings**: 1066, William, the Duke of Normandy defeated Harold, the King of England.
- **100-Year War**: 1338-1453, Fought between France and England. The cause of the war was the succession question to the throne of France which was claimed by Edward III of England. The war was resumed by Henry V and was brought to an end by the heroism of Joan of Arc — a country girl who overthrew the power of England. Joan of Arc was burnt alive at the stake in 1431.
- **War of the Roses**: 1455-1485, Civil War in England; the cause of the war was a struggle for the throne of England between the two royal houses of Lancaster and York.
- **Anglo-Spanish War (Spanish Armada)**: 1588, Spanish and English fleets fought in the English Channel; the English fleet led by Lord Howard defeated the Spanish Armada.
- **Battle of Bannockburn**: 1314, The English army under Edward II defeated the Scottish army at Bannockburn.
- **Thirty-Year War**: 1618-1648, Started as religious-cum-political war between the Luthers and Catholics in Germany and developed into an international war.
- **Civil War in England**: 1642-1649, Between Cavaliers (King Charles I supporters) and forces of Parliament led by Oliver Cromwell, King Charles I executed.
- **Battle of Blenheim**: 1704, England and Austria headed by Marlborough defeated France and Russia.
- **War of Austrian Succession**: 1740-1748, Queen of Austria, Maria Theresa (daughter of Charles VII) was challenged by King Frederick II of Prussia. England supported the queen and Frederick II was helped by France. Ended with a Treaty which recognized the Queen's right to the throne after the death of King Frederick.
- **Seven-Year War**: 1756-1763, Britain and France against Austria and Prussia; the British alliance won.
- **Battle of the Nile**: 1798, British and French fleets, Britain victorious.
- **Battle of Trafalgar**: 1805, British fleet defeated fleets of France and Spain. British fleet were commanded by Admiral Nelson, who was killed during the battle.
- **Battle of Austerlitz**: 1805, Britain, Austria, Russia and Prussia on one side, France on the other. Napoleon (France) defeated Austria and Russia.
### Geography

Uranus is commonly defined as the totality of everything that exists, including all physical matter and energy, the planets, stars, galaxies and the contents of intergalactic space.

- The study of universe is known as **Cosmology**.
- Cosmology = cosmos (universe) + logos (science)
- The universe has no limit.

#### Galaxy
- A galaxy is a vast system of billions of stars, which also contains a large number of gas clouds (mainly of hydrogen gas) and dust, isolated in space from similar systems.
- There are about 100 billion galaxies in the universe, and each galaxy has, on average, 100 billion stars. So, the total number of stars in the universe is $10^{22}$.
- The Milky Way Galaxy is the home of the Earth and our Solar System. It is spiral in shape.
- Milky Way Galaxy was formed 5 billion years after the Big Bang.
- Latest known galaxy is the Dwarf Galaxy.
- According to the modern thought, universe can be classified into two parts namely—
  (a) Atmosphere and (b) Space.
- Origin of the universe is explained by the Big Bang Theory, formulated and proposed by the Belgian astronomer and cosmologist Georges Lemaître.
- Andromeda is our nearest galaxy.

#### The Big Bang Theory
- All the matter in the universe was originally a concentrated lump called primary atom.
- Big Bang was an explosion that occurred 15 billion years ago, leading to the formation of galaxies of stars and other heavenly bodies.
- Since then, all the galaxies have been flying away from one another causing expansion of the universe.

#### Star
- Clumps of dust and gas in a nebula come together due to gravity and form stars.
- Stars are made of hot burning gases.
- They emit light of their own and are very large and very hot.
- Light takes about 4.3 years to reach us from the next nearest star *proxima centauri*.

#### The Solar System
- The solar system consists of the sun, the eight planets and their satellites (or moons), and thousands of other smaller heavenly bodies such as asteroids, comets and meteors.
The sun is at the centre of the solar system and all these bodies are revolving around it.
- The gravitational pull of the sun keeps all the planets and other objects revolving around it. Thus, the motion of all the members of the solar system is governed mainly by the gravitational force of the sun.
- Planets revolve around the sun in elliptical orbit.

In the solar system the planet nearest to the sun is Mercury and the planet farthest from the sun is Neptune (not Pluto).
- The size of solar system has been estimated to at about 10^6 A.U.
- The solar system is dominated by the sun which accounts for almost 99.9% of the matter in the whole solar system.
- The sun is also the source of all the energy in the solar system.
- Pluto is a dwarf planet.
- Mercury, Venus, Earth, Mars are called **terrestrial planets** and Jupiter, Saturn, Uranus and Neptune are called **gaseous planets**.

**The Sun**
- The Sun is at the centre of the Solar System.
- Its size is thirteen lakh times as that of the Earth.
- It is the nearest star to the Earth.
- It is an ultimate source of energy for life on Earth.
- Its diameter is 14 lakh kms.
- It is composed of 71% Hydrogen, 26.5% Helium and 2.5% other elements. 
  **Hydrogen** and **Helium** are the main gases present in the Sun.
- Within the Sun, hydrogen is converted to Helium due to nuclear fusion releasing a tremendous amount of heat and light.
- It has a surface temperature of 5778 K or 5504.85°C.
- The temperature at the centre is around 1.571 x 10^7 K or 15,000,000°C.
- Shining surface of the sun is called photosphere, it appears like a disc, radiates energy and acts as a source of energy.
- The outer layer of sun’s atmosphere made up of thin hot gases, is called Corona. Corona is visible only during a total eclipse of the sun (or with a special solar telescope called Coronagraph).

**The Planets**
- These are opaque bodies which continuously revolve around and are lighted by the Sun.
- There are eight planets in the Solar system.
- A ninth planet has been recently discovered by NASA named as Carla.
- The sequence of planets according to their distance from the Sun is Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.
- The sequence of planets according to their size (in descending order i.e. from big to small) is Jupiter, Saturn, Uranus, Neptune, Earth, Venus, Mars, Mercury.
- Jupiter is the biggest and mercury is the smallest planets of our solar system.

**Classification of Planets**
- The eight planets have been divided into two groups. All the planets of a particular group have some common features. ‘Terrestrial planets’ or ‘Rocky planets’ and ‘Jovian planets’ or ‘Gaseous planets’ (Gas giants) are the two groups of planets.
- The four planets nearest to the Sun—Mercury, Venus, Earth and Mars are called terrestrial planets, because their structure is similar to the earth.
- Other four planets—Jupiter, Saturn, Uranus and Neptune are called Jovian planets.
- Planets are classified into the following two groups—inner and outer planets. These are separated by asteroid belt.

<table>
<thead>
<tr>
<th>Inner Planets</th>
<th>Outer Planets</th>
</tr>
</thead>
<tbody>
<tr>
<td>They include Mercury, Venus, Earth, Mars.</td>
<td>They include Jupiter, Saturn, Uranus, Neptune etc.</td>
</tr>
<tr>
<td>They are nearer to the sun.</td>
<td>They are far away from the sun.</td>
</tr>
<tr>
<td>They are made up of dense metallic minerals.</td>
<td>They are made up of hot gases, mainly hydrogen and helium.</td>
</tr>
<tr>
<td>They move faster and have a shorter period of revolution.</td>
<td>They move rather slowly and have a longer period of revolution.</td>
</tr>
<tr>
<td>They have thin, rocky crust.</td>
<td>They are all gaseous bodies.</td>
</tr>
<tr>
<td>They have a mantle rich in iron and magnesium. Made of gases.</td>
<td>They have ring systems around them.</td>
</tr>
<tr>
<td>They have a core of molten metals.</td>
<td>They have thin atmosphere.</td>
</tr>
<tr>
<td>They have thin atmosphere.</td>
<td>They have very few natural satellites (or moons). They have a large number of natural satellites (or moons).</td>
</tr>
</tbody>
</table>

**Some Notable Facts About Various Planets and Satellites**
- Mercury
  - Mercury is the closest planet to the Sun.
It is extremely hot planet.
- The planet has no water on it.
- Mercury planet has no gases like CO₂, N₂, H₂ and O₂ which can act as building blocks of life.
- Mercury planet has no protective blanket like Ozone around it to prevent us from harmful radiations.

**Venus**
- Venus is the second planet in distance from the Sun. This planet is nearest to the Earth and is also the brightest planet.
- Venus is known as the 'Evening Star' as well as 'Morning Star'.
- Venus is surrounded by a thick cloud cover, hence known as the 'Veiled Planet'. ('Veil' means unclear/cover).
- Venus is like the Earth in size and mass, and hence also known as the 'Earth's twin'. It also rotates clockwise like Uranus.
- Venus is the hottest planet (even hotter than Mercury) of our Solar System, due to its veil of cloud.
- Venus has no water on it. There is no sufficient oxygen on the Venus.

**The Earth**
- Earth is the largest of the inner planets.
- The Earth is 23½° tilted on its axis and thus makes 66½° angle.
- It takes 23 hours 56 minutes and 4.091 seconds to rotate on its axis.
- It takes 365 days, 5 hours and 48 minutes to revolve around the Sun.
- Earth is known as the 'watery planet' or the 'blue planet' due to the presence of huge amount of water on it.
- Earth is the only known planet which provides sustenance or life on it. It has a large quantity of oxygen which supports life.

**The Moon**
- The Moon is the only satellite of the earth.
- It has a diameter of 3,475 km and its circumference is 10,864 km while its orbit is elliptical.
- The maximum distance (apogee) of the moon from the earth is 4,06,000 km and the minimum distance (perigee) is 3,64,000 km.
- It takes 27 days, 7 hours and 43 minutes to rotate on its axis (this period of about 27½ days is called the 'sidereal month') and approximately the same period of time it takes to revolve around the earth. The moon's period of revolution with reference to the sun is about 29.53 days (29 days, 12 hours, 44 minutes and 2.8 seconds). This period is called a 'synodic month'.
- Only 59 per cent of the total surface of the moon is visible from the earth.
- The bright part of the moon is full of mountains whereas the dark patches are low lying plains.
- 'Sea of tranquility' made of the plain of dust particles, is on the rear side of the moon, which always remains dark.

The highest mountain on the moon is liebuitv mountain which is 10,660 meter high.
The moon has no atmosphere, no twilight and no sound.
The temperature during daytime is about 100°C and during night it drops down to about -180°C.
The light from the moon takes 1.3 seconds to reach the Earth.
The size of the Moon is one-fourth (1/4th) the size of the Earth.
The size of the Earth is one-sixth (1/6th) that of the Earth.
- Galvani pull of Moon is one-sixth (1/6th) that of the Earth.
- Mainly silicon, iron, magnesium etc elements are found on the Moon's surface.
- The study of the Moon is called 'Selenology'.
- Moon is also known as the fossil planet.

**Mars**
- Iron-rich red soil and pink sky of Mars give it the name, 'Red Planet'.
- Phobos and Demos are two satellites of Mars.

**Jupiter**
- Jupiter is the largest planet of the Solar System.
- Jupiter is also known as winter planet as its average temperature is very low (-148°C).
- Ganymeda, satellite of Jupiter is the largest satellite in the Solar System.

**Saturn**
- Saturn is the second largest planet in the Solar System.
- Saturn has bright concentric rings which are made up of ice and ice-covered dust particles which revolve around it.
- Titan is the largest satellite of Saturn.

**Uranus**
- Uranus is about four times the size of the Earth. This planet appears greenish in colour because of methane gas present in its atmosphere.
- Uranus was discovered in 1781 by Sir William Hersiel.
- Uranus is the 7th planet from the Sun.
- Uranus is the first planet to have been discovered by the use of a telescope. Uranus is the third biggest planet of the Solar System.
- Uranus is extremely cold, having surface temperature -190°C and is surrounded by 13 rings, namely zeta (ζ)/R1986U2, 6, 5, 4, alpha (α), beta (β), eta (η), gamma (γ), delta (δ), lambda (λ), epsilon (ε), nu (ν) and mu (μ).
- Uranus rotates from east to west on its axis, which is opposite to other planets except Venus.
- The axis of Uranus has large inclination so that it appears to be lying down, hence it bears the name 'A Planet on its Side'.

**Neptune**
- Neptune is the 8th planet of the Solar System.
- The temperature on the surface of Neptune remains low.
- Neptune is very similar to Uranus and can be considered as its twin.
- Neptune is surrounded by methane rings of sub zero temperature.
Pluto is not a Planet now

> On the basis of the new definition of planet given by the IAU (International Astronomical Union), the world's top institution on space science research, leading astronomers participating in IAU's meet at Prague (Czech Republic) on August 24, 2006, declared that Pluto would no longer remain a planet.

> Under the IAU's new guidelines, the number of planets in the Solar System has thus been reduced from nine to eight. Its merits mentioning here that, prior to this decision, Pluto had been holding the planetary status since its discovery in 1930 by Clyde Tombaugh.

> Now, with the omission of Pluto from the Solar System, its membership has been restricted to the eight 'classical' planets, namely Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.

Pluto Gets a Numerical Denomination

Weeks after it was demoted to a sub-planetary status, Pluto was given a new name to reflect its new status as a dwarf planet in September, 2006. The former 9th planet was assigned the dwarf number 134340 by the Minor Planet Centre (MPC), the official organisation responsible for collecting data about asteroids and comets in our Solar System.

Pluto's companion satellites, Charon (Pluto's largest moon), Nix and Hydra, are considered part of the same system and will not be assigned separate asteroid numbers. Instead, they will now be called 134340 I, II, and III respectively.

> Before losing its planetary status on 24th August, 2006 Pluto was the outermost planet in the Solar System.

<table>
<thead>
<tr>
<th>Name of planet</th>
<th>Distance from Sun (km)</th>
<th>Time taken for one revolution around Sun</th>
<th>Time taken to turn once on its axis</th>
<th>Diameter of planet (km)</th>
<th>Mass of planet to earth taken as 1</th>
<th>No of satellites (or moons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>58 x 10^6</td>
<td>88 days</td>
<td>58.6 days</td>
<td>4,878</td>
<td>0.055</td>
<td>None</td>
</tr>
<tr>
<td>Venus</td>
<td>108 x 10^6</td>
<td>224.7 days</td>
<td>243 days</td>
<td>12,100</td>
<td>0.8</td>
<td>None</td>
</tr>
<tr>
<td>Earth</td>
<td>150 x 10^6</td>
<td>365.26 days</td>
<td>23.9 hours (23 hours 56 min 04 sec.)</td>
<td>12,760</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mars</td>
<td>228 x 10^6</td>
<td>687 days</td>
<td>24.6 hours</td>
<td>6,780</td>
<td>0.1</td>
<td>2</td>
</tr>
<tr>
<td>Jupiter</td>
<td>778 x 10^6</td>
<td>11.9 years</td>
<td>9.9 hours</td>
<td>1,42,800</td>
<td>318</td>
<td>67 (50+17)</td>
</tr>
<tr>
<td>Saturn</td>
<td>1427 x 10^6</td>
<td>29.5 years</td>
<td>10 hours</td>
<td>1,20,000</td>
<td>95</td>
<td>62 (53+19)</td>
</tr>
<tr>
<td>Uranus</td>
<td>2870 x 10^6</td>
<td>84 years</td>
<td>16.2 hours</td>
<td>50,800</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Neptune</td>
<td>4,504 x 10^6</td>
<td>164.8 years</td>
<td>18.5 hours</td>
<td>45,600</td>
<td>17</td>
<td>8</td>
</tr>
</tbody>
</table>

Asteroids (or Planetoids)

> Asteroids are also known as minor planets.

> They are objects that revolve around the Sun.

> They are mostly found between the orbits of Mars and Jupiter. They are a belt of debris which failed to assemble into planets and keeps on revolving around the Sun. This has come to be called as 'asteroid belt'.

More than 5000 asteroids have been identified.

* Asteroids may be spherical, elongated or irregular in shape.

* All asteroids rotate on their axis, every 5 to 20 hours. Certain asteroids may have satellites.

* Trojan asteroids are found in two clouds moving in the orbit of Jupiter, one moving ahead of it and the other moving behind it.

* Scientists believe that these asteroids occupy a place where a planet could have existed but was prevented from its formation by the disruptive gravitational force of the nearby giant planet, Jupiter.

Meteors and Meteorites are also called shooting stars.

* Meteors and Meteorites are fragments of rocks coming towards the earth, formed due to the collision of asteroids with one another.

* Meteors are usually small, and due to the heat produced by air resistance, burn up before they reach the Earth's surface.

* When meteors are large and do not burn up completely, they land on the Earth's surface and are known as Meteorites.

* All meteorites are believed to originate in the asteroid belt, where a sudden collision may send them towards the Earth and the Earth's gravity attracts them towards its surface.

Comets

* Visitors of the Solar System, Comets (the name derived from the Latin words stella cometa meaning 'hairy star') are among the most spectacular and unpredictable bodies in the Solar System.

* Comets move around the Sun in regular orbits, but their orbits are elongated ellipses that it takes them hundreds and, sometimes even thousands of years to complete one revolution around the Sun.

* Comets are made up of frozen gases which hold together rocky and metallic materials.

* A comet becomes visible only when it travels close to the Sun.

* Its ice melts and the gas and dust is swept back into a tail.

* The tail always points away from the Sun. So when it is travelling away from the Sun it is led by its tail.

Features of a Comet

* A comet is characterised by a long luminous tail, which emits light.

* But this is visible only when the comet's orbit passes close to the Sun.

* When the comet travels close to the Sun, the ice melts to a head of gas called a coma.

* The Sun's radiation sweeps this into a gas tail.

* Dust particles are also swept back to form a dust tail.

Stars

* Stars are heavenly bodies made up of hot burning gases, thus shining by their own light.
Stars seem to be fixed with respect to each other. In fact, they are in rapid motion but are at such great distance that relative changes in position become noticeable only over the centuries.

According to NASA, Proxima Centauri is the closest star to the Earth after the Sun. It is about 4.24 light years away.

Pole star (or Polaris), Sirius, Vega, Capella, Alpha centauri, Beta centauri, Proxima centauri, Spica, Regulus, Pleiades, Aldebaran, Arcturus, Betelgeuse and of course the Sun are some of the important examples of the stars.

Facts about Stars
- There are billions and billions of stars in the sky but only about 2000 stars can be seen with the naked eye on a clear moonless night.
- There are $10^{22}$ stars in the Universe.
- About 8000 stars are visible from the Earth with naked eye. Out of this, 4000 stars are visible in the Northern Hemisphere and 4000 in the Southern Hemisphere.
- In either hemisphere, only 2000 stars are visible at any given time.
- The other 2000 are located in the day-time sky and the brightness of the Sun renders them invisible.

Constellations
- To enable astronomers to identify roughly the position of the stars, the sky is divided into units. These units are known as Constellations.
- These constellations were named in the honour of mythological characters.
- At present 88 constellations are recognized.

Some well known constellations
- Some well known constellations, with their Indian names are given below:

<table>
<thead>
<tr>
<th>Constellations</th>
<th>Indian names</th>
<th>Constellations</th>
<th>Indian names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ursa Major (Great Bear)</td>
<td>Saptarishi</td>
<td>Cancer*</td>
<td>Kark</td>
</tr>
<tr>
<td>Ursa Minor (Little Bear)</td>
<td>Dhruva Matsya</td>
<td>Leo*</td>
<td>Simha</td>
</tr>
<tr>
<td>Orion (Hunter)</td>
<td>Mriga</td>
<td>Virgo*</td>
<td>Kanya</td>
</tr>
<tr>
<td>Draco (Dragon)</td>
<td>Kaley</td>
<td>Libra*</td>
<td>Tula</td>
</tr>
<tr>
<td>Scorpio*</td>
<td>Vrishchika</td>
<td>Sagittarius*</td>
<td>Dhanu</td>
</tr>
<tr>
<td>Aries*</td>
<td>Mesh</td>
<td>Capricorn*</td>
<td>Makar</td>
</tr>
<tr>
<td>Taurus*</td>
<td>Vrish</td>
<td>Aquarius*</td>
<td>Kumbh</td>
</tr>
<tr>
<td>Gemini*</td>
<td>Mithun</td>
<td>Pisces*</td>
<td>Meen</td>
</tr>
</tbody>
</table>

* 12 Zodiac signs

Galaxy
- A large group of stars, dust and light gases, bound together by their own gravity is called a galaxy.
- There are $10^{11}$ galaxies in the universe.
- We live on the outer edge of a spiral type of galaxy called the Milky Way, which is about 100,000 light years in diameter and is rotating slowly.

Earth's Galaxy: The Milky Way
- The Milky Way is a large spiral-shaped galaxy.

It spans about 1,00,000 light-years across and is about 10,000 light-years thick at the centre.
- It is called the Milky Way because it appears as a soft glowing light of billions of stars. These stars are so far that they can be seen only in constellation, not separately.
- Galileo discovered that this band of light was produced by countless individual stars which a naked eye can not see.
- It takes about 250 million years to complete one revolution.

Andromeda: Earth's closest Galactic neighbour
- Andromeda is a spiral galaxy and also our closest neighbour.
- It appears as a fuzzy patch of light and contains millions of stars.
- It is the farthest object that can be seen with the naked eye.
- Along with the Milky Way, it belongs to a group of galaxies known as the Local Group, which in turn is a part of Virgo Cluster of groups.
- Like stars, galaxies are grouped into clusters. Some clusters contain thousands of galaxies.
- About 30 galaxies, along with the Milky Way and the Andromeda are grouped together in one cluster called the Local Group.
- Clusters may group together into upper clusters.
- Super clusters are also spread randomly throughout the universe.

Nebulae
- Nebulae are huge interstellar clouds of gas and dust that appear as faint, misty patches of light scattered all over the sky.
- They appear either as bright luminous clouds or as dark patches against a brighter background.
- Anebula depends for its luminosity upon the presence of stars that have either arisen from it or are contained in it.
- If the stars are extremely hot, the hydrogen in the nebula is ionized and emits a certain amount of light of its own.
- If a star is less hot, the nebula shines only by reflection.
- If there are no suitable stars, the nebula does not shine and remains dark and can be detected only because it blots out the light of the stars beyond.

The Earth: Shape and Size

Shape of the Earth
- Pythagoras (572-500 B.C.), a Greek philosopher and mathematician, was among the first to suggest that the Earth was shaped like a globe.

The Earth is not flat
- If the Earth were a flat disc, then the rising Sun would have been seen at all places at the same time. But this does not happen. Places in the east see the rising Sun earlier.
- When a ship approaches land, its funnel or mast is seen first and then the hull. If the Earth had been flat, the whole ship would have been seen at the same time.
The Earth is a sphere
> The Earth is rarely oriented in the same position during successive eclipses, but it always casts a circular shadow, thus proving that the Earth is a sphere.
> A sphere is the only solid body that will always cast a circular shadow.
> At the North Pole, the Pole Star can always be observed at 90 degrees in the sky, since the star lies in the line with the axis of the Earth.
> As one travels southwards, the angle of Pole Star decreases.
> At the Equator the angle becomes zero degree.
> This observation proves that the path of travel is an arc of a circle.
> The Sun, Moon and all the heavenly bodies appear to be spherical when viewed from different positions. It seems logical to conclude that the Earth is no exception.
> The photographs of the Earth taken from the space prove beyond any doubt that the Earth is a sphere.

The Earth as an Oblate Spheroid
> Refined measurements of the Earth have proved that the true form of the Earth resembles a sphere that has been compressed at the poles and made to bulge at the Equator. This form is known as an oblate spheroid.

The various factors which make the earth suitable for life to evolve and survive are
> The Earth has all the essential elements like carbon, hydrogen, nitrogen and oxygen, which act as the block for the origin of life.
> The Earth is neither too hot nor too cold. It has the right temperature range for carrying out the life-sustaining chemical reactions.
> The Earth has a lot of water in the form of lakes, rivers and oceans for the growth and survival of life.
> The Earth has enough oxygen gas in its atmosphere for the survival of living beings through breathing.
> The Earth has a protective blanket of ozone layer high up in its atmosphere to save life from harmful ultraviolet radiations coming from the sun.
> Biodiversity changes increase towards equator. Biodiversity is the degree of variation of life. It is a measure of variety of organisms present in different ecosystems. It is richest in the tropics.

Statistical Data of The Earth
The Earth, third planet from the Sun, is the fifth largest planet in the Solar System in terms of size and mass.

<table>
<thead>
<tr>
<th>Composition of Earth (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Iron</td>
<td>35</td>
</tr>
<tr>
<td>2. Oxygen</td>
<td>30</td>
</tr>
<tr>
<td>3. Silicon</td>
<td>15</td>
</tr>
<tr>
<td>4. Magnesium</td>
<td>13</td>
</tr>
<tr>
<td>5. Nickel</td>
<td>24</td>
</tr>
<tr>
<td>6. Sulphur</td>
<td>19</td>
</tr>
<tr>
<td>7. Calcium</td>
<td>11</td>
</tr>
<tr>
<td>8. Aluminium</td>
<td>11</td>
</tr>
<tr>
<td>9. Others</td>
<td>0.5</td>
</tr>
</tbody>
</table>

| Total Surface area      | 51,00,66,000 sq km |
| Total Land area         | 14,84,29,000 sq km (29.1%) |
| Total Ocean area        | 36,16,37,000 sq km (70.9%) |
| Total Water area        | 38,26,72,000 sq km |

<table>
<thead>
<tr>
<th>Diameter</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Equatorial diameter</td>
<td>12,756 km</td>
</tr>
<tr>
<td>Equatorial radius</td>
<td>6,378.1 km</td>
</tr>
<tr>
<td>Polar diameter</td>
<td>12,713.6 km</td>
</tr>
<tr>
<td>Polar radius</td>
<td>6,356.8 km (UGG)</td>
</tr>
<tr>
<td>Polar circumference</td>
<td>40,077 km</td>
</tr>
<tr>
<td>Polar circumference</td>
<td>40,009 km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Important Facts of Earth</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest land point (Mt. Everest, Nepal)</td>
<td>8,850 m</td>
</tr>
<tr>
<td>Lowest land point (Dead Sea, between Jordan and Israel)</td>
<td>400 m/1,300 ft (approx.)</td>
</tr>
<tr>
<td>Greatest ocean depth (Marina Trench in Pacific Ocean, near Japan)</td>
<td>11,033 m (36,201 ft)</td>
</tr>
<tr>
<td>Maximum distance from the Sun (At Aphelion)</td>
<td>152 million km (approx.)</td>
</tr>
<tr>
<td>Minimum distance from the Sun (At Perihelion)</td>
<td>147 million km (approx.)</td>
</tr>
<tr>
<td>The mean distance from the Sun</td>
<td>14,95,98,262 km (1.0 AU)</td>
</tr>
</tbody>
</table>

> 29.1% of the total surface area of Earth is covered by continents (land), while 70.9% is covered by oceans.
> The total water area of the Earth including the oceans, lakes, rivers, ice sheets and the water in the atmosphere is called hydrosphere and it covers about 71% of the earth's surface.

Continents of The World
Asia, Africa, North America, South America, Europe, Australia and Antarctica are the seven continents.

### Facts about Asia
- **Latitude**: 10°S and 80° N
- **Longitude**: 25° E and 170° W
- **Area**: 44,579,000 sq. km (approx. 30% of the world)
- **Population**: 4,351 million (mid-2014) [60.11% of world population]
- **Oceans and Seas**: Arctic Ocean, Pacific Ocean, Indian Ocean, Red Sea, Gulf of Aden, Persian Gulf, Gulf of Oman, Arabian Sea, Bay of Bengal, China Sea, Yellow Sea of Okhotsk, Bering Sea.

### Highest and Lowest Points
- Everest (8,850 metres*) and Dead Sea (~396.8 m*) respectively.
  (* World's highest and lowest point)

### Straits
- Strait of Malacca, Bering Strait.

### Lakes
- Caspian Sea, Aral Sea, Lake Baikal, Lake Balkhash.
Lucent's General Knowledge

Islands: Kurile, Sakhalin, Honshu, Hokkaido, Taiwan, Borneo, Sumatra, Java, Celebes, New Guinea, Philippines, Sri Lanka, Bahrain, Cyprus.


Peninsulas: Kamchatka Peninsula, Peninsula of Korea, Peninsula of Indo-China, Malay Peninsula, Indian Peninsula, Arabian Peninsula.

Deserts: Arabian Desert, Thar Desert, Gobi Desert.

Rivers: Euphrates, Tigris, Indus, Ganga, Brahmaputra, Huang-Ho, Yang-Tse, Si-Kiang, Amur, Lena Yenisei, Ob, Irrawady, Salween, Mekong.

Important cities: Aden, Karachi, New Delhi, Mumbai, Kolkata, Colombo, Yangon (former Rangoon), Kuala Lumpur, Bangkok, Ho Chi Minh City (former Saigon), Singapore, Manila, Guangzhou (former Canton), Hong Kong, Shanghai, Tokyo.

Facts about Africa
Latitude: 35° S and 37° N
Longitude: 50° E and 17° W
Population: 1,136 million (mid-2014) [15.69% of world population]
Area: 30,065,000 sq km (approx. 20.3% of the world).

Highest and Lowest Points:
- Kilimanjaro (5,895 m.) and Lake Assal (~156.1 m.) respectively.

Straits:
- Strait of Bab-el-Mandeb, Straits of Gibraltar.

Lakes:
- Victoria, Tanganyka, Malawi, Chad, Rudolf, Albert.

Islands:
- Madagascar, Cape Verde Islands, The Comoros, Mauritius, Seychelles.

Mountains: Atlas, Drakensberg, Kilimanjaro.

Plateaus: Plateau of Africa - the entire continent is a plateau.

Deserts: Sahara, Kalahari, Namib.

Facts about North America

North America, northern continent of Western Hemisphere, comprising U.S.A., Canada, Central America, lower range in east and central plains. Climate varies considerably owing to wide range of latitude and altitude.
Latitude: 7° N and 84° N
Longitude: 20° W and 180° W
Area: 24,235,280 sq km (approx. 16.5% of the world)
Population: 353 million (mid-2014) [4.88% of world population]
Plateaus: Plateau of Bolivia, Plateau of Equador.
Deserts: Atacama, Pantagonia

Rivers: Amazon, Orinoco, Paraguay, Parana, Uruguay

Important cities: Buenos Aires, Rio de Janeiro, Montevideo, Quito, Santiago, La Paz, Lima, Bogota, Valparaiso, Sao Paulo, Belen, Caracas.

Facts about Europe

Latitude: 35° N and 73° N
Longitude: 25° W and 65° E
Area: 10,530,750 sq. km (approx.) (7.1%); greatest length north to south 3,860 km; breadth east to west 5,300 km.
Population: 741 million (mid-2014) [10.24% of world population]

Oceans and Seas: Atlantic Ocean, Arctic Ocean, Mediterranean Sea, Caspian Sea, Black Sea, White Sea, North Sea, Norwegian Sea, Baltic Sea, Gulf of Bothnia, Gulf of Finland, Bay of Biscay, Aegean Sea, Adriatic Sea.

Highest and Lowest Points: Mt. Elbrus (5,642 m) and Caspian Sea (~28.0 m) respectively.

Straits: Straits of Gibraltar

Lakes: Lake Ladoga, Onega, Peipus, Vanern, Vatnern,

Islands: British Isles, Iceland, Sardinia, Sicily, Crete.


Plates: Plateau of Bohemia, Plateau of Spain, Central Massif.

Rivers: Volga, Danube, Rhine, Po, Dnieper, Don, Vistula, Elbe, Oder, Seine, Loire, Garonne, Duero, Tagus, Ural.


Facts about Australia

Australia is an island continent and a British Dominion.

Australia with New Zealand, Tasmania, New Guinea and the Pacific Islands (Micronesian, Melanesian and Polynesian Islands) is called Australasia by some geographers while some others call it ‘Oceania’, which includes proximate islands (Caribbean countries etc.). Oceania contains 39 million population which is 0.54% of total world population in 2014.

Latitude: 12° S and 38° S
Longitude: 114° E and 154° E
Area: 7,830,682 sq. km (approx. 5.3% of the world).
Population: Oceania—39 million (mid-2014)

Oceans: Pacific Ocean, Indian Ocean.

Geography

Sea: Tasman Sea, Timor Sea, Arafura Sea, Gulf of Carpentaria, Coral Sea, Great Australian Bight.

Highest Point: Puncak Jaya (4,884 m) in island of New Guinea [Kosciuszko (2,228 m.) in Australian main land], Mt. Wilhelm (4,509 m.) in Papua New Guinea.

Lowest Point: Lake Eyre (~15.8 m)

Strait: Bass Strait

Lake: Lake Eyre

Island: Tasmania

Mountains: Great Dividing Range

Plateau: Gibson Desert, Great Sandy Desert, Great Victoria Desert, Simpson Desert.

Important Cities: Sydney, Melbourne, Adelaide, Brisbane, Darwin, Canberra, Hobart, Perth.

Atlantic Ocean

> The Atlantic Ocean (Area: 8,65,60,000 sq. km) is the second largest ocean in the world.
> Its name is derived from Atlas, a Titan (giant) in Greek mythology.
> The Atlantic Ocean has the longest coastline.
> The Atlantic Ocean is the busiest ocean for trade and commerce since its shipping routes connect the two most industrialized regions, namely Western Europe and N.E. United States of America.
> The Atlantic Ocean was formed millions of years ago when a rift opened up in the Gondwanaland and the continents of South America and Africa separated. The separation continues even today and the Atlantic Ocean is still widening.
> The continental islands of Newfoundland and British Isles are the major ones.
> Volcanic islands are fewer and they include those of Cuba, Jamaica and Puerto Rico. Iceland is the largest island of volcanic origin.

Indian Ocean

> The Indian Ocean (Area: 73,430,000 sq. km) is the only ocean named after a country.
Lucent's General Knowledge

The Indian Ocean is deeper than the Atlantic Ocean.

It contains numerous continental islands, Madagascar and Sri Lanka are being the largest ones. Some of the islands of volcanic origin are those of Mauritius, Andaman and Nicobar, Seychelles, Maldives and Lakshadweep are of coral origin.

South Indian Ocean

Arctic Ocean
- The Arctic Ocean (Area: 13,230,000 sq. km) is the smallest of all the oceans.
- It lies within the Arctic Circle, hence the name Arctic Ocean.
- The North Pole lies in the middle of the Arctic Ocean.
- Most of the parts of Arctic Ocean remain frozen with thick ice for most of the days every year.
- It is the shallowest of all oceans, with an average depth of 1,500 m.
- It has the least salinity of all the oceans. It has a salinity of 20 units per thousand.

Ocean Currents
- The flow of a large amount of water in a definite direction with a great intensity is known as Ocean Current.
- Ocean Currents are of two types—Hot and Cold.

Hot Currents
- The currents flowing from tropical zones of lower latitudes to higher temperate and sub polar zones are known as hot water currents.

Cold Currents
- The currents flowing from higher latitudes to lower latitudes are known as cold water currents.
- The only exception to the conduction of ocean currents is found in the Indian Ocean. The flow of currents changes here with a change in the direction of the Monsoon Winds. The hot currents flow towards cooler oceans and the cold currents flow towards the warmer oceans.

Biosphere
- The part of the Earth where life exists is called the Biosphere (bios' means life).
- The Earth is the only planet of the solar system that supports life. Life is possible because of its unique lithosphere, hydrosphere and atmosphere.

Lithosphere
- The uppermost layer of the Earth's crust which is capable of supporting life is called Lithosphere.
- The Lithosphere (or land) covers two-sevenths or 29.22% (14,90,41,182 sq. km) of the total surface area of the earth.

Hydrosphere
- Hydrosphere (or sea) covers five-sevenths or more accurately 70.78% (36,10,59,226 sq. km) of the total surface area of the earth.

Water is freely available in the gaseous, liquid and solid state.

It is necessary for carrying out chemical reactions within the bodies of the living organisms.

Water also dissolves and transports nutrients from the soil to the plants.

It is used by plants for making food.

Latitude and Longitude
- Any location on Earth is described by two numbers—its latitude and its longitude.

Latitude
- On a globe of the Earth, lines of latitude are circles of different size. The longest is the equator, whose latitude is zero, while at the poles—at latitudes 90° north and 90° south (or −90°) the circles shrink to a point.

Longitude
- On the globe, lines of constant longitude (meridians) extend from pole to pole.
- Every meridian must cross the equator. Since the equator is a circle, we can divide it like any circle into 360 degrees, and the longitude of a point is then the marked value of that division where its meridian meets the equator.
- For historical reasons, the longitude (meridian) passing the old Royal Astronomical Observatory in Greenwich, England, is the one chosen as zero longitude. Located at the eastern edge of London, the British capital, the observatory is now a public museum and a brass band stretching across its yard marks the 'prime meridian'.

A line of longitude is also called a meridian, derived from the Latin, from medi, a variation of 'medius' which denotes 'middle', and dies, meaning 'day'. The word once meant "noon", and times of the day before noon were known as "ante meridian", while times after it were "post meridian". Today's abbreviations a.m. and p.m. come from these terms, and the Sun at noon was said to be "passing meridian". All points on the same line of longitude experienced noon (and any other hour) at the same time and were therefore said to be on the same "meridian line".

Local Time (LT) and Time Zones
- Two important concepts, related to latitude and (especially) longitude are Local Time (LT) and Universal Time (UT).
- Longitudes are measured from zero to 180° east and 180° west (or −180°), and both 180° degree longitudes share the same line, in the middle of the Pacific Ocean.
- As the Earth rotates around its axis, at any moment one line of longitude "the noon meridian" faces the Sun, and at that moment, it will be noon everywhere on it. After 24 hours the Earth has undergone a full rotation with respect to the Sun, and the same meridian again faces noon. Thus each hour the Earth rotates by 360°/24 = 15 degrees.

The Date Line and Universal Time (UT)
- Longitude determines only the hour of the day—not the date, which is
determined separately. The international date line has been established—most of it following the 180th meridian—whereby by common agreement, whenever we cross the date advances one day (going west) or goes back one day (going east).

That line passes the Bering Strait between Alaska and Siberia, which thus have different dates, but for most of its course it runs in mid-ocean and does not inconvenience any local time keeping.

Astronomers, astronauts and people dealing with satellite data may need a time schedule which is the same everywhere, not tied to a locality or time zone. The Greenwich Mean Time, the astronomical time at Greenwich (averaged over the year) is generally used here. It is sometimes called Universal Time (UT).

Heat Zones of The Earth

Torrid Zone
- This is also referred to as Tropical zone. The Tropics is a region on the Earth surrounding Equator by the Tropic of Cancer in the northern hemisphere at 23°26'16" N (approx.) and the Tropic of Capricorn in the southern hemisphere at 23°26'16" S (approx.). The Tropics include all the areas on the Earth where the sun reaches a point directly overhead at least once in a year.
- This area receives maximum heat and is called the Torrid (hot) Zone.

Frigid Zone
- Near the polar regions, the rays of the Sun are very slanting and so it is very cold.
- The region/area between the Arctic Circle and the North Pole in the Northern Hemisphere is called the Frigid zone.
- There are similar regions in the Southern Hemisphere between the Antarctic Circle and the South Pole, also called the Frigid Zone (frigid means cold).

Rotation of the Earth
- The Earth spins (rotates), west to east on its axis once in 24 hours approximately.
- The Earth’s axis is not vertical. It makes an angle of 23°30' with the vertical or 66°30' with the plane of the Earth’s orbit.
- The Earth’s axis always remains pointed in the same direction (towards the Pole Star) as the Earth moves around the Sun. The tilt of the Earth’s axis is known as the inclination of the Earth’s axis.
- Movements of tides are mostly determined by rotation of the Earth.

Effect of the Tilted Axis on Day and Night
- Rotation of the Earth on its tilted axis causes days and nights to be of different length in different parts of the Earth.
- Since the Earth’s axis is tilted in the same direction, the orientation of the Earth’s axis to the Sun’s rays is constantly changing as the Earth moves around the Sun. This results in a continuous change in the length of days and nights throughout the year.

Perihelion
- The position of the earth or any other planet in its orbit when it is at its nearest point to the sun.
- The earth reaches its perihelion about 3rd January at a distance of about 147 million kilometer near one extremity of the major axis of the earth’s elliptical orbit, the axis being called Apsides line.

Aphelion
- The position of the earth or any other planet in its orbit when it is at its distant point from the sun.
- The earth reaches its aphelion on 4th July when the earth is at a distance of 152 million kilometer near the other extremity of the major axis.

Solstice
- Solstice is one of the two dates in the year on which the sun reaches greatest altitude north or south of the equator and is directly overhead along one of the lines of the tropics.

Summer Solstice
- On June 21, the earth is so located in its orbit that the sun is overhead on the Tropic of Cancer (23°26’N).
- On this date the northern hemisphere is tipped towards the sun having the longest day, while the southern hemisphere is tipped away from the sun having the shortest day.

Winter Solstice
- On December 22, the earth is in an equivalent position on the opposite points in its orbit, so the southern hemisphere is tipped towards the sun and the northern hemisphere away from it.
- The sun is overhead on the Tropic of Capricorn (23°26’S), resulting in the shortest day in the northern hemisphere.

Equinoxes
- Two days in a year when day and night are equal throughout the world are equinoxes.
- Falling midway between the dates of solstices, on these dates, the earth’s axis lies at 90° to the line joining the centres of the earth and the sun and neither the northern nor the southern hemisphere is inclined towards the sun.
- The ‘vernal equinox’ occurs on March 21 and it is also called the spring equinox in the northern hemisphere.
- The ‘autumnal equinox’ occurs on September 23.

Midnight Sun
- This phenomenon is observed in the Arctic and Antarctic zones around midsummer, when the Sun does not sink below the horizon throughout 24 hours of the day and therefore, may be seen at midnight.
- This is the direct consequence of the inclination of the axis of the earth to the plane of the orbit.
- Norway is the place of midnight sun where the sun is continuously visible between May and July.

In the southern hemisphere, the phenomenon is seen in the Antarctica continent.

Eclipses
- An Eclipse occurs when the Sun, moon and earth are in a straight line.
- A ‘solar eclipse’ occurs between sunrise and sunset on new moon when the moon passes directly in front of the Sun so that its shadow lies on the earth. In other words, the moon lies between the sun and the earth.
The 'lunar eclipse' takes place when the earth comes in between the sun and the moon so that the shadow of the earth is cast on the moon. A lunar eclipse takes place on a full moon.

Generally a total of seven eclipses, including solar and lunar eclipses, take place every year.

Atmosphere
- The envelope of air that completely surrounds the earth is known as atmosphere.
- The atmosphere extends to about 1000 km from the surface of the earth. But 99% of the total mass of the atmosphere is found within 32 km.
- This is because the atmosphere is held by the gravitational pull of the earth.

Composition of the Atmosphere

<table>
<thead>
<tr>
<th>Rank</th>
<th>Gas</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nitrogen</td>
<td>78%</td>
</tr>
<tr>
<td>2</td>
<td>Oxygen</td>
<td>21%</td>
</tr>
<tr>
<td>3</td>
<td>Argon</td>
<td>0.93%</td>
</tr>
<tr>
<td>4</td>
<td>Carbon dioxide</td>
<td>0.03%</td>
</tr>
<tr>
<td>5</td>
<td>Neon</td>
<td>0.0018%</td>
</tr>
<tr>
<td>6</td>
<td>Helium</td>
<td>0.0005%</td>
</tr>
<tr>
<td>7</td>
<td>Ozone</td>
<td>0.0006%</td>
</tr>
</tbody>
</table>

Carbon dioxide is present in small quantity in the atmosphere.
- It is an important constituent of air because it has the ability to absorb heat and thus keep the atmosphere warm, thereby, balancing the heat of the earth.
- Water vapour is the most significant component of the atmosphere as far as its effect on weather is concerned although its quantity varies considerably from practically none (0) to up to about 4% by volume.
- Water vapour is the source of all clouds and precipitation (rain, hail storm etc). Water vapour, like carbon dioxide, has the ability to absorb heat energy. It also regulates the hydrological cycle.
- Dust intercepts and reflect incoming insolation.
- The polluted particles present in the air not only absorb larger amount of insolation but also greatly absorb the terrestrial radiation.
- Dust in the atmosphere contributes to the red and orange colour of sunrise and sunset.

Layers of the Atmosphere
- There are five distinct layers of the atmosphere: (a) Troposphere, (b) Stratosphere, (c) Mesosphere, (d) Thermosphere and (e) Exosphere.

Troposphere
- This is the first layer of the atmosphere. It extends to a height of 18 km at the equator and 8 km at the poles.
- In this layer temperature decreases with height. This is due to the fact that the density of air decreases with height and so the heat absorbed is less. It contains more than 90% of gases in the atmosphere.
- Since most of the water vapour form clouds in this layer, all weather changes occur in the troposphere ('tropo' means 'change').
- The height at which the temperature stops decreasing is called tropopause. Here the temperature may be as low as -58°C.

Stratosphere
- This the second layer of the atmosphere. It extends from the tropopause to about 50 km.
- The temperature increases due to the absorption of the ultraviolet radiation of the Sun by ozone present in this layer. The temperature slowly increases to 4°C.
- This layer is free from clouds and associated weather phenomena. Hence, it provides ideal flying conditions for large jet planes.
- At about 50 km the temperature begins to fall again. This marks the end of the stratosphere. The end of the stratosphere is called the stratosphere.

Mesosphere
- Above the stratosphere lies the mesosphere.
- The mesosphere extends to a height of 80 km.
- Here the temperature decreases again, falling as low as -90°C.
- The end of this layer is known as the mesopause.

Thermosphere
- The thermosphere lies above the mesosphere.
- This layer extends to a height of about 640 km.
- In this layer temperature rises dramatically, reaching up to 1480°C.
- This increase in temperature is due to the fact that the gas molecules in this layer absorb the X-rays and ultraviolet radiation of the Sun.
- This results in the break up of the gas molecules into positively and negatively charged particles or ions. Thus, this layer is also known as the ionosphere.
- The electrically charged gas molecules of the thermosphere reflect radio waves from the Earth back into space. Thus, this layer also helps in long distance communications.
- The thermosphere also protects us from meteors and obsolete satellites, because its high temperature burns up nearly all the debris coming towards the Earth.

Exosphere
- This layer lies above the thermosphere.
- The exosphere extends beyond the thermosphere upto 960 km.
- It gradually merges with interplanetary space.
- The temperatures in this layer range from about 300°C to 1650°C.
- This layer contains only traces of gases like oxygen, nitrogen, argon and helium because the lack of gravity allows the gas molecules to escape easily into space.

How the Sun Creates Energy
- Hydrogen and helium are the predominant gases that constitute the Sun. The proportion of hydrogen to helium is 3 : 1.
- The core of the Sun acts like a gigantic nuclear reactor and converts huge quantity of hydrogen into helium. In this process of nuclear fusion, the Sun releases tremendous amount of energy in all directions.
- The Sun radiates energy (both heat and light) in all directions.
- Because of its small size in relation to the Sun, the Earth intercepts only a small part of the Sun's radiant energy.
- Solar radiations are the primary source of heat and light to the Earth.

Insolation
- The incoming solar radiation (energy intercepted by the Earth) is known as insolation and it is received in the form of short waves.
Terrestrial Radiation
- The Sun's energy absorbed by the Earth's surface when radiated out into space is called terrestrial radiation.

Weather and Climate
- Weather is the description of the atmospheric conditions of a particular place at a particular time for a short period of time.
- Climate is the composite or integrated picture of the weather conditions over a long period of time.
- Climatic data is based on calculated averages of data recorded over a period of 35 years. The classical period is 30 years, as defined by WMO.

Atmospheric Pressure
- Atmospheric pressure is the pressure at any point on the surface of the Earth due to the weight of the column of air above that point.
- Standard sea level pressure is 76 cm or 29.92 inches on this scale.
- Another pressure unit used by meteorologists in drawing weather charts is millibars (mb).
- One bar is divided into 1000 millibars. Millibars are now known as hectopascals.

Winds
- Wind is the movement of air caused by the uneven heating of the Earth by the Sun.
- Sometimes wind blows gently, refreshing us. At other times, it blows strongly creating storms that cause widespread damages.
- We need measurements of two quantities: direction and speed, to give a description of the wind.

Trade Winds
- They blow from the Sub-tropical High Pressure Belt to the Equatorial Low Pressure Belt in the tropics between 30° North and 30° South latitudes.
- They blow as the N.E. Trades in the Northern Hemisphere and as the S.E. Trades in the Southern Hemisphere.
- The name 'Trade' is derived from a nautical expression 'to blow t'ead' meaning to blow along a regular path or 'tread'.

Westerlies
- They blow from the Sub-tropical High Pressure Belt to the Sub-polar low Pressure Belt in the temperate latitudes between 30° and 60°, on either side of the Equator.
- They are more constant and stronger in the Southern Hemisphere because there are no large landmasses to interrupt them.
- In places they become so strong that these winds are known as the Roaring Forties or the Brave West Winds and the Furious Fifties.
- The belts of the Westerlies move north and south following the Sun's movement. These are known as Westerlies because they blow out of the west.

Polar Winds
- They blow from the Polar High Pressure Belt to the Sub-polar Low Pressure Belt between latitudes 60° and the poles on both sides of the Equator.
- These winds blow from the east to form the Polar Easterlies.
- These winds are more regular in the Southern Hemisphere.
- Polar winds are extremely cold and dry.

Climatic Winds or Periodic Winds
- These winds change their direction along with change in time or change in climate. Land and sea breezes and the Monsoon winds are typical examples of periodic winds.

Monsoon Winds
- Monsoon winds are seasonal winds characterised by a complete reversal in their direction from one season to another.
- They blow from the sea to the land in summer.
- They blow from the land to the sea in winter.

Internal Structure of The Earth

The Earth's Crust
- The outermost solid cover or shell of the earth is known as the earth's crust.
- The thickness of the crust is about 30 km.
- It is thicker in the region of the continents and thinner in the region of the ocean floors.
- The density of the rocks in the earth's crust ranges from 2.7 to 3 g/cc (grams per cubic centimeter).
- The upper part of the crust consists of silica and aluminium in greater proportions. That is why, it is called 'Sial'.
- Whereas the lower part of the crust is called 'Sima' because the proportion of silica and magnesium is higher in this part.

Mantle
- This layer lies below the crust.
- Its thickness is about 2900 km and the density of substances in the mantle ranges from 3.0 to 4.7.

Core
- The earth's core lies below the mantle. Its thickness may be about 3,471 km.
- Its radius is 6,371 km., according to IUGG.
- It is divided into two parts—the outer core and the inner core. The outer core is probably in a liquid state and the inner core in a solid state.
- The core mainly consists of iron with some amount of nickel and sulphur (NIFE).
- After the mantle, the earth's density goes on increasing rapidly towards its centre and finally is more than 13.
- The temperature of the central part of the earth may be about 5000°C.
- The study of the earth's interior helps us to understand the original rocks in the earth's crust and their later transformation.
Rocks
- The solid parts of the earth's crust are called rocks. Most of the rocks are made up of two or more minerals.
- In the same type of rocks, the proportions of minerals may be different in different areas.
- Rocks may not always necessarily be hard.
- Minerals are obtained from rocks.
- Rocks are classified in three main types depending on the process of their formation: (a) Igneous, (b) Sedimentary, (c) Metamorphic.

**Igneous rocks**
- Hot lava pours out at the time of volcanic eruptions and cools down later, forming rocks.
- The molten materials known as magma, sometimes cool down beneath the earth's crust, again forming rocks.
- Both these types of rocks are known as Igneous rocks.
- When the earth's surface first became solid after it cooled down from its hot liquid state, the original rocks of the earth's crust were formed. They are the Primary Igneous rocks, which are usually not found today.
- Igneous rocks are generally harder and granular.
- There are no layers in Igneous rocks.
- Fossils are not found in Igneous rocks.
- The formation of Igneous rocks takes place beneath and above the surface of the earth.
- Rocks formed by the cooling of molten matter beneath the earth's surface are called intrusive igneous rocks. 'Granite' and 'Gabbro' are the main examples of these rocks.
- The intrusive rocks are thus crystalline rocks.
- Sometimes, the molten matter oozes out through cracks in the earth's crust and spreads on the surface, forming extrusive igneous rocks.
- Gabbro, Obsidian, Basalt etc are examples of extrusive igneous rocks.
- A very large area of the Deccan Plateau consists of basalt rocks.
- These rocks contain silica from 40 to 80%, others are felspar, magnesium and iron etc.
- Other examples of Igneous rocks are-Granite, Pumic stone, Basalt and Gabbro.

**Sedimentary rocks**
- They are formed by the deposition, sedimentation and leaching of sediments over a long period of time.
- As layers over layers get deposited, over a period of time, unified sedimentary rocks are formed on account of the tremendous pressure exerted by the layers above.
- Sometimes the remains of plants, dead animals etc are found in the deposited material. Such fossil containing sedimentary rocks are useful for studying life on earth.

**Metamorphic rocks**
- The nature of igneous and sedimentary rocks changes due to the effects of heat or pressure, and new, transformed rocks, called metamorphic rocks, are formed.
- Minerals in the rocks get restructured on account of heat and pressure. This brings about a change in the original formation of the rocks.

Some examples of metamorphic rocks formed from igneous and sedimentary rocks:

<table>
<thead>
<tr>
<th>Type of rock</th>
<th>Original rock</th>
<th>Metamorphic rock</th>
<th>Type of rock</th>
<th>Original rock</th>
<th>Metamorphic rock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Igneous</td>
<td>granite</td>
<td>gneiss</td>
<td>Sedimentary</td>
<td>coal</td>
<td>graphite coal</td>
</tr>
<tr>
<td>Igneous</td>
<td>basalt</td>
<td>hornblende</td>
<td>Sedimentary</td>
<td>sandstone</td>
<td>quartzite</td>
</tr>
<tr>
<td>Sedimentary</td>
<td>limestone</td>
<td>marble</td>
<td>Sedimentary</td>
<td>shale/clay</td>
<td>slate, mica schist</td>
</tr>
</tbody>
</table>

**Earthquakes and Volcanoes**

**Earthquakes**
- The sudden tremors or shaking of the earth's crust is called an earthquake. When a part of the earth's surface moves backward and forward or up and down, the earth's surface 'quakes', and these are called the 'earthquake'.
- The earth's crust is made up of different parts of various sizes. They are called plates.
- Most of the earthquakes in the world are caused by the movements of the plates.
- 'Seismology', the special branch of Geology, deals with the study of earthquakes.
- 'Richter scale' and 'Mercalli scale' are the instruments to measure/record the magnitude and the intensity of an earthquake respectively.

**Seismic Waves**
- The place where the seismic waves originate beneath the earth's surface is called the focus of the earthquake.
- The epicenter is that point on the ground surface which is closest to the focus.
- Seismic waves are recorded on the seismograph. Seismic waves are mainly of three types- 1. Primary waves, 2. Secondary waves and 3. Surface or Long waves.

**The earthquake zones in India**
- The Indian plate is moving from south to north. That is why there are earthquakes in the Himalayan region.
- Earthquakes occur in Assam, Arunachal Pradesh, Nagaland, Tripura, Manipur, Mizoram, Andaman and Nicobar Islands, Jammu and Kashmir, the northwestern region of Uttar Pradesh, the northern region of Bihar etc.
Volcanic Activity
Magma or molten rock is formed beneath the ground surface due to various reasons. This molten rock ruptures the ground and pours out. Sometimes, it cools down beneath the ground surface instead of pouring out. All these activities are called volcanic activities.
Volcanic activities have been taking place since times immemorial.
There are three types of Volcanoes:
1. Active Volcanoes
2. Dormant Volcanoes
3. Extinct Volcanoes

Types of Volcanic Eruptions
Volcanic eruptions are classified into two types depending on the manner of ejection of the magma:
1. Central eruption
2. Fissure eruption

Central eruption
This type of eruption is sometimes very explosive, because lava, steam, gas, dust, smoke, flying rocks, fragments are projected from a narrow pipe from under the ground with greater intensity. This type of eruption gives rise to conical or dome-shaped hills.

Some examples of volcanic mountains formed due to central eruption are:
- Mt. Kilimanjaro in Africa
- Fujiyama in Japan
- Vesuvius and Mount Etna in Italy
- It is basically poured acidic lava.

Fissure eruption
A very long fissure (cracks) develops in the ground surface and so, the molten rock, rock fragments, steam and gases within, pour out slowly. These eruptions take place at a very slow speed. Since this lava is more fluid, it spreads over a longer distance.

The lava cools down on the ground over a period of time, increasing the thickness of the surface in that area. Basalt plateaus are formed due to these eruptions.
Weathered Plains: The plains formed due to weathering by rivers, winds, etc.

Loess Plains: These are formed by the soil and sands brought by winds.

Karst Plains: Plains formed due to the weathering of limestone.

Erosional Plains: Plains near the river banks formed by river erosion.

Glacial Plains: Marshy plains formed due to the deposition of ice.

Desert Plains: These are formed as a result of the flow of rivers.

Deposition Plains: Large plains are formed due to the silt brought by the river. Such plains are plains of Ganga, Sutlej, Mississippi, Hwang-Ho.

Forests
They are of the following types:

(a) Tropical Evergreen Rain Forests: Such forests are found in the equatorial and tropical regions with more than 200 cms annual rainfall. The leaves of trees in such forests are very wide. Ex.- Red wood, palm etc.

(b) Tropical Semi Deciduous Forests: Such forests receive rainfall less than 150 cms. Saagwan, saal, bamboo etc. are found in such forests.

(c) Coniferous Forests or Taiga: These are evergreen forests. The trees in these forests have straight trunks, conical shape with relatively short branches and small needle-like leaves. Example—Pine, Fir etc.

(e) Tundra Forests: Such forests are covered with snow. Only Mosses, a few slades and Lichens grow here in the summers. This type of vegetation is chiefly confined to the northern hemisphere (e.g. in Eurasia, North America and Greenland Coast).

(f) Mountainous Forests: Vegetation varies according to altitude.

Pastures (or Grasslands)
They can be divided into two types:

(i) Tropical Pastures and (ii) Temperate Pastures

Tropical Pastures: They have different names in different countries. Savana in Africa, Campos in Brazil, Lanas in Venezuela and Columbia.

Temperate Pastures: They are known by the following names—Praries in USA and Canada, Pampas in Argentina, Veld in South Africa, Rangeland or Downs in Australia and New Zealand, Steppes in Eurasia (Ukraine, Russia).

Land forms created by the river system

V-shaped valley
A river flows with a greater velocity in the mountainous region and big, pointed fragments of rock also flow with a great speed along with the water.

The river bed is scoured and down cutting starts, ultimately giving rise to a deep valley with steep sides. This valley is called a v-shaped valley.

These valleys are found in mountainous regions.

A deep and narrow valley with steep sides is called a gorge.

The gorge of the river Ulhas in Thane district in Maharashtra and the gorge of the river Narmada at Bhedaghat near Jabalpur in Madhya Pradesh are well known.

There are many gorges in the Himalayas.

Waterfall
If there are both hard (resistant) and soft (less resistant) rocks in the course of the river, the less resistant rock is eroded faster.

The resistant rock does not erode so easily. That is why, the river falls with a great speed from a cliff-like part of hard rock. This is called a waterfall.

The Niagara Falls on the Niagara river is in North America.

Potholes
In areas where the river bed consists of hard rock, the stones carried along with the river water due to the whirling impact of water.

That is why holes of various shapes are formed in the rocky river bed. Such holes are called potholes.

Many potholes are observed in the river bed of the Kukadi, Krishna, Godavari etc. in Maharashtra.

Meanders and ox-bow lakes
Meanders are formed by lateral erosion. As the erosion increases over a period of time, the meanders in the river again start flowing in a straight line.

The loop previously formed then separates from the main course of the river. Water accumulates in this separated part.

As this loop resembles on ox-bow it is called ox-bow lake. It formed due to impounding of water in the abandoned meander loop.

Fan-shaped plains
In the region near the source of a river the tributaries joining the main river deposit materials carried by them on the banks of the main river.

This deposition creates fan-like plains. They are called fan-shaped plains or alluvial fans.

Flood plains
When, during the floods, the river-water overflows its banks and spreads in the surrounding areas, the silt carried by the water gets deposited in those areas. This creates flat plains on both the banks of the river. Plains created by this depositional work done during floods are called flood plains.

The Gangetic Plain is a flood plain.

Natural levees
When a river is over flooded, its water crosses its banks. At that time, the speed of the water is reduced, and the pebbles and stones carried by the river get deposited near the banks.

On account of frequent floods, the area where these sediments are deposited near the bank of the river rises higher than the flood plain.

This high wall is called a natural levee or natural embankment.

Such levees are found on the banks of the Mississippi, the Huang-Ho etc. Southern bank of river Ganga.

Delta
Delta was coined by Herodotus (the ‘Father of History’) after the Greek letter delta (Δ) because of the deltoid shape at the mouth of the Nile.

A delta is a land form that is formed at the mouth of a river where that river flows into an ocean, sea, estuary, lake, reservoir, flat arid area or another river.
Deltas are formed from the deposition of the sediment carried by the river as the flow leaves the mouth of the river. Over long periods of time, this deposition builds the characteristic geographic pattern of a river delta.

**Delta region**

- A river meets a sea or a lake. The silt carried by the river is deposited on the bed near its mouth.
- The area near the mouth of the river gets gradually filled up by this deposition and gets raised causing an obstruction for the river to flow in a single channel. It, therefore, splits into two branches and meets the sea.
- Over a period of time, there is deposition also at the mouth of these branches. In this manner, the main course of the river gets split into a network of small channels. These sub-channels are called distributaries.
- A triangular region of innumerable such distributaries is formed near the mouth of the river. This region is called the delta region.
- There are delta regions near the vent (opening) of the rivers Godavari, Ganga, Nile, Mississippi etc. Deltas are very fertile.
- The largest delta of the world is 'Ganges Delta' / 'Sunderbans Delta' (350 km).

**Glacier**

- A mass of ice sliding down the slope from a snow-clad region is called a glacier. On an average a glacier moves 1 to 15 metres a day.
- While a glacier is moving, the friction of the ice at the bottom slows down the movement of the bottom layers.
- There are two main types of glaciers: 1. Continental Glacier and 2. Alpine Glacier.

**Continental Glacier**

- An extensive sheet of ice spreading across a vast region sometimes begins to move due to the pressure of the ice.
- This moving sheet of ice is called a continental glacier.
- Such glaciers are seen in Antarctica and Greenland.

**Alpine or mountain glacier**

- There are snow-field in the mountainous regions of the Himalayas, the Alps, the Andes, the Rocky mountains etc.
- The ice accumulating in these areas starts sliding down the slopes.
- This mass of ice sliding down from the mountains is called a mountain glacier or an alpine glacier.

**Iceberg**

- Blocks of ice break off from the continental glaciers and float away into the sea.
- A block of ice floating in the sea is called an iceberg. These icebergs are huge in size.

**Land forms created by the actions of river**

<table>
<thead>
<tr>
<th>Erosion</th>
<th>Erosion</th>
<th>Deposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-shaped valley</td>
<td>Meanders</td>
<td>Fan-shaped plains</td>
</tr>
<tr>
<td>Gorge</td>
<td>Ox-bow</td>
<td>Flood plains</td>
</tr>
<tr>
<td>Potholes</td>
<td>Lakes</td>
<td>Delta</td>
</tr>
<tr>
<td>Waterfall</td>
<td></td>
<td>Natural levees</td>
</tr>
</tbody>
</table>

**Land forms of glaciation**

- Various land forms are created on account of the transportation, erosion and depositional work of a glacier. Let us consider the major land forms thus created.

**Cirque**

- When the snow from the mountain peaks slides, it gets deposited in a hollow, if there is one on any side of the peak.
- The accumulated snow starts sliding down the slope. This causes friction at the floor and at the sides of the hollow, thus enlarging it further. This is called a cirque.
- The back wall of a cirque is like a high cliff and the floor is concave and huge in size. The total shape resembles an armchair.
- When a glacier melts completely, water accumulates in the cirque and forms a lake which is known as tarn.

**Fjord**

- Where the lower end of the trough is drowned by the sea it forms a deep steep-side inlet called 'Fjord' as on the Norwegian and South Chilean Coasts.

**U-shaped valley**

- When a glacier is flowing through a valley in a mountainous region, the sides of the valley get eroded. Ice causes friction on the sides of the valley.
- As the erosion of the sides is greater than that of the floor, a valley is formed with vertical sides and a wide floor. This valley is called a U-shaped valley.

**Hanging valley**

- In the mountainous region, many tributaries join the main glacier.
- The quantity of ice in a tributary is comparatively smaller. Hence, it causes less friction.
- The valley of a tributary is at a higher level than a valley of the main glacier. The valley of the tributary appears to be hanging. That is why, such a valley is called a hanging valley.

**Moraine**

- The material transported and deposited by a glacier is known as moraine.
- Moraines are made up of pieces of rocks that are shattered by frost action and are brought down the valley.
- Moraines are of the following types: 1. lateral moraine, 2. medial moraine, 3. terminal moraine and 4. ground moraines.
- After a glacier has melted, different land forms of deposition are seen.
- The oval-shaped hills of lesser height are called drumlins.
- Zig-zag hills, with many steep slopes, made up of long stretches of sand and gravel are called eskers.

**Mushroom rock**

- The wind blowing in desert regions erodes the rock near the ground surface.
to a great extent. At the same time, the upper part of the rock gets eroded to a lesser extent.

- As this is a continuous process, the foot of the rock becomes narrow.
- The top portion of the rock then looks like an umbrella. This landform is called a mushroom rock.

**Sand dunes**

- Sand gets transported from one place to another along with the wind.
- At a spot where the wind meets an obstruction or where the speed of the wind reduces, dunes are formed out of the sand which gets deposited.
- The side of the dune facing the wind has a gentle slope and the opposite side has a steep slope.
- Because of the slow speed of the wind, the sand on the gentle slope gets carried to the top and comes down the steep slope on the other side. Sand dunes gradually move forward in this manner.

**Barkhan**

- The fine sand particles carried by the wind get deposited when the speed of the wind is reduced forming crescent-shaped dunes. Such hills are called barkhans.

**Loess**

- Loess is a soil finer than sand.
- Loess is a silt transported by the wind from the desert regions and deposited much further away.
- Loess transported from the desert regions of Central Asia has been deposited in layers in China. The plain they form is known as the Loess plain.

**Groundwater**

- Some water from the rainfall received on the earth’s surface seeps through the ground.
- This water trickles down until it reaches an impervious rock.
- Water accumulated under the ground surface in this manner, is called ground water.
- Some rocks on the earth’s surface are porous and some have cracks or joints.
- Water seeps through these pores or joints.
- Groundwater gushes out in the form of springs.

**Land forms created by the actions of groundwater**

- Water on the ground surface seeps through limestone. Some portion of the limestone dissolves in that water. If this process takes place continuously, it makes holes in these rocks.
- As this process continues over a number of years, these holes get enlarged. These holes are called sink holes.

**Caves**

- In limestone region, water goes very deep through sink holes.
- If there is a layer of impervious and hard rock underneath, water flows horizontally on the impervious rock instead of going deeper.
- Hence, soft rocks get eroded and a cave is formed.

**Sulciates and stalagmites**

- Inside the cave created by groundwater under the ground surface in a limestone region, water is always seeping through the roof. This water contains calcium carbonate.
- As the seeping water evaporates, some of the calcium carbonate, it contains, is deposited on the cave’s roof. This deposition continues to grow very slowly. Hence a column is seen growing from the roof towards the floor. It is called a stalacite.
- The water dripping on the floor of the cave also evaporates leaving behind calcium carbonate which accumulates over a period of time.
- A column then starts growing from the floor to the roof. This column which grows upwards is called a stalagmite.
- Stalactites and stalagmites are observed in the Parner Taluka of Ahmadnagar district, in Bastar District in Chhattisgarh and also in the Karst region of former Yugoslavia now Serbia and Montenegro.

**Land forms created by the actions of sea waves**

**Sea cliff**

- The base of the rocks on the coast get eroded because of the impact of the ocean waves and notches develop in these rocks.
- The crest of the rock overhangs the notch. These notches in the rocks gradually extend landwards over a period of time. Then the crest falls and a steep cliff, which has receded away from the sea is formed.

**Sea cave**

- Rocks on the coast have many cracks. They become wider and wider with the impact of the waves, creating small caves. They are called sea caves.
- Such sea cliffs and sea caves are observed at Shrivandhan, Ratnagiri, Malvan, Vengurle etc.

**Beach**

- The fine sand and other material that flows along with the waves get deposited in a direction parallel to the sea coast.
- This deposition of sand is called a beach.
- There are extensive beaches in the coastal regions of the states of Maharashtra, Goa, Kerala, Tamil Nadu, Odisha and West Bengal in India and in other countries like Bangladesh and Canada.

**Sand bar**

- A deposition of sand which results in a long, narrow embankment in the sea near the coast is called a sand bar.

**Lagoon**

- A shallow lake is formed between the sand and the sea coast. It is called a lagoon. Such a lake is called Kayal in Kerala.

**The Indian Subcontinent: Position, Extent and Physical Features**

**Location of the Sub Continent**

- Mainland of the Indian subcontinent, comprising India, Pakistan, Bangladesh, Nepal and Bhutan extends between 8°N and 37°6’N latitudes and between 68°E and 97°25’E longitudes.
### Size and Extent of Subcontinent

- Total area of the Indian subcontinent is 44.9 lakh sq. km i.e. India 32,87,263 sq. km, Pakistan 7,96,095 sq. km, Bangladesh 1,48,393 sq. km, Nepal 1,47,819 sq. km, Bhutan 46,500 sq. km and Sri Lanka 65,610 sq. km. From North to South this subcontinent stretches over 3,200 km and from East to West it is 3,000 km. The 82°30'E meridian helps in calculating the Indian Standard Time (IST) which is 5 hours 30 minutes ahead of the Greenwich Mean Time (GMT).

- This very meridian (82°4'E) dictates time in Sri Lanka and Nepal also.

### Political Divisions of India

- India is divided into 29 States and 7 Union Territories.

### Position and Extent of India and its Locational Advantage

- India forms part of the large continental land mass of Eurasia.

- It is located on one of the peninsulas of Southern Asia. The country extends from Kashmir in north to Kanyakumari in the south.

- The Arabian Sea and the Bay of Bengal are situated on western and eastern side of peninsular India respectively.

- The latitudinal extent of the country is from 8°4' North to 37°6' North.

- The Tropic of Cancer (23°44' N) which passes through the middle of the country measures from 68°7' E to 97°25'E. The location of the country is in the northern and eastern parts of the country.

- The importance of location of India is that it is located on the world's major sea routes.

- Due to its location, India has maritime contacts with south-west Asia and Africa on the west and south-east Asia in the east. Its location has given India an advantage of the route of the Suez Canal for trade with North America and Europe.

### Size of India (in terms of area and population)

- India is the seventh largest country (in terms of area) in the world.

- The area of India is about 3.28 million sq. km.

- The area of India is nearly equal to the area of the continent of Europe excluding Russia.

- India is eight times as large as Japan. India ranks as the second largest country in terms of population (next to China only).

- No continent of the world except Asia has a larger population than that of India.

- India contains about one-sixth of the total population of the world.

### Physical Divisions of the Indian Subcontinent

- A chain of high mountains radiate out from the Pamir Knot which lies just in the north of India.

- In these mountains the Hindukush, the Sulaiman and the Kirthar in the east and the Himalayas in the west separate the Indian subcontinent from rest of Asia.

### Heights of Major Mountain Peaks in India

<table>
<thead>
<tr>
<th>Peaks</th>
<th>Elevation (in mts)</th>
<th>Location</th>
<th>Important Passes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Godwin Austin (K-2)</td>
<td>8,611*</td>
<td>Jammu &amp; Kashmir</td>
<td>Burzi-La, Joji-La</td>
</tr>
<tr>
<td>Kanchenjunga</td>
<td>8,586</td>
<td>Himachal Pradesh</td>
<td>Bara-La, Cha-La, Shipka-La</td>
</tr>
<tr>
<td>Nanga Parbat</td>
<td>8,126*</td>
<td>Uttarakhand</td>
<td>Niti-La, Liplu-Lekh-La</td>
</tr>
<tr>
<td>Gasher Brum</td>
<td>8,068*</td>
<td>Sikkim</td>
<td>Jelep-La, Nathu-La</td>
</tr>
<tr>
<td>Broad Peak</td>
<td>8,051*</td>
<td>Arunachal Pradesh</td>
<td>Bomdi-La</td>
</tr>
<tr>
<td>Dostgul Sar</td>
<td>7,885*</td>
<td>Location</td>
<td>Important Passes</td>
</tr>
</tbody>
</table>

- Height in metres above mean sea level
- Situated in Pak occupied Kashmir (PoK)

1. Mashar Brum is also known as K-1.
Lucent’s General Knowledge

The Great Northern plains
- The northern plains are divided into three subdivisions. These are the Punjab and Haryana plains. The Ganga plains and the Brahmaputra valley.
- The Ganga plains form the largest lowland drained by the Ganga and its tributaries.
- The Yamuna is the most important tributary of the Ganga.
- The Chhamb, the Ganga, the Kosi, and the Tista are other tributaries of the Ganga.
- The Sone and the Damodar are tributaries of the Yamuna from the peninsular plateau, and the Betwa are tributaries of the Yamuna from the peninsular plateau.
- The Ganga plain has an extremely gentle slope. Parts of the plain are subject to floods in the rainy season. In the lower course, the Ganga divides itself into four major distributaries and forms a large delta along with the Brahmaputra.
- The Punjab and Haryana plains represent a part of the Indus basin.
- A low watershed separates these plains from the Ganga plains.

The Great Peninsular Plateau
- Anamudi or Anaimudi (2,695 m) situated in Sahyadri range is the highest peak of the peninsula.
- The Deccan plateau includes the area to the south of the Vindhyas.
- The western edge of the plateau rises steeply from the Arabian Sea to form the Western Ghats (which includes the Sahyadri).
- The Deccan plateau slopes gently towards the east. The surface of the plateau is dissected into a rolling upland by a number of streams.
- The elevation ranges from 300 to 900 metres.
- The eastern edge of the plateau is known as the Eastern Ghats.
- The north-western region of the Deccan plateau is covered by nearly horizontal sheets of lava. This region is called ‘Deccan Trap region.’ The Deccan plateau is drained by many long east flowing rivers. These rivers originate in the Western Ghats, flow towards the east and enter the Bay of Bengal.
- The Godavari, the Mahanadi, the Krishna, and the Cauvery are the major rivers that have built deltas along the coast.
- The Narmada and the Tapti rivers are west flowing.
- Both the rivers enter the Arabian Sea along the Gujarat coast.
- These rivers do not have deltas.

The Coastal Plain
- Narrow strips of flat land on eastern and western coasts are known as the East Coastal Plain and the West Coastal Plain respectively.

The West Coastal Plain
- This plain which lies between the Arabian Sea and the Western Ghats spreads from Gujarat in the north to Kanyakumari in the south.

The Great Indian Desert
- It lies to the west of the Aravali range.
- It extends over major part of Rajasthan and Sindh in Pakistan.
- This desert does not get much rain as the Aravali range run parallel to the south-western monsoon winds.
- It is in the rain shadow area of the Bay of Bengal current.
- Lake Sambhar is found here.

The Island Groups
- Lakshadweep is a group of 36 coral islands in the Arabian Sea.
- It is located 300 km to the west of the coast of Kerala.
- Andaman and Nicobar islands are a group of about 324 islands.
- Most of these islands are uninhabited.
- Andaman and Nicobar islands are separated by the Ten Degree Channel because 10°N latitude passes through this place.

Climatic Diversity in the Indian Subcontinent
- Due to the vastness of the country and a variety of relief features there are regional variations in the climate of India.
- The interior of the country, specially in the north, has a continental type of climate.
- The coastal areas have a more equable climate. In mountainous areas, altitude determines the climate. There is a great deal of variation in the amount of annual rainfall.
- In June, the highest temperature in Rajasthan may go up to 55°C. But, in Darr and Kargil the night temperature in January may go down to -45°C to -50°C.
- Mawsynram and Cherrapunji in Meghalaya have an annual rainfall of 11,873 mm (467 in) and 11,430 mm (450 in) respectively. But, in the Thar Desert the annual rainfall is less than 500 mm (20 in).
Along the Malabar Coast (Kerala) the annual range of temperature is about 3°C. But it is 20°C in Hisar, Ambala and other parts of the interior.

Soil Resources of the Indian Sub-continent

Soil
- Soil forms the upper layer of the earth's crust capable of supporting life.
- It is made up of loose rock materials and humus.
- The soil forming processes are mainly influenced by the parent rock, climate, vegetation and animal life.

Importance of Soil Resources
- Soil is an extremely important resource, especially in agricultural countries like India, Pakistan and Bangladesh.
- Most food items, like rice, wheat, pulses, fruits and vegetables and much of our clothing are derived from the soil directly or indirectly.
- Soil also gives us firewood, timber, rubber, fibres, etc. Food like milk, meat and eggs are obtained indirectly from the soil. Flowers, grass, plants and trees are also grown out of soil.

Soil Erosion and its types
- Removal of top layer of soil when it is exposed to wind and rain, is easily blown or washed away. This condition is known as soil erosion.
- Basically, soil cover is removed by two powerful agents: 1. Running water and 2. Wind.

Types of Soil found in India
- Indian Council of Agricultural Research (ICAR) divides Indian soils into eight groups: (a) Alluvial soil (b) Black soil (c) Red soil (d) Laterites and Lateritic soil (e) Arid and Desert soil (f) Saline and Alkaline soil (g) Forest soil (h) Peaty and other organic soil. However, Indian soils are generally divided into four broad types: 1. Alluvial soils. 2. Regur soils. 3. Red soils and 4. Laterite soils.

Alluvial Soils
- This is the most important and widespread category. It covers 40% of the land area. In fact the entire Northern Plains are made up of these soils.
- They have been brought down and deposited by three great Himalayan rivers - Sutlej, Ganga and Brahmaputra and their tributaries.
- They are common in Eastern coastal plains and in the deltas of Mahanadi, Godavari, Krishna and Cauvery.
- Crops Grown: Suitable for Kharif & Rabi crops like cereals, Cottons, Oilseeds and Sugarcane. The lower Ganga-Brahmaputra valley is useful for jute.

Regur or Black Soils
- These soils are of volcanic origin. These soils are black in colour and are also known as black soils.
- Since they are ideal for growing cotton, they are also called black cotton soils, in addition to their normal nomenclature of Regur soils.
- These soils are most typical of the Deccan trap (Basalt) region spread over north-west Deccan plateau and are made up of lava flows.

They cover the plateaus of Maharashtra, Saurashtra, Malwa and southern Madhya Pradesh and extend eastward in the south along the Godavari and Krishna Valleys.


Red Soils
- Formed by weathering of crystalline and metamorphic mixture of clay and sand.
- These soils are developed on old crystalline igneous rocks under moderate to heavy rainfall conditions.
- They are red in colour because of their high Iron-oxide (FeO) content.
- They are deficient in phosphoric acid, organic matter and nitrogenous material.
- Red soils cover the eastern part of the peninsular region comprising Chhotanagpur plateau, Odisha (Orissa), eastern Chhattisgarh, Telangana, the Nilgiris and Tamil Nadu plateau.
- They extend northwards in the west along the Konkan coast of Maharashtra.


Laterite Soils
- The Laterite soils are formed due to weathering of lateritic rocks in high temperatures and heavy rainfall with alternate dry and wet period.
- They are found along the edge of plateau in the east covering small parts of Tamil Nadu, Odisha and a small part of Chhotanagpur in the north and Meghalaya in the north-east.
- Laterite soils are red in colour with a high content of iron-oxides; poor in Nitrogen and Lime.
- Crops Grown: Unsuitable for agriculture due to high content of acidity and inability to retain moisture.

Arid & Desert Soil
- Region: NW India. Covers entire area of the west Aravalis in Rajasthan and parts of Haryana, Punjab & Gujarat.
- Characteristics: Rich in Phosphates and Calcium but deficient in Nitrogen and humus.
- Crops Grown: Fertile if irrigated e.g. Ganganagar area of Rajasthan (Wheat basket of Rajasthan).

Agriculture in India
- About 65-70% of the total population of the country is dependent on agriculture.
- Approximately 48.9% of our population derives its livelihood from agriculture.
- It provides food to the second biggest population and the biggest population of cattle in the world.
- Our agro-based industries are fully dependent on raw material provided by agriculture.
- Agriculture with its allied activities accounts for 45% of our national income.
Types of Agriculture in India:

**Subsistence Farming**
- In this type of agriculture, farmers work hard to grow enough food to meet only their family's needs.
- In this type of farming, the produce is consumed mainly by farmers and their family.
- There remains no surplus to sell in the market.

**Mixed Farming**
- The combination of agriculture and pastoral farming is called mixed farming.
- In this type of farming, cultivation of crops and rearing of animals are done together on the same farm.

**Jhum/Shifting Cultivation**
- This is a primitive form of agriculture, in which a plot of land is cultivated for a few years and then is deserted.
- This slash and burn method of farming is carried on in the jungles of northeastern part of India, e.g., in Assam, Meghalaya, Mizoram, etc.
- A plot of land is cleared for cultivation. As the yield decreases after two or three years, the plot is abandoned and a fresh clearing is made.

**Extensive Farming**
- This is a system of farming in which the cultivator uses a limited amount of labour and capital on relatively large area.
- This type of agriculture is practised in countries where population size is small and land is enough.
- Here, per acre yield is low but overall production is in surplus due to less population.
- Agriculture is done with the help of machines.

**Intensive Farming**
- This is a system of farming in which the cultivator uses large amount of labour and capital on a relatively small area.
- In countries where the size of population is big but land is less, this type of farming is done.
- Annually two or three crops are grown due to the demand of food for the large size of population.
- Agriculture is done with the help of manual labour.

**Plantation Agriculture**
- In this type of agriculture, trees or bushes are planted on huge estates.
- A single crop like rubber, sugarcane, coffee, tea or banana is grown.

**Problems of Indian Agriculture**
- The low productivity of our agriculture is mainly due to the difficulties faced by our peasants.
- Indian agriculture is chiefly of subsistence type where a large manual labour is employed to work on farms to grow just enough food for the needs of the family and very little is left for marketing.

A major part of the Indian soil has been impoverished because it has been under plough for the last 4000 or 5000 years.

- Deforestation, overgrazing and heavy rainfall have led to soil erosion.
- Overgrazing and heavy rainfall have led to soil erosion.
- Divisions of land holding is very small and uneconomic.
- The size of land holding is very small and uneconomic.
- The farmers are poor, illiterate and ignorant.
- The farmers are poor, illiterate and ignorant.
- They use primitive tools and out dated method.
- They use primitive tools and out dated method.
- They lack financial credit and investment.
- They lack financial credit and investment.
- They lack irrigation facilities and are still on the mercy of nature.
- They lack irrigation facilities and are still on the mercy of nature.
- Most of the farmers have no security against crop failure or loss caused by nature.
- Generally farmers are uneducated and have no scientific approaches.

**Three Crop Seasons in India**

1. **Rabi**
   - This season starts after the rainy season. Sowing begins in September-October and harvesting takes place in February-March.
   - Wheat, barley, pulses and some oil seeds are grown in the Rabi season.

2. **Kharif**
   - The Kharif season begins with the onset of the monsoons in June-July.
   - The crop grows in the rainy season and harvesting takes place after the retreat of monsoon in September-October.
   - Rice, maize, millets, groundnuts, cotton and jute are grown in the Kharif season.

3. **Zayad**
   - This is the summer season for growing crops which remain till April, May and June.
   - Products are mainly vegetables and fruits.

**Green Revolution**
- The increase in agriculture productivity of cereals that has taken place since the 1960s mainly as a result of introduction of high yielding varieties of wheat and rice and use of fertilizers, machines and irrigation etc., is known as *green revolution*.
- Green revolution has made us self-sufficient in food production.
- This has not only saved our much precious foreign exchange but has also made us self-reliant.
- But green revolution has proved more beneficial to rich farmers only, because it involves a lot of investment.

**Land use Pattern of India**

<table>
<thead>
<tr>
<th>Uses of land</th>
<th>Percentage (%)</th>
<th>Uses of land</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultivated land</td>
<td>43.41</td>
<td>Wasteland (arid, rocky and sandy areas)</td>
<td>6.29</td>
</tr>
<tr>
<td>Forested area</td>
<td>22.57</td>
<td>Area under non-agricultural use</td>
<td>6.29</td>
</tr>
<tr>
<td>Fallow land</td>
<td>10.85</td>
<td>Cultivable waste</td>
<td>4.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pastures and meadows</td>
<td>3.45</td>
</tr>
</tbody>
</table>
The total geographical area of India is 32.88 crore hectares.

This data is available for only 92.5% land area. Though land is put to different uses, but cultivation of land is its most important use.

Water Resources and Their Utilization in India

- India has 4% of the world’s water resources, while it has to support 16% of the world population and 15% of livestock.
- The annual precipitation including snowfall, which is the main source of water in the country, is estimated to be of the order of 4,000 Billion Cubic Metres (BCM).
- The estimated precipitation during the monsoon season (June to September) is of the order of 3,000 BCM.
- The resources potential of the country, which occurs as natural run off in the rivers, is about 1869 BCM, considering both surface and ground water as one system.
- Water resources of India can be divided into two parts:
  1. Surface Water Resources
  2. Underground Water Resources

Surface Water Resources

- According to the estimate, India receives an average of 109 cm of rainfall annually.
- This rainfall amounts to 37,000 million cubic meters. Out of this, 12,500 million cubic meters evaporates and another 7,900 million cubic meters is absorbed by land. Only 16,600 million cubic meters of water is available in our rivers.
- Out of this, only 6,600 million cubic meters of water can be used for irrigation.

Underground Water Resources

- Out of total rainfall, only 7,900 million cubic meters of water percolates inside/beneath the earth.
- Out of this, only 4,300 million cubic meters of water is able to reach the upper layer of the soil.
- This water is more important for agricultural production.
- Rest 3,600 million cubic meters reaches the impervious rocks which can be used by digging wells or tubewells. Out of this only 2,250 million cubic meters of water is economically viable.

Sources of Irrigation in India

There are various sources of irrigation which are:

- Wells & Tubewells: 46% of total irrigation
- Canals: 39% of total irrigation
- Tanks: 8% of total irrigation
- Other Sources: 7% of total irrigation (Dongar, Kuhls, Springs etc.)

Power Resources of India

India uses a large amount of fossil fuels as a source of energy along with a number of renewable sources of energy viz., hydroelectric power, thermal energy, wind energy, tidal energy, bio-gas etc.

Multipurpose Projects of India

Multipurpose river valley projects, once referred to Jawahar Lal Nehru as ‘Temples of Modern India’, present an integrating system of controlling floods, generation of hydroelectricity, irrigation, development of fishery and tourist spots, boat navigation and draining away extra water. These projects aim at all round development of river valleys.

Multipurpose River Valley Projects

<table>
<thead>
<tr>
<th>Project/River</th>
<th>Purposes</th>
<th>Name of Power Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td>On river Sutlej 518 m long, 226 m high</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On river Damodar, located in West Bengal and Jharkhand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On Mahanadi river in Odisha, 4800 m long</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tungabhadra Project</td>
<td>1. Irrigation, 2. Generation of Hydroelectricity</td>
<td>1. At Malappuram, 2. At Hampi, 3. On left side of Malappuram</td>
</tr>
<tr>
<td>On river Tungabhadra</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Transport in India

The present transport system of the country comprises several modes of transport including rail, road, coastal shipping, air transport etc.

Road Transport

- The total road length of the country increased from 3.99 lakh kms on 31st March, 1951 to 48.65 lakh kms as on 31st March, 2012, growing at a Compound Annual Growth Rate (CAGR) of 4.2%. About 60% freight traffic and 87.4% passenger traffic is carried by the roads.

At present Indian road network of 48.85 lakh km. is the one of the largest in the world and consists of—

<table>
<thead>
<tr>
<th>Expressways / Major District Roads,</th>
<th>National Highways</th>
<th>Rural and other roads</th>
<th>Total length 48.85 lakh km (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>92,851 km</td>
<td>46,49,462 km</td>
<td></td>
</tr>
<tr>
<td>State Highways</td>
<td>1,42,687 km</td>
<td>Total length 48.85 lakh km (approx.)</td>
<td></td>
</tr>
</tbody>
</table>

(Source: INDIA 2015)

National Highways

- They are constructed and maintained by the central government.
- The National Highways has 79,116 km. length comprising only 2% of the total length of roads, carries about 40% of the total traffic of India.
- The development and maintenance of the National Highways system is carried out through three agencies— 1. National Highways Authority of India (NHAI),
2. State Public Works Departments (PWDs) and 3. Border Roads Organisation (BRO).

- In order to give boost to the economic development of the country, the government has embarked upon a massive National Highways Development Project (NHDP) in the country.
- The NHDP is the largest highway project ever undertaken in the country.
- The NHDP is being implemented mainly by National Highways Authority of India (NHAI).
- As on 31st March, 2012 around 99.1% of SHs (State Highways) was surfaced.
- The State/UT-wise break-up SHs shows that Maharashtra accounted for the largest share (19.8%) as on 31st March, 2012, followed by Karnataka (12.6%), Gujarat (11.2%), Tamil Nadu (6.6%) and Andhra Pradesh (6.5%). These five states accounted for about 56.7% of the total length of SHs.

Some Important National Highways (As on 23 June, 2012)

<table>
<thead>
<tr>
<th>NH.</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH.1</td>
<td>Delhi - Ambala - Amritsar - Indo-Pak Border (456 km)</td>
</tr>
<tr>
<td>NH.2</td>
<td>Delhi - Agra - Kanpur - Varanasi - Kolkata (1,465 km)</td>
</tr>
<tr>
<td>NH.3</td>
<td>Agra - Gwalior - Indore - Nasik - Mumbai (1,161 km)</td>
</tr>
<tr>
<td>NH.4</td>
<td>Junction with N.H. 3 near Thane - Bolgaum - Bengaluru - Ranipet - Chennai (1,235 km)</td>
</tr>
<tr>
<td>NH.7</td>
<td>Varanasi - Jabalpur - Nagpur - Hyderabad - Bengaluru - Madurai - Kanyakumari (1,389 km)</td>
</tr>
<tr>
<td>NH.8</td>
<td>Delhi - Jaipur - Alnuedabad - Vadodara - Mumbai (1,375 km)</td>
</tr>
<tr>
<td>NH.9</td>
<td>Pune - Solapur - Hyderabad - Vijayawada - Machilipatnam (841 km)</td>
</tr>
<tr>
<td>NH.15</td>
<td>Pithampur - Amritsar - Bhatinda - Ganganagar - Bikaner - Jaisalmer - Barmer - Samalkhial (1,526 km)</td>
</tr>
<tr>
<td>NH.17</td>
<td>Ambala - Kalka - Shimla - Rampur - Indo-Tibet (China) Border near Shipki-La (472 km)</td>
</tr>
<tr>
<td>NH.23</td>
<td>Delhi - Bareilly - Lucknow (438 km)</td>
</tr>
<tr>
<td>NH.39</td>
<td>Varanasi - Gwalior - Indore - Nasik - Mumbai (1,161 km)</td>
</tr>
<tr>
<td>NH.44</td>
<td>Nagpur - Agra - Kanpur - Varanasi - Kolkata (1,465 km)</td>
</tr>
<tr>
<td>NH.52</td>
<td>Salem - Coimbatore - Trichur - Ermakulam - Thiruvananthapuram - Cape (640 km)</td>
</tr>
<tr>
<td>NH.58</td>
<td>Bangaluru - Hassan - Mangaluru (328 km)</td>
</tr>
<tr>
<td>NH.59</td>
<td>Kochi - Madurai - Dhanushkodi (440 km)</td>
</tr>
<tr>
<td>NH.60</td>
<td>Mokamah - Raj Mahal - Farakka (310 km)</td>
</tr>
<tr>
<td>NH.62</td>
<td>Chhapra - Rewaghat - Muzafarpur (80 km)</td>
</tr>
<tr>
<td>NH.285</td>
<td>Ananthpur - Renugunta - Chennai (442 km)</td>
</tr>
<tr>
<td>NH.217</td>
<td>Raipur (Chhattisgarh) - Gopalpur (Odisha) (508 km)</td>
</tr>
<tr>
<td>NH.327</td>
<td>Bangun (Bariyahi Bazer) on NH.107 - Supaul - Pipra (106) - Tribeni - Khargamau - Basuki - Maner (1,090 km)</td>
</tr>
<tr>
<td>NH.947</td>
<td>Sirkhej - Virungunj - Jamshor - Dwarka - Okha (461 km)</td>
</tr>
<tr>
<td>NH.953</td>
<td>Vvaya (NH-6) - Netaji - Raipplaa - Bodali (190 km)</td>
</tr>
</tbody>
</table>

Geography

The longest National Highway in India is NH-7 (from Varanasi to Kanyakumari), which has a length of 128 kms in Uttar Pradesh, 504 kms in Madhya Pradesh, 232 kms in Maharashtra, 753 kms in Andhra Pradesh (including Telangana), 125 kms in Karnataka, 627 kms in Tamil Nadu i.e. total 2,369 kms.

State Highways and other Roads

- They are constructed and maintained by the state government.
- As on 31st March, 2012—
  - Average road density of India—148 km per 100 sq. kms.
  - Average road length per lakh population (census 2011)—402.03 kms.
  - The length of NHs per 100 sq. kms of area—2.34 kms and the length of NHs per lakh population—6.35 kms.
  - U.P. has the largest share (10.2%) of the total length of NHs, followed by Rajasthan (9.3%), M.P. (6.6%), Tamil Nadu (6.4%) and Rajasthan (5.9%). These five states accounted for about 38.4% of the total road length of NHs.
  - Roads on the borders are constructed and maintained by the Border Roads Organisation (BRO).
  - BRO was established in May 1960.
  - BRO is a premier construction agency roads airfields, bridges, buildings, hospitals and schools.
  - The BRO, through ‘Project Dantak’ is constructing and maintaining a large road infrastructure and executing other prestigious projects in Bhutan.
  - The BRO is doing highly commendable jobs of construction and maintenance in Myanmar and Afghanistan too.

Rail Transport

- The Indian Railways have been a great integrating force for more than 160 years.
- From a very modest beginning in 1853, Indian Railways have grown into a vast network of 7,030 stations spread over a route-length of 64,015 km, with a fleet of 8,592 (43 steam, 4,963 diesel and 3,568 electric) locomotives, 49,110 passenger service vehicles, 5,985 other coaching vehicles and 2,11,763 wagons as on 31 March, 2009.
- Indian Railway network is the largest in Asia and world’s second largest under one management.
- The first rail in India started in 1853 between Mumbai and Thane (34 kms).
- Indian Railway Board was established in March, 1905.
- Indian Railway was nationalised in 1950.
- The network runs multigauge operations extending over 1,08,706 (BG – 86,526, MG – 18,529 and NG–3,651) Track kilometres.

<table>
<thead>
<tr>
<th>Gauge</th>
<th>Route</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad Gauge</td>
<td>1,676 mts</td>
<td>84.81 %</td>
</tr>
<tr>
<td>Meter Gauge</td>
<td>1,000 mts</td>
<td>11.22 %</td>
</tr>
<tr>
<td>Narrow Gauge</td>
<td>0.762 and 0.610 mts</td>
<td>3.97 %</td>
</tr>
<tr>
<td>Total (as on 31st March, 2010)</td>
<td>63,974 km</td>
<td>100.00 %</td>
</tr>
</tbody>
</table>
Lucent's General Knowledge

Air Transport

1. Airways in India started in 1911.
2. Indian National Airways Company was started in 1933.
3. All the airway companies were nationalised in 1953 and were put under two corporations namely — Indian Airlines and Air India.
4. Indian Airlines provides its services to the internal parts of India along with neighbouring countries of Nepal, Bangladesh, Pakistan, Afghanistan, Sri Lanka, Myanmar, and Maldives.
5. Air India provides its services to the foreign locations.
6. Vayudoot was established in 1981 for domestic services, but was later merged in Indian Airlines.

Major International Airports of India

<table>
<thead>
<tr>
<th>Name of Airport</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chhatrapati Shivaji Int. Airport (Santa Cruz Airport)</td>
<td>Mumbai</td>
</tr>
<tr>
<td>Subhish Chandra Bose Airport (DumDum Airport)</td>
<td>Kolkata</td>
</tr>
<tr>
<td>Indira Gandhi International Airport</td>
<td>Delhi</td>
</tr>
<tr>
<td>Anna (Meenambakkam) International Airport</td>
<td>Chennai</td>
</tr>
<tr>
<td>Trivendram International Airport</td>
<td>Thiruvananthapuram</td>
</tr>
<tr>
<td>Guru Ramdasji (Rajasansi) International Airport</td>
<td>Amritsar</td>
</tr>
<tr>
<td>B. R. Ambedkar International Airport</td>
<td>Nagpur</td>
</tr>
<tr>
<td>Kampagowada (Bangaluru) International Airport</td>
<td>Bangalore</td>
</tr>
<tr>
<td>Devi Ahilyabai Holkar International Airport</td>
<td>Indore (M.P.)</td>
</tr>
<tr>
<td>Calicut International Airport</td>
<td>Kozhikode (Kerala)</td>
</tr>
<tr>
<td>Veer Savarkar International Airport</td>
<td>Port Blair</td>
</tr>
<tr>
<td>Rajeev Gandhi International Airport</td>
<td>Hyderabad</td>
</tr>
<tr>
<td>Lokpriya Gopinath Bordoloi International Airport</td>
<td>Guwahati</td>
</tr>
<tr>
<td>Loknayak Jai Prakash Narayan International Airport</td>
<td>Patna</td>
</tr>
<tr>
<td>Goa International Airport</td>
<td>Goa</td>
</tr>
<tr>
<td>Sardar Vallab Bhai Patel International Airport</td>
<td>Ahmedabad</td>
</tr>
<tr>
<td>Mangalore International Airport</td>
<td>Mangalore</td>
</tr>
<tr>
<td>Aranmula International Airport</td>
<td>Pathanamthitta</td>
</tr>
<tr>
<td>Raja Bhoj International Airport</td>
<td>Bhopal</td>
</tr>
<tr>
<td>Lal Bahadur Shastri International Airport</td>
<td>Varanasi</td>
</tr>
<tr>
<td>Choudhary Charan Singh International Airport</td>
<td>Lucknow</td>
</tr>
</tbody>
</table>
Water Transport
- The Central Water Tribunal was established in 1887.
- Its headquarter is in Kolkata.
- The waterways of the country have been divided into internal waterways and oceanic waterways.

Internal Waterway
- This transport is through rivers, canals and lakes.
- India has got about 14,544 km of navigable waterways which comprise rivers, canals, backwaters, creeks etc.
- About 55 million tonnes of Cargo is being moved annually by Inland Water Transport (IWT).
- The waterway from Haldia to Allahabad was made a National Water way in 1986.
- The Inland Waterways Authority of India (IWAI) came into existence on 27 October, 1986 for development and regulation of inland waterways in the country.

Oceanic Waterway
- The peninsular bank is very important for this purpose.
- There are 13 large and 200 small ports on the major bank of 5600 kms.
- Large ports are maintained by the central government whereas small ports are included in the concurrent list and are managed by the state government.
- As on 31st March, 2014 the capacity of major ports was about 800.52 MMT against cargo traffic of 555.54 MMT handled in 2013-14. Thus the capacity utilization is 70%.
- Largest port of India is Jawahar Lal Nehru Port in Mumbai.
- The largest natural port is in Vishakhapatnam.
- Kandla in Gujarat is a tidal port. It has been made into a free trade zone.
- Haldia Port (WB) is said to be developed as the first Green Port of India.

Major Ports of India
<table>
<thead>
<tr>
<th>Name</th>
<th>State/UT</th>
<th>River/Strait/Ocean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kolkata</td>
<td>West Bengal</td>
<td>Hooghly River</td>
</tr>
<tr>
<td>Mumbai</td>
<td>Maharashtra</td>
<td>Arabian Sea</td>
</tr>
<tr>
<td>Chennai</td>
<td>Tamil Nadu</td>
<td>Bay of Bengal</td>
</tr>
<tr>
<td>Kochi</td>
<td>Kerala</td>
<td>Arabian Sea</td>
</tr>
<tr>
<td>Vishakhapatnam</td>
<td>Andhra Pradesh</td>
<td>Bay of Bengal</td>
</tr>
<tr>
<td>Paradip</td>
<td>Odisha (Orissa)</td>
<td>Arabian Sea</td>
</tr>
<tr>
<td>New Tuticorin</td>
<td>Tamil Nadu</td>
<td>Bay of Bengal</td>
</tr>
<tr>
<td>Marmagao</td>
<td>Goa</td>
<td>Arabian Sea</td>
</tr>
<tr>
<td>Kandla</td>
<td>Gujarat</td>
<td>Arabian Sea</td>
</tr>
</tbody>
</table>

IWAI
The IWAI came into existence on 27 October, 1986 for development and regulation of inland waterways for shipping and navigation. The Authority primarily undertakes projects for development and maintenance of IWAI infrastructure on national water ways through grant received from Ministry of Shipping. The Head Office of the IWAI is at NOIDA. The authority also has its regional offices at Patna, Kolkata, Guwahati and Kochi and sub-offices at Allahabad, Varanasi, Bhubaneswar, Farakka, Hemisagar, Dibrugarh, Kollam, Chennai and Vijaywada.

India Facts and Figures
- The state and union territory capitals are sorted according to the administrative, legislative and judicial capitals.
- The administrative capital is where the executive government offices are located. The legislative capital is where the state assembly convenes.
- The judicial capital is the location of the state or territorial High Courts of India.
- The date mentioned in the table refers to when the city became the capital of the state or territory.
- In the following table, S and W refers to the summer and winter sessions respectively. B refers to the budget session of the legislature.
- The administrative capital is considered to be the main capital of the state.
- The former capital refers to a city which was the capital from admission into the Indian Union. An absence of a legislative capital means that it is administered by the Central government.

<table>
<thead>
<tr>
<th>Name</th>
<th>State/UT</th>
<th>Administrative Capital</th>
<th>Legislative Capital</th>
<th>Judicial Capital</th>
<th>Since</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andaman and Nicobar Islands</td>
<td>Port Blair</td>
<td>—</td>
<td>—</td>
<td>Kolkata</td>
<td>1956</td>
</tr>
<tr>
<td>Annapurna Pradesh</td>
<td>Arunachal Pradesh</td>
<td>Itanagar</td>
<td>Itanagar</td>
<td>Guwahati</td>
<td>1972</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>Hyderabad</td>
<td>Hyderabad</td>
<td>—</td>
<td>Hyderabad</td>
<td>1956</td>
</tr>
<tr>
<td>Assam</td>
<td>Dispur</td>
<td>—</td>
<td>—</td>
<td>Guwahati</td>
<td>1972</td>
</tr>
</tbody>
</table>

Former Capital: Shillong (1874-1972)
- Bihar:
  - Patna: Patna, Patna, Bilaspur, Chandigarh, 1966
- Chhattisgarh: Raipur
- Chandigarh: Chandigarh
- Dadra and Nagar Haveli: Silvassa
- Daman and Diu: Daman
- Delhi: Delhi
- NCT-Delhi: Panaji
- Goa: Gandhi Nagar
- Gujarat: Gandhi Nagar
- Haryana: Chandigarh
- Himachal Pradesh: Shimla
- Jammu and Kashmir: Srinagar
- Kashmir: Jammu (W)

Former Capital: Ahmedabad (1960-1970)
- Chandigarh: Chandigarh, Shimla
- Himachal Pradesh: Shimla
- Jammu and Kashmir: Jammu (W)
- Kashmir: Srinagar
<table>
<thead>
<tr>
<th>State / UT</th>
<th>Administrative Capital</th>
<th>Legislative Capital</th>
<th>Judicial Capital</th>
<th>Since</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jharkhand</td>
<td>Ranchi</td>
<td>Ranchi</td>
<td>Ranchi</td>
<td>2000</td>
</tr>
<tr>
<td>Karnataka</td>
<td>Bengaluru</td>
<td>Bengaluru</td>
<td>Bengaluru</td>
<td>1977</td>
</tr>
<tr>
<td>Kerala</td>
<td>Thrivananthapuram</td>
<td>Tirur</td>
<td>Ernakulam</td>
<td>1956</td>
</tr>
<tr>
<td>Lakshadweep</td>
<td>Kavaratti</td>
<td>—</td>
<td>Ernakulam</td>
<td>1986</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>Bhopal</td>
<td>Bhopal</td>
<td>Jabalpur</td>
<td>1956</td>
</tr>
<tr>
<td>Manipur</td>
<td>Imphal</td>
<td>Imphal</td>
<td>Imphal</td>
<td>1960</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>Shillong</td>
<td>Shillong</td>
<td>Shillong</td>
<td>2003</td>
</tr>
<tr>
<td>Mizoram</td>
<td>Aizawl</td>
<td>Aizawl</td>
<td>Guwahati</td>
<td>1972</td>
</tr>
<tr>
<td>Nagaland</td>
<td>Kohima</td>
<td>Kohima</td>
<td>Guwahati</td>
<td>1963</td>
</tr>
<tr>
<td>Odisha (Orissa)</td>
<td>Bhubaneshwar</td>
<td>Bhubaneshwar</td>
<td>Cuttack</td>
<td>1948</td>
</tr>
<tr>
<td>Punjab</td>
<td>Chandigarh</td>
<td>Chandigarh</td>
<td>Chandigarh</td>
<td>1966</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>Jaipur</td>
<td>Jaipur</td>
<td>Jodhpur</td>
<td>1948</td>
</tr>
<tr>
<td>Sikkim</td>
<td>Gangtok</td>
<td>Gangtok</td>
<td>Gangtok</td>
<td>1975</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>Chennai</td>
<td>Chennai</td>
<td>Chennai</td>
<td>1956</td>
</tr>
<tr>
<td>Telangana</td>
<td>Hyderabad</td>
<td>Hyderabad</td>
<td>Hyderabad</td>
<td>2014</td>
</tr>
<tr>
<td>Tripura</td>
<td>Agartala</td>
<td>Agartala</td>
<td>Agartala</td>
<td>2013</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>Dehradun</td>
<td>Dehradun</td>
<td>Nainital</td>
<td>2000</td>
</tr>
<tr>
<td>West Bengal</td>
<td>Kolkata</td>
<td>Lucknow</td>
<td>Allahabad</td>
<td>1937</td>
</tr>
</tbody>
</table>

According to the ‘Andhra Pradesh Reorganisation Act 2014’ Hyderabad is the joint capital of Telangana and Andhra Pradesh states for maximum 10 years period. The ancient town of ‘Amaravati’, place between Guntur and Prades.

Population of India, States and UTs (Census 2011)

<table>
<thead>
<tr>
<th>State</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uttar Pradesh</td>
<td>1,99,812,341</td>
</tr>
<tr>
<td>Maharashatra</td>
<td>122,324,333</td>
</tr>
<tr>
<td>Bihar</td>
<td>104,999,452</td>
</tr>
<tr>
<td>West Bengal</td>
<td>91,276,115</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>2,966,889</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>72,626,809</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>72,147,030</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>68,548,437</td>
</tr>
<tr>
<td>Jammu and Kashmir</td>
<td>10,86,292</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>8,68,602</td>
</tr>
<tr>
<td>Andhra Pradesh (including Telangana)</td>
<td>3,673,917</td>
</tr>
<tr>
<td>Manipur</td>
<td>84,580,777</td>
</tr>
<tr>
<td>Nagaland</td>
<td>2,72,1756</td>
</tr>
<tr>
<td></td>
<td>1,97,802</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,210,854,977</strong></td>
</tr>
</tbody>
</table>

Union Territories: Facts and Figures (Census 2011)

<table>
<thead>
<tr>
<th>UT</th>
<th>Capital</th>
<th>Area in sq km</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puducherry</td>
<td>Pondicherry</td>
<td>490</td>
<td>12,47,953</td>
</tr>
<tr>
<td>Chandigarh</td>
<td>Chandigarh</td>
<td>114</td>
<td>10,55,480</td>
</tr>
<tr>
<td>Andaman &amp; Nicobar</td>
<td>Port Blair</td>
<td>8,249</td>
<td>3,80,581</td>
</tr>
<tr>
<td>Dadra &amp; Nagar Haveli</td>
<td>Silvassa</td>
<td>491</td>
<td>3,43,789</td>
</tr>
<tr>
<td>Daman &amp; Diu</td>
<td>Daman</td>
<td>111</td>
<td>2,43,247</td>
</tr>
<tr>
<td>Lakshadweep</td>
<td>Kavaratti</td>
<td>30</td>
<td>64,473</td>
</tr>
</tbody>
</table>

*National Capital Territory / Region (Census 2011)*

<table>
<thead>
<tr>
<th>State</th>
<th>Capital</th>
<th>Area</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi</td>
<td>Delhi</td>
<td>1,483</td>
<td>1,67,87,941</td>
</tr>
</tbody>
</table>

Top 10 Most Populous Countries (Projected as of June 1, 2015)

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Country</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>China</td>
<td>1,36,15,12,535</td>
</tr>
<tr>
<td>2.</td>
<td>India</td>
<td>1,25,16,95,584</td>
</tr>
<tr>
<td>4.</td>
<td>Indonesia</td>
<td>25,59,93,674</td>
</tr>
<tr>
<td>5.</td>
<td>Brazil</td>
<td>20,42,59,812</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, International Data Base

Wildlife Sanctuaries and National Parks in India

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Important Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bandipur National Park</td>
<td>Mysore, Karnataka</td>
<td>Elephant, Tiger, Bear, Sambbar, Panther</td>
</tr>
<tr>
<td>3. Chandraprabha Sanctuary</td>
<td>Varanasi, UP</td>
<td>Asiatic Lion, Tiger, Panther, Indian Gazelle, Sloth bear</td>
</tr>
<tr>
<td>Name of the Project</td>
<td>Location</td>
<td>State</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Gandak Project</td>
<td>River Gandak</td>
<td>Uttar Pradesh, Bihar</td>
</tr>
<tr>
<td>Dhuvaran Power</td>
<td>Kheda District</td>
<td>Gujarat</td>
</tr>
<tr>
<td>Station</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sabarigiri (Pamba-Kakki) Project</td>
<td>River Pamba-Kakki</td>
<td>Kerala</td>
</tr>
<tr>
<td>Iduki Project</td>
<td>Rivers Periyar, Cherutheni Iduki</td>
<td>Kerala</td>
</tr>
<tr>
<td>Tawa Project</td>
<td>River Tawa (Narmada)</td>
<td>Madhya Pradesh</td>
</tr>
<tr>
<td>Chambal Project</td>
<td>River Chambal</td>
<td>Rajasthan, Madhya Pradesh</td>
</tr>
<tr>
<td>Korba Project</td>
<td>Near Korba Coalfields</td>
<td>Chhattisgarh</td>
</tr>
<tr>
<td>Satpura Power</td>
<td>Patharkada Station</td>
<td>MP Coalfield</td>
</tr>
<tr>
<td>Koyuna Project</td>
<td>River Koyuna</td>
<td>Maharashtra</td>
</tr>
<tr>
<td>Nagpur Power Station</td>
<td>Koradi, Near Nagpur City</td>
<td>Maharashtra</td>
</tr>
<tr>
<td>Tungabhadra</td>
<td>River Tungabhadra Multipurpose Project</td>
<td>Karnataka and Telangana</td>
</tr>
<tr>
<td>Upper Krishna Project</td>
<td>River Krishna</td>
<td>Karnataka</td>
</tr>
<tr>
<td>Sharavati Project</td>
<td>River Sharavati</td>
<td>Karnataka (near Jog Falls)</td>
</tr>
<tr>
<td>Hirakud Multipurpose Project</td>
<td>River Mahanadi</td>
<td>Odisha</td>
</tr>
<tr>
<td>Mahanadi Delta Project</td>
<td>River Mahanadi</td>
<td>Odisha</td>
</tr>
<tr>
<td>Talcher Power Station</td>
<td>Near Talcher</td>
<td>MP, Punjab, Haryana</td>
</tr>
<tr>
<td>Bhakra-Nangal</td>
<td>River Sutlej</td>
<td>Rajasthan</td>
</tr>
<tr>
<td>Multipurpose Project</td>
<td>Sutlej in Punjab</td>
<td>Headworks in Punjab</td>
</tr>
<tr>
<td>Rajasthan Canal Project</td>
<td>Sutlej in Punjab</td>
<td>Tamil Nadu</td>
</tr>
<tr>
<td>Kundah Project</td>
<td>River Kundah</td>
<td>Tamil Nadu</td>
</tr>
<tr>
<td>Neyveli Power Station</td>
<td>Neyveli</td>
<td>Tamil Nadu</td>
</tr>
<tr>
<td>Ramanganga</td>
<td>Chusot stream (near Kalagarh)</td>
<td>Uttar Pradesh, Madhya Pradesh</td>
</tr>
<tr>
<td>Multipurpose Project</td>
<td></td>
<td>Uttarakhand</td>
</tr>
<tr>
<td>Matalilla Multipurpose Project</td>
<td>River Betwa</td>
<td>Uttarakhand</td>
</tr>
<tr>
<td>Rihand Scheme</td>
<td>River Rihand</td>
<td>Uttarakhand</td>
</tr>
<tr>
<td>Obra Power Station</td>
<td>Obra</td>
<td>Uttar Pradesh</td>
</tr>
<tr>
<td>Damodar Valley Project</td>
<td>River Damodar</td>
<td>Jharkhand</td>
</tr>
<tr>
<td>Urai Project</td>
<td>River Tapi</td>
<td>Kodar</td>
</tr>
<tr>
<td>Mahi Project</td>
<td>River Mahi</td>
<td>Gujarat</td>
</tr>
<tr>
<td>Ghataprabha Project</td>
<td>River Ghataprabha</td>
<td>Kerala</td>
</tr>
</tbody>
</table>

**Important Irrigation and Power Projects**

<table>
<thead>
<tr>
<th>Name of the Project</th>
<th>Location</th>
<th>State</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nagarjuna Sagar</td>
<td>River Krishna</td>
<td>Andhra Pradesh</td>
<td>Irrigation, Hydro-electricity</td>
</tr>
<tr>
<td>Multipurpose Project</td>
<td>Sutlej in Punjab</td>
<td>Tamil Nadu</td>
<td>Hydro-electricity</td>
</tr>
<tr>
<td>Pochampad Project</td>
<td>River Godawari</td>
<td>Andhra Pradesh</td>
<td>Irrigation</td>
</tr>
<tr>
<td>Lower Sileru Project</td>
<td>River Sileru (Godawari)</td>
<td>Andhra Pradesh</td>
<td>Hydro-electricity</td>
</tr>
<tr>
<td>Kakarpara Project</td>
<td>River Tapri</td>
<td>Andhra Pradesh</td>
<td>Thermal Power</td>
</tr>
<tr>
<td>Kothagudem Project</td>
<td>Singareni Coalfields</td>
<td>Telangana</td>
<td>Flood Control</td>
</tr>
<tr>
<td>Kosi Project</td>
<td>River Kosi</td>
<td>Bihar</td>
<td>Irrigation</td>
</tr>
</tbody>
</table>

**Important Species**

- Elephant, Tiger, Sloth bear, Nilgai, Panther, Sambar
- Tiger, Panther, Sambar, Nilgai
- Siberian, Crane, Spoonbill, Heron teal, Stork
- Asian Lion, Panther, Sambar, Nilgai, Crocodile, Rhinoceros
- Tiger, Leopard, Sambar, Chital
- Tiger, Leopard, Sambar, Chital
- Tiger, Panther, Antelope, Barking Deer, Nilgai
- Tiger, Great Indian one horned Rhinoceros, Wild Buffalo, Sambar
- Tiger, Elephant, Panther, Wild Buffalo, One horned Rhinoceros
- Elephant, Dear, Pigs
- Tiger, Elephant, Panther, Leopard
- Tiger, Panther, Chital, Nilgai
- Elephant, Tiger, Chital, Nilgai
- Birds
- Tiger, Birds
- Tiger, Wild boar, Crocodile, Deer
- Birds
- Wild Ass, Wolf, Nilgai, Chinkara
<table>
<thead>
<tr>
<th>Name of the Project</th>
<th>Location</th>
<th>State</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bhima Project</td>
<td>River Bhima</td>
<td>Maharashtra</td>
<td>Irrigation</td>
</tr>
<tr>
<td>Sendar Sarowar Project</td>
<td>River Namada</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bana Sagar Project</td>
<td>River Soni</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dui Hasti Project</td>
<td>River Chemab</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salal Project</td>
<td>River Chemab</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thein Dam Project</td>
<td>River Ravi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malaprabha Project</td>
<td>River Malaprabha</td>
<td>Maharashtra</td>
<td>Irrigation</td>
</tr>
<tr>
<td>Jaykadi Project</td>
<td>River Godawari</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beas Project</td>
<td>River Beas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharda-Hayak Project</td>
<td>River Ghagha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mayurakahi Project</td>
<td>River Mayurakahi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rama Pintap Sagar Project</td>
<td>River Chambal</td>
<td>Rajasthan</td>
<td>Thermal Power</td>
</tr>
<tr>
<td>Suratgarh Super Thermal Project</td>
<td>River Cauvery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mettur</td>
<td>River Mundrapujha</td>
<td>Kerala</td>
<td></td>
</tr>
<tr>
<td>Pallivasal</td>
<td>River Tamliraparani</td>
<td>Tamil Nadu</td>
<td></td>
</tr>
<tr>
<td>Papanasam Project</td>
<td>Lake Loktak</td>
<td>Manipur</td>
<td></td>
</tr>
<tr>
<td>Lekttak Project</td>
<td>River Bhagirathi (Ganga)</td>
<td>Uttarakhand</td>
<td>Irrigation, Hydro-electricity</td>
</tr>
<tr>
<td>Tehri Project</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farakka Project</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Indian Satellites: At a Glance**

<table>
<thead>
<tr>
<th>Satellite</th>
<th>Launch Date</th>
<th>Weight (Kg.)</th>
<th>Launching Station</th>
<th>Launch Vehicle</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aryabhata</td>
<td>19 Apr, 1975</td>
<td>360</td>
<td>R.R.L.S., USSR</td>
<td>ICR</td>
<td>Scientific (S)</td>
</tr>
<tr>
<td>Bhaskar-1</td>
<td>07 June, 1979</td>
<td>442</td>
<td>R.R.L.S., USSR</td>
<td>ICR</td>
<td>Earth Scanning (S)</td>
</tr>
<tr>
<td>Rohini RS-1</td>
<td>10 Aug, 1979</td>
<td>35</td>
<td>R.L.C., Srinagar</td>
<td>SLV-3</td>
<td>Earth Scanning (S)</td>
</tr>
<tr>
<td>Rohini RS-2</td>
<td>18 July, 1980</td>
<td>35</td>
<td>R.L.C., Srinagar</td>
<td>SLV-3</td>
<td>Earth Scanning (S)</td>
</tr>
<tr>
<td>Rohini RS-3</td>
<td>31 May, 1981</td>
<td>38</td>
<td>R.L.C., Srinagar</td>
<td>SLV-3</td>
<td>Earth Scanning (S)</td>
</tr>
<tr>
<td>Apple</td>
<td>19 June, 1981</td>
<td>670</td>
<td>E.R.L.S., Kourou</td>
<td>Ariane-1</td>
<td>Earth Scanning (S)</td>
</tr>
<tr>
<td>INSAT-1A</td>
<td>10 Apr, 1982</td>
<td>1160</td>
<td>A.R.L.S., USA</td>
<td>SLV-3</td>
<td>Scientific (S)</td>
</tr>
<tr>
<td>Rohini RS-D-2</td>
<td>17 Apr, 1983</td>
<td>41.5</td>
<td>R.L.C., Srinagar</td>
<td>Shuttle (PAM-D)</td>
<td>Multipurpose (S)</td>
</tr>
<tr>
<td>INSAT-1B</td>
<td>30 Aug, 1983</td>
<td>1193</td>
<td>K.S.C., USA</td>
<td>SLV-3</td>
<td>Scientific (S)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Satellite</th>
<th>Launch Date</th>
<th>Weight (Kg.)</th>
<th>Launching Station</th>
<th>Launching Vehicle</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SROSS-1</td>
<td>24 Mar, 1987</td>
<td>150</td>
<td>R.L.C., Srinagar</td>
<td>ASLV-D1</td>
<td>R. Sensing</td>
</tr>
<tr>
<td>IRS-1A</td>
<td>17 Mar, 1988</td>
<td>980</td>
<td>R.S.S., Balnour</td>
<td>Vostek</td>
<td>R. Sensing (S)</td>
</tr>
<tr>
<td>SROSS-2</td>
<td>13 July, 1988</td>
<td>150</td>
<td>R.L.C., Srinagar</td>
<td>ASLV-D2</td>
<td>R. Sensing</td>
</tr>
<tr>
<td>INSAT-1C</td>
<td>21 Jul, 1988</td>
<td></td>
<td>E.R.L.S., Kourou</td>
<td>Ariane-3</td>
<td>Multipurpose</td>
</tr>
<tr>
<td>INSAT-1D</td>
<td>12 June, 1990</td>
<td>850</td>
<td>K.S.C., USA</td>
<td>Delta 4925</td>
<td>Multipurpose</td>
</tr>
<tr>
<td>IRS-1A</td>
<td>29 Aug, 1991</td>
<td>983</td>
<td>R.S.S., Balnour</td>
<td>Vostek</td>
<td>R. Sensing (S)</td>
</tr>
<tr>
<td>SROSS C-1</td>
<td>20 May, 1992</td>
<td>106</td>
<td>R.L.C., Srinagar</td>
<td>ASLV-D3</td>
<td>R. Sensing</td>
</tr>
<tr>
<td>IRS-1E</td>
<td>20 Sep, 1993</td>
<td>850</td>
<td>R.L.C., Srinagar</td>
<td>PSLV-D1</td>
<td>R. Sensing</td>
</tr>
<tr>
<td>SROSS C-2</td>
<td>04 May, 1994</td>
<td>113</td>
<td>R.L.C., Srinagar</td>
<td>ASLV-D4</td>
<td>R. Sensing</td>
</tr>
<tr>
<td>IRS-F2</td>
<td>15 Oct, 1994</td>
<td>870</td>
<td>R.L.C., Srinagar</td>
<td>PSLV-D2</td>
<td>R. Sensing</td>
</tr>
<tr>
<td>INSAT-2C</td>
<td>07 Dec, 1995</td>
<td>2050</td>
<td>E.R.L.S., Kourou</td>
<td>Ariane</td>
<td>Multipurpose</td>
</tr>
<tr>
<td>IRS-1C</td>
<td>29 Dec, 1995</td>
<td>1250</td>
<td>B.L.S., Kazakh</td>
<td>Satellites</td>
<td>R. Sensing</td>
</tr>
<tr>
<td>IRS-P3</td>
<td>21 Mar, 1996</td>
<td>930</td>
<td>R.L.C., Srinagar</td>
<td>PSLV-D3</td>
<td>R. Sensing</td>
</tr>
<tr>
<td>INSAT-2D</td>
<td>04 June, 1997</td>
<td>2070</td>
<td>E.R.L.S., Kourou</td>
<td>Ariane-4</td>
<td>Multipurpose</td>
</tr>
<tr>
<td>IRS-1D</td>
<td>29 Sep, 1997</td>
<td>1200</td>
<td>R.L.C., Srinagar</td>
<td>PSLV-C1</td>
<td>R. Sensing</td>
</tr>
<tr>
<td>INSAT-2E</td>
<td>03 Apr, 1999</td>
<td>2550</td>
<td>E.R.L.S., Kourou</td>
<td>Ariane-42P</td>
<td>Multipurpose</td>
</tr>
<tr>
<td>IRS-P4</td>
<td>26 May, 1999</td>
<td></td>
<td>R.L.C., Srinagar</td>
<td>PSLV-C2</td>
<td>R. Sensing (S)</td>
</tr>
<tr>
<td>INSAT-3B</td>
<td>22 Mar, 2000</td>
<td>2070</td>
<td>E.R.L.S., Kourou</td>
<td>Ariane-5G</td>
<td>—</td>
</tr>
<tr>
<td>GSAT-1</td>
<td>18 Apr, 2001</td>
<td>1540</td>
<td>S.H.A.R., Andhra Pradesh</td>
<td>GSLV-D1</td>
<td>C C</td>
</tr>
<tr>
<td>TES</td>
<td>22 Oct, 2001</td>
<td>1109</td>
<td>S.H.A.R., Andhra Pradesh</td>
<td>PSLV-C3</td>
<td>Techno. Ext (S)</td>
</tr>
<tr>
<td>INSAT-3C</td>
<td>24 Jan, 2002</td>
<td></td>
<td>E.R.L.S., Kourou</td>
<td>Ariane-4</td>
<td>Comm. (S)</td>
</tr>
<tr>
<td>METISAT*</td>
<td>12 Sep, 2002</td>
<td>1060</td>
<td>S.H.A.R., Andhra Pradesh</td>
<td>PSLV-C4</td>
<td>Mete. (S)</td>
</tr>
<tr>
<td>GSAT-2</td>
<td>08 May, 2003</td>
<td>1800</td>
<td>Srinagar, Andhra Pradesh</td>
<td>CSLV-2</td>
<td>Comm. (S)</td>
</tr>
<tr>
<td>INSAT-3E</td>
<td>28 Sep, 2003</td>
<td>2795</td>
<td>Kourou</td>
<td>Ariane-5G</td>
<td>Comm. (S)</td>
</tr>
<tr>
<td>RESOURCE SAT-1</td>
<td>17 Oct, 2003</td>
<td>1360</td>
<td>Srinagar, Andhra Pradesh</td>
<td>PSLV-C5</td>
<td>R. Sensing (S)</td>
</tr>
<tr>
<td>EDUSAT</td>
<td>20 Sep, 2004</td>
<td>1950</td>
<td>Srinagar, Andhra Pradesh</td>
<td>CSLV-F01</td>
<td>Education (S)</td>
</tr>
<tr>
<td>CARTO SAT-1</td>
<td>05 May, 2005</td>
<td>1560</td>
<td>S.S.C., Srinagar, Andhra Pradesh</td>
<td>PSLV-C6</td>
<td>Mapping Satellite (S)</td>
</tr>
<tr>
<td>Satellite</td>
<td>Launch Date</td>
<td>Wt (Kg)</td>
<td>Launching Station</td>
<td>Launch Vehicle</td>
<td>Purpose</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
<td>---------</td>
<td>------------------------------------</td>
<td>----------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>INSAT-4A</td>
<td>22 Dec, 2005</td>
<td>3080</td>
<td>Kourou</td>
<td>Ariane</td>
<td>Comm.</td>
</tr>
<tr>
<td>INSAT-4CR</td>
<td>02 Sep, 2007</td>
<td>2130</td>
<td>S.S.C., Sriharikota, Andhra Pradesh</td>
<td>GSRL-F04</td>
<td>Comm.</td>
</tr>
<tr>
<td>CARTOSAT-2A</td>
<td>28 April, 2008</td>
<td>690</td>
<td>S.H.A.R., Andhra Pradesh</td>
<td>GSRL-C9</td>
<td>R. Imaging</td>
</tr>
<tr>
<td>RISAT-1</td>
<td>26 April, 2012</td>
<td>1858</td>
<td>S.D.S.C., S.H.A.R., Andhra Pradesh</td>
<td>GSRL-C16</td>
<td>R. Sensing</td>
</tr>
<tr>
<td>GSAT-10</td>
<td>29 Sep, 2012</td>
<td>3400</td>
<td>S.H.A.R., Andhra Pradesh</td>
<td>GSRL-C19</td>
<td>R. Sensing</td>
</tr>
<tr>
<td>INSAT-3D</td>
<td>30 June, 2013</td>
<td>2026</td>
<td>Kourou</td>
<td>GSRL-C20</td>
<td>Earth Observation (S)</td>
</tr>
<tr>
<td>IRNSS-1B</td>
<td>04 April, 2014</td>
<td>1432</td>
<td>S.D.S.C., S.H.A.R., Andhra Pradesh</td>
<td>GSRL-C24</td>
<td>Navigation Satellite (S)</td>
</tr>
</tbody>
</table>

**Abcissions used in the above table:**

- **R.R.L.S.:** Russian Rocket Launching Station, Cosmodrome
- **R.I.S.:** Radar Imaging Satellite
- **R.L.C.:** Rocket Launching Centre, Sriharikota Range, A.P.
- **E.R.L.S.:** European Rocket Launching Station, Kourou, French Guiana
- **A.R.L.S.:** American Rocket Launching Station, Cape Canaveral, USA
- **R.S.S.:** Russian Space Station, Baikonur, USSR
- **S.H.A.R.:** Sriharikota High Altitude Range, Andhra Pradesh (A.P.)
- **S.S.C.:** Satish Dhawan Space Centre, Sriharikota, A.P.
- **A.L.C.:** Ariane Launching Space Centre, South America

- **(named after Kalpana Chawla)**

**Note:** (CC) — Commercial Communication; (S) — Successful; (Comm.) — Communication; (Techno. Ex.) — Technology Experiments; (Mete.) — Meteorological

2. Unmanned lunar probe, that carried 11 scientific instruments built in India, UK, Germany, Sweden and Bulgaria.
3. Co-passenger with ANUSAT
5. INSAT-4D: Indian communication satellite, failed to reach orbit due to GSRL-F06 failure.
6. PSLV-C16 placed three satellites with a total payload mass of 1404 kg. RESOURCESAT-2
7. PSLV-C18 is configured to carry four satellites in which one satellite, developed by India and France will track the weather, two were developed by educational institutions, and the fourth is from Luxembourg.
9. India’s advanced communication satellite.
10. The Satellite with ARGOs and ALTICA (SARAL)
11. Advanced meteorological satellite, enhancing India's capability in Weather Forecasting and Disaster warning areas.
The successful use of indigenous cryogenic engine in the GSLV-D5 puts India among a league, five other nations—the US, Russia, France, Japan and China, that possess this technology that is considered the ultimate frontier in rocket science.

14. The five satellites—a 714 kg French Earth Observation Satellite ‘SPOT-7‘, a 143 kg Canadian satellite ‘ASAT‘ two 15 kg satellites from Canada CAN-X4 & CAN-X5 and a 7 kg satellite of Singapore VELOX-1. These satellites were launched under commercial arrangement of ANTRIX (ISRO’s commercial arm) with foreign agencies.

15. IRNSS-1C is the 3rd navigation satellite of the 7 satellites constituting the IRNSS space segment. Its predecessors, IRNSS-1A and IRNSS-1B were launched by PSLV-C22 and PSLV-C24 in July 2013 and April 2014 respectively. The configuration of IRNSS-1C is similar to that of IRNSS-1A and IRNSS-1B.

16. IRNSS-1D is the fourth navigational satellite and one of the seven of the IRNSS constellation of satellites slated to be launched to provide navigational services to the region.

Note: IRNSS (Indian Regional Navigation Satellite System) is an independent regional navigation satellite system being developed by India. It is designed to provide accurate position information service to users in India as well as the region extending up to 1500 km from its boundary, which is its primary service area. The IRNSS space segment consists of seven satellites, with three satellites in geostationary orbit and four satellites in inclined geosynchronous orbit.

General Introduction to Asia

> The word ‘Asia’ is derived from the word ‘Asu’ (of Hiberu language), which literally means ‘rising sun’.

> Asia is the largest of all the seven continents of the world.

> With 4.46 million sq km area, it covers 30% (about one-third) of the land surface of the world.

> With 4.299 million people, it contains about 60% of the world population and emerges as the most populous continent of the world.

> This vast continent comprises the greatest diversity in terms of physical features, climate, vegetation, wildlife and people.

> It has the highest mountain peak on the Earth, Mount Everest (8850 m) and the lowest point, the Dead Sea (396.8 m below sea level).

> It has the coldest place, Vostok, Antarctica has winter temperature of −89.2° C. Jacobabad in Sindh is the hottest place on the Earth.

> Mawsynram near Sherrapunji (India) has the world’s highest average rainfall of 11,873 mm. Simultaneously, it has desert areas of central Asia.

> Asia has the world’s deepest fresh water lake, i.e. Baikal Lake (Russia) which is 1741 meters deep.

> It has the largest delta ‘Sunderbans’, the most fertile river valleys (Ganga-Indus, Brahmaputra, Yangtze kiang and Huang-Ho etc) and the extensive barren lands of Baluchistan.

> It has rich and varied wildlife which is peculiar to this continent.

> Asia has been the cradle of ancient civilizations like the Mesopotamian Civilization, the Indus Civilization and the Chinese Civilization which sustained in the fertile river valleys of Asia.

Asia has the privilege of being the birthplace of major religions of the world, Judaism, Hinduism, Christianity, Islam, Taoism, Shintoism, Jainism, Sikhism, Buddhism and Zoroastrianism etc.

Asia wholly lies in the Northern Hemisphere.

> Latitude: It lies between 10° S to 80° N latitudes, i.e. it spans over 90° of latitudes.

> Longitude: It lies almost entirely in the Eastern Hemisphere.

> It extends from 25°E to 170°E. This large longitudinal extent brings about a difference of 11 hours between the local times of the easternmost part and the westernmost part of Asia.

> Boundaries: The continent is bounded by oceans on three sides—Arctic Ocean in the north, Pacific in the east and the Indian Ocean in the south.

> In the west, Asia is separated from Europe by the low Yural Mountains, the Yural river and the Caspian Sea. The Red Sea and Suez Canal separate it from Africa.

> In the north-east, the Bering strait separates it from North America.

Geography of the Indian Subcontinent

Introduction: India, Pakistan, Bangladesh, Nepal, Bhutan, Myanmar and Sri Lanka, collectively constitute the Indian subcontinent.

These six countries are India’s closest and nearest neighbours and share a common heritage of history and geography.

Pakistan

Location: Pakistan is our western neighbour.

It is bordered by Iran in the west, India in the east the Arabian Sea in the south and Afghanistan in the North.

Latitude: Pakistan lies between 24°N and 37°N latitudes.

Longitude: It lies between longitudes 61°E and 75°E.

Area and composition: Pakistan has an area of about 3,12,685 sq km.

Physical composition of Pakistan: Pakistan may be divided into following physical divisions:

The Northern and Western Highlands: The Hindukush mountains which extend from the Pamir Knot form a mountain wall in the north of Pakistan. Tirich Mir (7690 m) is the highest peak of the Hindukush.

The famous Khyber Pass lies in this region.

Other important mountain ranges are Sulaiman range and Kirthar range.

These ranges spread in north-south direction.

The Baluchistan Plateau: Situated in the south-west of Pakistan.

The Indus Plain: Without the Indus, Pakistan would have been a complete desert.

It is a 2700 km long fertile plain in the eastern Pakistan made by rich alluvial soil brought down by Indus and its five tributaries.
The Thar Desert: It is located in south-eastern part of Pakistan and continues into India.

Climate of Pakistan: The climate of Pakistan is one of the extremes.
> It is very hot in summer and very cold in winter.
> It gets little rainfall in summer.
> The average rainfall in Pakistan is less than 25 cm in a year.
> There is some rainfall in winter brought by the Western disturbances coming from the Mediterranean Sea.

Natural Vegetation
> In plateaus, plains and desert mostly bushes, shrubs and coarse grasses are found.
> In mountainous area in the north and west temperate deciduous trees, coniferous trees and alpine vegetation is found.


Economic Development
Agriculture: Rainfall in this agricultural country is very low and unreliable.
> Rivers and a developed network of canals make irrigation possible.
> Pakistan is known as the ‘Land of Canals’. Mangla Dam and Tarbila Dam in Pakistan are very famous.
> Wheat, millets, cotton, rice, sugarcane and oil seeds are cultivated.

Animal Rearing: People of Pakistan rear milk cattle.
Drought animals are also reared. Sheep and goats are reared in dry Baluchistan, Sui and the mountainous areas.

Mining: Mineral position of Pakistan is not satisfactory.
> It has some deposits of petroleum, coal, iron and copper.
> The gas fields of Sui is important.
> Salt deposits near Khewra are well known.

Industrial Development: Industrially Pakistan is now well developed.
Cotton textile, woollen textile, chemicals, cement, sugar, paper etc. are important industries of Pakistan. Carpets, embroidered goods, pottery and handicrafts are also manufactured here.

> The density of population is 236 persons per sq km. (in 2013).
> 90% people are Muslims, who follow Islam. Urdu is the state language.

Bangladesh
Bangladesh is our eastern neighbouring country.
Location: It is bordered on the north, west and east by India and on the south by the Bay of Bengal.
Latitude: Bangladesh lies between latitudes 21°N and 26°30’N. The Tropic of Cancer passes through the middle of it.
Longitude: It lies between longitudes 88°E and 92°30’E.

Physical Division of Bangladesh: Nearly whole of Bangladesh lies in the largest delta of the world.
> It is a vast flat alluvial plain. It is a land of big rivers, lakes, swamps and marshes.
> A large part of Bangladesh is flooded every year during rainy season.
> It has an area of 1,47,570 sq km.
> The Jamuna (Brahmaputra), Padma (Ganga) and Meghna are the important rivers.
> A small hilly area in the south-east forms the Chittagong Hill tract.

Climate
> It has hot and humid climate.
> Rainfall varies from 250 to 40 cm. It has distinct dry and rainy season.
> In early summer, Bangladesh experiences cyclone storms.

Natural Vegetation
> In the fringes of delta Mangrove forests are found.
> Sundari and bamboo trees are found in these Sunderbans.

Agriculture
> Because of fertile alluvial soil and abundant water supply, rice is the main crop of Bangladesh as it covers 85% of the cultivated area.
> Jute the main cash crop.
> Tea plantations are found in some areas in the north.
> Sugarcane, cotton and tobacco are also grown.

Animal Rearing
> Most of the animals reared in Bangladesh work as beasts of burden.
> Bangladesh has become a leading supplier of animal hides and skins.

Fishing
> Large number of rivers and nearness to the sea make fishing an important activity in Bangladesh.


Minerals
> Bangladesh is not rich in mineral resources.
> Coal, natural gas and oil are mined in a small quantity.

Industries
> The important industries of Bangladesh include jute and cotton textiles, cement, fertilizers, sugar, paper, glass etc.

Population, Language and Religion
> The population of Bangladesh is about 156,594,962 (2013).
> The density of population here is 1,203 persons per sq km. (in 2013).
> Bengali is the official language of Bangladesh.
> Most of the people follow Islam.
> Dhaka, Chittagong, Khulna and Narayanganj are some of the important cities of Bangladesh.
<table>
<thead>
<tr>
<th>Country</th>
<th>Capital</th>
<th>Currency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>Kabul</td>
<td>Afghani</td>
</tr>
<tr>
<td>Algeria</td>
<td>Algiers</td>
<td>Dinar</td>
</tr>
<tr>
<td>Angola</td>
<td>Luanda</td>
<td>Kwanza</td>
</tr>
<tr>
<td>Argentina</td>
<td>Buenos Aires</td>
<td>Argentino Soledad</td>
</tr>
<tr>
<td>Australia</td>
<td>Canberra</td>
<td>Australian Dollar</td>
</tr>
<tr>
<td>Austria</td>
<td>Vienna</td>
<td>Shilling</td>
</tr>
<tr>
<td>Azerbaijan</td>
<td>Baku</td>
<td>Manat</td>
</tr>
<tr>
<td>Bahrain</td>
<td>Manama</td>
<td>Bahrain Dinar</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Dhaka</td>
<td>Taka</td>
</tr>
<tr>
<td>Belarus</td>
<td>Brussel</td>
<td>Euro</td>
</tr>
<tr>
<td>Bhutan</td>
<td>Minsk</td>
<td>Belaros Ruble</td>
</tr>
<tr>
<td>Brazil</td>
<td>Thimphu</td>
<td>Nugultram</td>
</tr>
<tr>
<td>Brunei</td>
<td>Brasilia</td>
<td>Real (BRC)</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>Bander Seri Begawan</td>
<td>Brunei Dollar or Ringgit</td>
</tr>
<tr>
<td>Cambodia</td>
<td>Sofia</td>
<td>Lev</td>
</tr>
<tr>
<td>Canada</td>
<td>Phnom Penh</td>
<td>Rial</td>
</tr>
<tr>
<td>China</td>
<td>Ottawa</td>
<td>Dollar</td>
</tr>
<tr>
<td>Cuba</td>
<td>Beijing</td>
<td>Yuan</td>
</tr>
<tr>
<td>Cyprus</td>
<td>Havana</td>
<td>Peso</td>
</tr>
<tr>
<td>Denmark</td>
<td>Nicosia</td>
<td>Cyprus Pound</td>
</tr>
<tr>
<td>Egypt</td>
<td>Copenhagen</td>
<td>Danish Krone</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Cairo</td>
<td>Pound</td>
</tr>
<tr>
<td>Fiji</td>
<td>Adis Ababa</td>
<td>Birr</td>
</tr>
<tr>
<td>Finland</td>
<td>Suva</td>
<td>Dollar</td>
</tr>
<tr>
<td>France</td>
<td>Helsinki</td>
<td>Euro</td>
</tr>
<tr>
<td>Germany</td>
<td>Paris</td>
<td>Euro</td>
</tr>
<tr>
<td>Ghana</td>
<td>Berlin</td>
<td>Euro</td>
</tr>
<tr>
<td>Greece</td>
<td>Acra</td>
<td>Cedi</td>
</tr>
<tr>
<td>Guatemala</td>
<td>Athens</td>
<td>Euro</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>Guatemala City</td>
<td>Quetzal</td>
</tr>
<tr>
<td>Hungary</td>
<td>Victoria</td>
<td>Dollar</td>
</tr>
<tr>
<td>Iceland</td>
<td>Budapest</td>
<td>Dollar</td>
</tr>
<tr>
<td>India</td>
<td>Reykjavik</td>
<td>Florint</td>
</tr>
<tr>
<td>Indonesia</td>
<td>New Delhi</td>
<td>Krona</td>
</tr>
<tr>
<td>Iran</td>
<td>Jakarta</td>
<td>Rupee</td>
</tr>
<tr>
<td>Iraq</td>
<td>Teheran</td>
<td>Rupiah</td>
</tr>
<tr>
<td>Ireland</td>
<td>Baghdad</td>
<td>Rial</td>
</tr>
<tr>
<td>Israel</td>
<td>Jerusalem</td>
<td>New Shekel</td>
</tr>
<tr>
<td>Italy</td>
<td>Rome</td>
<td>Euro</td>
</tr>
<tr>
<td>Jamaica</td>
<td>Kingston</td>
<td>Dollar</td>
</tr>
<tr>
<td>Japan</td>
<td>Tokyo</td>
<td>Yen</td>
</tr>
<tr>
<td>Jordan</td>
<td>Amman</td>
<td>Dinar</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>Almati</td>
<td>Ruble</td>
</tr>
<tr>
<td>Kirghizistan</td>
<td>Bishkek</td>
<td>Ruble</td>
</tr>
<tr>
<td>Korea (North)</td>
<td>Pyongyang</td>
<td>Won</td>
</tr>
<tr>
<td>Korea (South)</td>
<td>Seoul</td>
<td>Won</td>
</tr>
<tr>
<td>Kuwait</td>
<td>Kuwait</td>
<td>Dinar</td>
</tr>
<tr>
<td>Laos</td>
<td>Vientiane</td>
<td>New Kipao</td>
</tr>
<tr>
<td>Lebanon</td>
<td>Beirut</td>
<td>Pound</td>
</tr>
<tr>
<td>Libya</td>
<td>Tripoli</td>
<td>Dinar</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>Luxembourg Ville</td>
<td>Euro</td>
</tr>
<tr>
<td>Macau</td>
<td>Macau</td>
<td>Pataka</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Kuala Lumpur</td>
<td>Ringgit</td>
</tr>
<tr>
<td>Maldives, Republic of</td>
<td>Male</td>
<td>Rupia</td>
</tr>
<tr>
<td>Mauritius</td>
<td>Port Luis</td>
<td>Rupee</td>
</tr>
<tr>
<td>Mexico</td>
<td>Mexico City</td>
<td>New Peso</td>
</tr>
<tr>
<td>Mongolia</td>
<td>Ulan Bator</td>
<td>Tugrik</td>
</tr>
<tr>
<td>Myanmar</td>
<td>Naypyidaw</td>
<td>Kyat</td>
</tr>
<tr>
<td>Mozambique</td>
<td>Maputo</td>
<td>Metical</td>
</tr>
<tr>
<td>Namibia</td>
<td>Yaren</td>
<td>Dollar</td>
</tr>
<tr>
<td>Nepal</td>
<td>Kathmandu</td>
<td>Rupee</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Amsterdam</td>
<td>Euro</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Wellington</td>
<td>Dollar</td>
</tr>
<tr>
<td>Nigeria</td>
<td>Abuja</td>
<td>Naira</td>
</tr>
<tr>
<td>Norway</td>
<td>Oslo</td>
<td>Kroner</td>
</tr>
<tr>
<td>Oman</td>
<td>Muscat</td>
<td>Rial</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Islamabad</td>
<td>Peso</td>
</tr>
<tr>
<td>Panama</td>
<td>Panama City</td>
<td>Balboa</td>
</tr>
<tr>
<td>Philippines</td>
<td>Manila</td>
<td>Peso</td>
</tr>
<tr>
<td>Poland</td>
<td>Warsaw</td>
<td>Euro</td>
</tr>
<tr>
<td>Portugal</td>
<td>Lisbon</td>
<td>Zloty</td>
</tr>
<tr>
<td>Qatar</td>
<td>Doha</td>
<td>Euro</td>
</tr>
<tr>
<td>Romania</td>
<td>Bucharest</td>
<td>Riyal</td>
</tr>
<tr>
<td>Russia</td>
<td>Moscow</td>
<td>Lari</td>
</tr>
<tr>
<td>Senegal</td>
<td>Dakar</td>
<td>Rouble</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>Riyadh</td>
<td>Riyal</td>
</tr>
<tr>
<td>Senegal</td>
<td>Dakar</td>
<td>CFA Franc</td>
</tr>
<tr>
<td>Country</td>
<td>Capital</td>
<td>Currency</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Serbia and Montenegro</td>
<td>Belgrade</td>
<td>Dinar</td>
</tr>
<tr>
<td>South Africa</td>
<td>Cape Town</td>
<td>Rand</td>
</tr>
<tr>
<td>Spain</td>
<td>Madrid</td>
<td>Euro</td>
</tr>
<tr>
<td>Singapore</td>
<td>Singapore</td>
<td>Dollar</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>Colombo</td>
<td>Rupee</td>
</tr>
<tr>
<td>Syria</td>
<td>Damascus</td>
<td>Pound</td>
</tr>
<tr>
<td>Cyprus</td>
<td>Nicosia</td>
<td>New Taiwan Dollar</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Taipei</td>
<td>Bhut</td>
</tr>
<tr>
<td>Thailand</td>
<td>Bangkok</td>
<td>Dollar</td>
</tr>
<tr>
<td>Trinidad &amp; Tobago</td>
<td>Port of Spain</td>
<td>Dinar</td>
</tr>
<tr>
<td>Tunisia</td>
<td>Tunis</td>
<td>Lira</td>
</tr>
<tr>
<td>Turkey</td>
<td>Ankara</td>
<td>Dirham</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>Abu Dhabi</td>
<td>Shilling</td>
</tr>
<tr>
<td>Uganda</td>
<td>Kampala</td>
<td>Shilling</td>
</tr>
<tr>
<td>Ukraine</td>
<td>Kiev</td>
<td>Shilling</td>
</tr>
<tr>
<td>U.K.</td>
<td>London</td>
<td>Pound Sterling</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>Washington D.C.</td>
<td>Dollar</td>
</tr>
<tr>
<td>Venezuela</td>
<td>Caracas</td>
<td>Bolivar</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Ho Chi Minh City (Hanoi)</td>
<td>Dong</td>
</tr>
<tr>
<td>Yemen</td>
<td>Sana’a</td>
<td>Riyal</td>
</tr>
<tr>
<td>Zaire</td>
<td>Kinshasa</td>
<td>Zaire</td>
</tr>
<tr>
<td>Zambian</td>
<td>Lusaka</td>
<td>Kwacha</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>Harare</td>
<td>Dollar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Town</th>
<th>River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kabul</td>
<td>Kabul</td>
</tr>
<tr>
<td>Allahabad</td>
<td>Confluence of Ganga, Jamuna, Saraswati</td>
</tr>
<tr>
<td>Nasik</td>
<td>Godawari</td>
</tr>
<tr>
<td>Kolkata</td>
<td>Hooghly</td>
</tr>
<tr>
<td>Cuttack</td>
<td>Mahanadi</td>
</tr>
<tr>
<td>Patna</td>
<td>Ganga</td>
</tr>
<tr>
<td>Chittagong</td>
<td>Mayani</td>
</tr>
<tr>
<td>Lucknow</td>
<td>Gomati</td>
</tr>
<tr>
<td>Jamshedpur</td>
<td>Subarnarekha</td>
</tr>
<tr>
<td>Haridwar</td>
<td>Ganga</td>
</tr>
<tr>
<td>Delhi</td>
<td>Jamuna</td>
</tr>
<tr>
<td>Kanpur</td>
<td>Ganga</td>
</tr>
<tr>
<td>Surat</td>
<td>Tapti</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Town</th>
<th>River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jhelum</td>
<td>River</td>
</tr>
<tr>
<td>Budapest (Hungary)</td>
<td></td>
</tr>
<tr>
<td>Rome (Italy)</td>
<td></td>
</tr>
<tr>
<td>Warsaw (Poland)</td>
<td></td>
</tr>
<tr>
<td>Bristol (U.K.)</td>
<td></td>
</tr>
<tr>
<td>London (U.K.)</td>
<td></td>
</tr>
<tr>
<td>New Castle (U.K.)</td>
<td></td>
</tr>
<tr>
<td>Tyre</td>
<td></td>
</tr>
<tr>
<td>Hudson</td>
<td></td>
</tr>
<tr>
<td>Philadelphia</td>
<td></td>
</tr>
<tr>
<td>New Orleans</td>
<td></td>
</tr>
<tr>
<td>Mississippi</td>
<td></td>
</tr>
<tr>
<td>Delaware</td>
<td></td>
</tr>
<tr>
<td>Quebec (Canada)</td>
<td></td>
</tr>
<tr>
<td>Ottawa</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Town</th>
<th>River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chongking</td>
<td></td>
</tr>
</tbody>
</table>

Wonders of The World

**Seven Wonders of the Ancient World**
1. Hanging Garden of Babylon
2. Temple of Diana at Ephesus (Rome)
3. Statue of Jupiter at Olympia
4. Pyramids of Egypt
5. Mausoleum of Mausolus (Ruler of Halicarnassus)
6. Light house of Alexandria
7. Colossus at Rhodes (912 ft. high Statue of Helios, the Sun God)

**Seven Wonders of the Medieval World**
1. Great Wall of China
2. Porcelain Tower of Nanking (China)
3. Colosseum of Rome (Italy)
4. Stone henge of England
5. Leaning Tower of Pisa (Italy)
6. Catacombs of Alexandria
7. Mosque at St. Sophia (Constantinople)

**New Seven Wonders of the World**

As declared on July 7, 2007 by New Seven Wonders Foundation of Switzerland, at a grand ceremony organised in ‘Stadia da Lutz, Benafica Stadium in Lisbon (Portugal).

1. The Taj Mahal (Agra, India)
2. The Great Wall of China (China)
3. The Pink Ruins of Petra (Jordan)
4. The Statue of Christ the Redeemer in Rio de Janeiro (Brazil)
5. Incan Ruins of Machu Pichu (Peru)
6. The ancient Mayan City of Chichen Itza (Mexico)
7. The Colosseum of Rome (Italy)

**Other Wonders of the World**
1. The Sphinx, near Gizeh (Chiza) in Egypt
2. The Catacombs at Rome
3. The Circus Maximus at Rome
4. Angkor Wat temple in Cambodia
5. The Alhambra at Granada in S. Spain
6. Shew Dragam Pagoda or the Golden Pagoda at Yangon in Myanmar
7. Mosque at St. Sophia (Constantinople)

**Countries and their main Produces/Industries**

<table>
<thead>
<tr>
<th>Country</th>
<th>Produces/Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>Dry and fresh fruits, carpets, wool</td>
</tr>
<tr>
<td>Australia</td>
<td>Wood, dairy products, wheat, meat, lead, zinc</td>
</tr>
<tr>
<td>Town</td>
<td>Industry</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Ahmedabad (Gujarat)</td>
<td>Cotton Textiles</td>
</tr>
<tr>
<td>Agra (U.P.)</td>
<td>Leather, marble</td>
</tr>
<tr>
<td>Baku (Russia)</td>
<td>Petroleum</td>
</tr>
<tr>
<td>Bangalore (Karnataka)</td>
<td>Aircraft and telephones</td>
</tr>
<tr>
<td>Bilaspur (Chhattisgarh)</td>
<td>Steel Plant</td>
</tr>
<tr>
<td>Bangkok (Thailand)</td>
<td>Ship-building, teak and wood</td>
</tr>
<tr>
<td>Bhopal (Bhopal)</td>
<td>Silk</td>
</tr>
<tr>
<td>Chandigarh</td>
<td>Film industries</td>
</tr>
<tr>
<td>Chennai (Tamil Nadu)</td>
<td>Leather, Integral Coach Factory</td>
</tr>
<tr>
<td>Chenna (U.P.)</td>
<td>Brassware, cutlery</td>
</tr>
<tr>
<td>Debipur (Bengal)</td>
<td>Oranges, Cotton mills</td>
</tr>
<tr>
<td>Delhi (India)</td>
<td>Newsprint</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>Iron and steel, coal, petroleum</td>
</tr>
<tr>
<td>Jodhpur (Rajasthan)</td>
<td>Integral Coach Factory</td>
</tr>
<tr>
<td>Jodhpur (Rajasthan)</td>
<td>Coal mines</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Sports goods</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Fertilizers and chemicals</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Cutlery</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Paper and Jute</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Ship-building</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Silk, Brocade Industry</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Town</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmadabad (Gujarat)</td>
<td>Cotton Textiles</td>
</tr>
<tr>
<td>Agra (U.P.)</td>
<td>Leather, marble</td>
</tr>
<tr>
<td>Baku (Russia)</td>
<td>Petroleum</td>
</tr>
<tr>
<td>Bangalore (Karnataka)</td>
<td>Aircraft and telephones</td>
</tr>
<tr>
<td>Bilaspur (Chhattisgarh)</td>
<td>Steel Plant</td>
</tr>
<tr>
<td>Bangkok (Thailand)</td>
<td>Ship-building, teak and wood</td>
</tr>
<tr>
<td>Bhopal (Bhopal)</td>
<td>Silk</td>
</tr>
<tr>
<td>Chandigarh</td>
<td>Film industries</td>
</tr>
<tr>
<td>Chennai (Tamil Nadu)</td>
<td>Leather, Integral Coach Factory</td>
</tr>
<tr>
<td>Chenna (U.P.)</td>
<td>Brassware, cutlery</td>
</tr>
<tr>
<td>Debipur (Bengal)</td>
<td>Oranges, Cotton mills</td>
</tr>
<tr>
<td>Delhi (India)</td>
<td>Newsprint</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>Iron and steel, coal, petroleum</td>
</tr>
<tr>
<td>Jodhpur (Rajasthan)</td>
<td>Integral Coach Factory</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Coal mines</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Sports goods</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Fertilizers and chemicals</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Cutlery</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Paper and Jute</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Ship-building</td>
</tr>
<tr>
<td>Kolkata (West Bengal)</td>
<td>Silk, Brocade Industry</td>
</tr>
</tbody>
</table>
### Famous Sites (India)

<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ajanta</td>
<td>Maharashtra</td>
</tr>
<tr>
<td>Akabar’s Tomb</td>
<td>Agra (U.P.)</td>
</tr>
<tr>
<td>Amarnath Cave</td>
<td>Kashmir</td>
</tr>
<tr>
<td>Anbhar Palace</td>
<td>Jaipur (Rajasthan)</td>
</tr>
<tr>
<td>Anand Bhawan</td>
<td>Allahabad (U.P.)</td>
</tr>
<tr>
<td>Bhakra Dam</td>
<td>Bilaspur (Himachal Pradesh)</td>
</tr>
<tr>
<td>Birla Planetarium</td>
<td>Kolkata (West Bengal)</td>
</tr>
<tr>
<td>Island Palace</td>
<td>Udaipur (Rajasthan)</td>
</tr>
<tr>
<td>Jagannath Temple</td>
<td>Puri (Odisha)</td>
</tr>
<tr>
<td>Jal Stambh (Tower of Victory)</td>
<td>Chittorgarh (Rajasthan)</td>
</tr>
<tr>
<td>Jama Masjid</td>
<td>Delhi</td>
</tr>
<tr>
<td>Black Pagoda</td>
<td>Konark (Odisha)</td>
</tr>
<tr>
<td>Brihadeeswara Temple</td>
<td>Tanjavur</td>
</tr>
<tr>
<td>Brindalsan Gardens</td>
<td>Mysore (Karnataka)</td>
</tr>
<tr>
<td>Buland Darwaza</td>
<td>Fathepur Sikri (U.P.)</td>
</tr>
<tr>
<td>Char Minar</td>
<td>Hyderabad (Telangana)</td>
</tr>
<tr>
<td>Chilika Lake</td>
<td>Near Bhubaneswar (Odisha)</td>
</tr>
<tr>
<td>Dal Lake</td>
<td>Srinagar (J &amp; K)</td>
</tr>
<tr>
<td>Dalwara Temples</td>
<td>Mumbai (Rajasthan)</td>
</tr>
<tr>
<td>Ellora Caves</td>
<td>Aurangabad (Maharashtra)</td>
</tr>
<tr>
<td>Gateway of India</td>
<td>Mumbai (Maharashtra)</td>
</tr>
<tr>
<td>Golden Temple</td>
<td>Amritsar (Punjab)</td>
</tr>
<tr>
<td>Gol Gumbaz</td>
<td>Biazpur (Karnataka)</td>
</tr>
<tr>
<td>Hanging Gardens</td>
<td>Mumbai</td>
</tr>
<tr>
<td>Hawa Mahal</td>
<td>Jaipur (Rajasthan)</td>
</tr>
<tr>
<td>Howrah Bridge</td>
<td>Kolkata (W. Bengal)</td>
</tr>
<tr>
<td>Mt. Girmar (Jain Temple)</td>
<td>Junagadh (Gujarat)</td>
</tr>
<tr>
<td>Nataraja Temple</td>
<td>Chennai (Gujarat)</td>
</tr>
<tr>
<td>Nishat Bagh</td>
<td>Srinagar (J &amp; K)</td>
</tr>
<tr>
<td>Padmanabha Temple</td>
<td>Tiruvananthapuram (Kerala)</td>
</tr>
<tr>
<td>Palitana</td>
<td>Junagadh (Gujarat)</td>
</tr>
<tr>
<td>Panch Mahal</td>
<td>Fatehpur Sikri (U.P.)</td>
</tr>
<tr>
<td>Pichola Lake</td>
<td>Udaipur (Rajasthan)</td>
</tr>
<tr>
<td>Prince of Wales Museum</td>
<td>Delhi</td>
</tr>
<tr>
<td>Qutub Minar</td>
<td>Delhi</td>
</tr>
<tr>
<td>Raj Ghat</td>
<td>Delhi</td>
</tr>
<tr>
<td>Rashtrapati Bhawan</td>
<td>Delhi</td>
</tr>
</tbody>
</table>

### Famous Sites (World)

<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al-Aqsa Mosque</td>
<td>Jerusalem (Israel)</td>
<td>Pentagon</td>
</tr>
<tr>
<td>Big Ben</td>
<td>London (U.K.)</td>
<td>Nanking (China)</td>
</tr>
<tr>
<td>Braenderberg Gate</td>
<td>Berlin (Germany)</td>
<td>Egypt</td>
</tr>
<tr>
<td>Broadway</td>
<td>New York (U.S.A.)</td>
<td>Moscow (Russia)</td>
</tr>
<tr>
<td>Brown House</td>
<td>Berlin (Germany)</td>
<td>London (U.K.)</td>
</tr>
<tr>
<td>Buckingham Palace</td>
<td>London (U.K.)</td>
<td>Shwe Dragon Pagoda</td>
</tr>
<tr>
<td>Colosseum</td>
<td>Rome (Italy)</td>
<td>Sphinx</td>
</tr>
<tr>
<td>Downing Street</td>
<td>London (U.K.)</td>
<td>Statue of Liberty</td>
</tr>
<tr>
<td>Eiffel Tower</td>
<td>Paris (France)</td>
<td>Vatican</td>
</tr>
<tr>
<td>Fleet Street</td>
<td>London (U.K.)</td>
<td>Wailing Wall</td>
</tr>
<tr>
<td>Harley Street</td>
<td>London (U.K.)</td>
<td>Wall Street</td>
</tr>
</tbody>
</table>

---

Location
### Changed Names of Cities, States and Countries

<table>
<thead>
<tr>
<th>Old Name</th>
<th>New Name</th>
<th>Old Name</th>
<th>New Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abyssinia</td>
<td>Ethiopia</td>
<td>Angora</td>
<td>Ankara</td>
</tr>
<tr>
<td>Aurangabad</td>
<td>Sambaji Nagar</td>
<td>Cochin</td>
<td>Kochi</td>
</tr>
<tr>
<td>Banaras</td>
<td>Varanasi</td>
<td>Batavia</td>
<td>Dacca</td>
</tr>
<tr>
<td>Bangalore</td>
<td>Bengaluru</td>
<td>Bantul</td>
<td>Belo</td>
</tr>
<tr>
<td>Baroda</td>
<td>Vadodara</td>
<td>Batavia</td>
<td>Belot</td>
</tr>
<tr>
<td>Bombay</td>
<td>Mumbai</td>
<td>British Guiana</td>
<td>Guwahati</td>
</tr>
<tr>
<td>Burma</td>
<td>Myanmar</td>
<td>Calcutta</td>
<td>Kolkata</td>
</tr>
<tr>
<td>Calcut</td>
<td>Kolkata</td>
<td>Calicut</td>
<td>Kozhikode</td>
</tr>
<tr>
<td>Cape Canaveral</td>
<td>Cape Kennedy</td>
<td>Jubbulpore</td>
<td>Jabalpur</td>
</tr>
<tr>
<td>Cawnpore</td>
<td>Kanpur</td>
<td>Central Provinces</td>
<td>Madhya Pradesh</td>
</tr>
<tr>
<td>Chennai</td>
<td>Madras</td>
<td>Chandrapur</td>
<td>Madhya Pradesh</td>
</tr>
<tr>
<td>Cachar</td>
<td>Manipur</td>
<td>Chhattisgarh</td>
<td>Madhya Pradesh</td>
</tr>
<tr>
<td>Chittagong</td>
<td>Chittagong</td>
<td>Chittagong</td>
<td>Chittagong</td>
</tr>
<tr>
<td>Churchill</td>
<td>Churchill</td>
<td>Churchtown</td>
<td>Churchtown</td>
</tr>
<tr>
<td>Ceylon</td>
<td>Sri Lanka</td>
<td>Christinia</td>
<td>Christinia</td>
</tr>
<tr>
<td>China</td>
<td>China</td>
<td>China</td>
<td>China</td>
</tr>
<tr>
<td>Columbia</td>
<td>Columbia</td>
<td>Colombo</td>
<td>Colombo</td>
</tr>
<tr>
<td>Connemara</td>
<td>Connemara</td>
<td>Conservatory</td>
<td>Conservatory</td>
</tr>
<tr>
<td>Coorg</td>
<td>Coorg</td>
<td>Cork</td>
<td>Cork</td>
</tr>
<tr>
<td>Delhi</td>
<td>Delhi</td>
<td>Dacca</td>
<td>Dacca</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Dakar</td>
<td>Dakar</td>
</tr>
<tr>
<td>Dakar</td>
<td>Dakar</td>
<td>Dakar</td>
<td>Dakar</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
<tr>
<td>Dacca</td>
<td>Dacca</td>
<td>Daegu</td>
<td>Daegu</td>
</tr>
</tbody>
</table>

### Highest Mountain Peaks (World)

<table>
<thead>
<tr>
<th>Name</th>
<th>Height (in metres)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mount Everest</td>
<td>8880</td>
<td>Himalayas</td>
</tr>
<tr>
<td>K-2 (Godwin Austen)</td>
<td>8611</td>
<td>Karakoram</td>
</tr>
<tr>
<td>Kanchenjunga</td>
<td>8598</td>
<td>Himalayas</td>
</tr>
<tr>
<td>Lhotse</td>
<td>8511</td>
<td>Himalayas</td>
</tr>
<tr>
<td>Makalu I</td>
<td>8481</td>
<td>Himalayas</td>
</tr>
<tr>
<td>Dhaulagiri I</td>
<td>8126</td>
<td>Himalayas</td>
</tr>
<tr>
<td>Annapurna</td>
<td>8091</td>
<td>Himalayas</td>
</tr>
</tbody>
</table>

### Three Deepest Oceans

<table>
<thead>
<tr>
<th>Name</th>
<th>Greatest depth (in metres)</th>
<th>Greatest depth location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific Ocean</td>
<td>11,033</td>
<td>Mariana Trench</td>
</tr>
<tr>
<td>Atlantic Ocean</td>
<td>9,460</td>
<td>Puerto Rico Trench</td>
</tr>
<tr>
<td>Indian Ocean</td>
<td>7,542</td>
<td>Java Trench</td>
</tr>
</tbody>
</table>

### Geographical Epithets (Sobriquets)

- Blue Mountains: Nilgiri Hills, India
- City of Sky Scrapers: New York, USA
- City of Seven Hills: Rome, Italy
- City of Dreaming Spires: Oxford, England
- City of Golden Spires: San Francisco, USA
- Cockpit of Europe: Belgium
- China's Sorrow: Hwang-Ho
- Dark Continent: Africa
- Eternal City: Rome
- Forbidden City: Lhasa, Tibet
- Gate of Tears: Bab-el-Mandeb, Jerusalem
Some Important Boundary Lines

- Durand Line: between Pakistan and Afghanistan
- Hindenburg Line: between Germany & Poland
- 49th Parallel: between USA & Canada
- MacMahon Line: between India & Tibet/China
- Maginot Line: between France & Germany
- 38th Parallel: between North & South Korea
- Oder Neisse Line: between Germany and Poland
- Radcliffe Line: between India & Pakistan
- 17th Parallel: between India & Pakistan (as claimed by Pakistan)

Some Important Tribes and their Homeland (World)

- Eskimos: Greenland, North Canada, Alaska, N. Siberia
- Koryaks: N. Siberia, Eurasian Tundra
- Lapps: N. Finland, Scandinavian country
- Chukchi: North-East Asia, U.S.S.R., North-East Asia
- Siberia

Glossary of Geographical Terms

- Ablation: Loss of ice in the body of a glacier through melting etc.
- Abrasion: Erosion of rocks by water, wind or ice (glacier).
- Absolute Humidity: Amount of water vapour present in a unit volume of air, usually expressed as grammes per cubic metre.
- Advection: Transfer of heat through horizontal movement of air.
- Aeolian: Relating to or caused by wind. Example: aeolian landforms.
- Alluvium: The fine debris transported and deposited by a river. Landforms formed by deposition of such material are called alluvial landforms, for example, alluvial plains. Soils formed through river deposition are called alluvial soils.
- Altimeter: A type of aneroid barometer for measuring height, used mainly in aeroplanes.
- Anemometer: An instrument used for measuring wind velocity.
- Anticline: The arch or crest of a fold in the rocks. Its opposite is a syncline, the bottom of a fold.
- Antipodes: Two points diametrically opposite on the surface of earth.
- Aphelion: The position of the earth in its orbit when it is at its greatest distance from the sun. At its nearest distance from the sun the earth is said to be in perihelion.
- Apogee: The position of the moon or any other heavenly body, when it is at its greatest distance from the earth. At its shortest distance from the earth the moon is said to be in perigee.
- Asteroids or planetoids: Minor planets revolving around the sun between the orbits of Mars and Jupiter.
- Atmosphere: The envelope of air surrounding the earth. The most abundant among its constituents are nitrogen and oxygen.
Atoll: A ring or horseshoe-shaped coral reef.

Attrition: Mutual wearing down of rock particles during transportation by wind, water or ice.

Aurora Australis and Aurora Borealis: The light phenomena seen in the sky at night in the higher latitudes of the southern and northern hemispheres respectively. Aurora comprises an electrical discharge and is usually accompanied by a magnetic storm.

Avalanche: A large mass of snow and ice at high altitude, sliding downslope on a mountain. Usually a large amount of rock material is also involved in an avalanche.

Azonal soil: Soil which has not been subjected sufficiently to soil forming processes and thus has changed little from the parent material. Such soils do not have a mature profile.

Barometer: Instrument used for measuring pressure. A self-recording barometer giving a continuous record of pressure conditions in the form of a line graph is called a barograph and the graph thus provided is called a barogram.

Barysphere, Bathysphere or Centrosphere: Inner portion of the earth below the lithosphere or outer crust.

Base level: The lowest level to which a river can deepen its valley. It is the level of the surface of the water body, a lake or sea, in which the stream finally falls.

Beach: A gently sloping strip of land along the coast. This lies between the high and low tide levels and is formed by depositional action of waves.

Bearing: The horizontal angle between the direction of an object and the meridian through the observer, measured in degrees (zero to 360) clockwise from the north.

Beaufort scale: A scale identifying wind strength. The lowest point on the scale is zero which refers to calm conditions and the highest is 12 referring to a hurricane.

Biogeography: Study of geographical distribution of plants and animals.

Biosphere: That portion of the earth and its environment occupied by various forms of life.

Blizzard: A storm of powdery snow in the polar regions.

Bog: An area of soft, wet, spongy ground consisting mainly of decayed or decaying moss and other vegetable matter.

Bora: A cold and often dry wind experienced along the eastern coast of the Adriatic Sea.

Bore: A high tidal wave causing backflow of water in river.

Caatinga: Thorn-forest of Brazil.

Canyon: A narrow, deep, steep-sided river valley cut in the soft rocks.

Cape: A headland, a more or less pointed piece of land jutting out into the sea.

Cardinal points: The four main directions of the compass.

Cartography: The art of drawing maps and charts.

Celestial equator: The imaginary circle formed by the intersection of a plane through the centre of the earth perpendicular to its axis and the celestial sphere.

Celestial sphere: A sphere of infinite radius having its centre at some point in the solar system, for example, at the centre of the earth, on to which all members of the solar system may be projected.

Chaparral: The low, dense scrub, characteristic of Mediterranean type of climatic regions.

Chronometer: An accurate time-keeping instrument.

Climate: The average weather conditions of region throughout the seasons.

Climatology: The science studying climates and their influence on other components of the environment.

Clinometer: An instrument used for determining the difference in elevation between two points.

Cloud: A mass of tiny water droplets or ice crystals formed by condensation of water vapor in the atmosphere.

Condensation: The process by which a substance changes from vapor to liquid.

Condensation nuclei: Microscopic particles having an affinity for water. These serve as the nuclei for the formation of raindrops. The presence of these particles in the atmosphere is necessary for condensation to occur.

Coniferous: Cone-bearing plants with needle-shaped leaves.

Connate water: Water entrapped in the interstices of rocks during their formation; also called fossil water.

Convection: The uplift of air as a result of surface heating or instability due to other reasons. Generally this term refers to vertical movement of gases in contrast to advection.

Convection currents: Due to instability in air some vertical motions in the atmosphere are set up which are more or less in the form of currents.

Coral: A kind of rock formed of polyps forming reefs in the oceans.

Colour of the sky: Seems blue because of the selective scattering of light in the atmosphere by gases and dust particles.

Deciduous forest: Consists of trees that shed their leaves in the dry season.

Downs: Grasslands of Australia.

Denudation: Wearing away of rocks by various agencies like wind, water and ice (glaciers).

Eclipse: Partial or full obscuring of the moon when the earth comes between the sun and the moon is called lunar eclipse. It occurs usually on the day of the full moon.

A partial or complete obscuring of the sun because of the presence of the moon between the sun and the earth is called the solar eclipse and it occurs on the day of the new moon, that is, on the day the moon is not visible.
Ecliptic: The apparent track of the sun throughout the year as a result of the motion of the earth around it. The plane of the ecliptic is the plane passing through this path and is coincident with the plane of the earth's orbit.

Ecology: Studies of organisms in relation to their environment.

Edaphic: Relating to soil.

Eluviation: Removal of material in solution or suspension from the upper horizons of the soils to the lower.

Epicentre: Point on the surface of the earth vertically above the seismic focus or deep focus, that is, the point where an earthquake originates.

Estuary: Mouth of a river where tidal effects are evident and where fresh water and sea water mix. The term also refers to river valleys which have been flooded by sea due to coastal subsidence.

Eustatic movement: A large scale rise or fall of sea level.

Evapotranspiration: The term signifies total loss of water (moisture) from soil in the form of water vapour, including that lost by evaporation from open water bodies, the surface of rocks and also that lost by transpiration from growing plants.

Fathometer: Instrument used for measuring the depth of the ocean.

Fauna: The animal life of a region or a geological period.

Fiord: A glacial valley or part there of now under the sea.

Flood Plain: A plain bordering a river and formed by river deposition.

Flora: The plant life of a region or geological period.

Fluvial: Belonging or relating to a river.

Fog: A dense mass or small water drops or smoke or dust particles in the lower layers of the atmosphere.

Geosyncline: A large depression or trough in the earth's crust, that is, a syncline on a large scale.

Geyser: A thermal spring which throws up a jet of hot water and steam intermittently.

Glacier: A moving mass of ice.

Gorge: A narrow and deep valley of a river.

Great circle: A circle on the earth's surface whose plane passes through its centre and thus bisects it into two hemispheres.

Great circle route: A route between any two points on the earth's surface which follows the great circle between them.

Gulf: A large, deep bay.

Habitat: Natural environment of a plant or animal.

Halophyte: A plant which grows naturally in saline environment.

Hemisphere: One half of the earth's surface, formed when a plane passing through its centre bisects it.

Hinterland: Area from which a port gets most of its exports.

Horse latitudes: Subtropical belt of high pressure over the oceans.

Humidity: State of the atmosphere with respect to the water vapour it contains.

Humus: Decomposed and partly decomposed organic matter in the soil.

Hydrology: The study of the water content on the earth.

Hygrometer: Instrument used for measuring humidity in the atmosphere.

Hyrophyte: Plant growing in wetlands.

Iceberg: A mass of land ice which has been broken off or carved from the end of a glacier and is afloat in the sea.

Illuviation: Deposition, in the lower soil horizon, of material removed by eluviation from the upper horizons of the soil.

Insolation: Energy radiated from the sun received by the earth.

International date line: The line approximating to 180° East or West longitude, where the date changes by one day as it is crossed. The date is one day earlier east of this line.

Intertropical convergence zone or inter-tropical front: Zone of low atmospheric pressure near the equator where the northeast and southeast trade winds converge.

Intrazonal soil: Soil which has been influenced in its development, less by climate and vegetation than by factors like parent material and drainage.

Isopleth: Line drawn on the map along which the value of a particular phenomenon or product is uniform.

Isonomal: Isopleth of anomaly.

Isorithm: Any line representing continuous value on maps.

Isobars: Lines of equal pressure.

Isobaths: Lines of equal depth in sea.

Isobronts: Lines joining places experiencing a thunderstorm at the same time.

Isochrones: Lines joining places located at equal travel time from a common centre.

Isogonals: Lines joining places with same magnetic declination.

Isolines: Isopleths of salinity.

Isohels: Isopleths of equal amount of sunshine.

Isohyet: Isopleth of rainfall.

Isohypse or contour lines: Isopleths of elevation above sea level.

Isolat: Isopleth of amount of snow.

Isophene: Isopleth of seasonal phenomena, for example, flowering dates of plants.

Isopotential: Surface to which artesian water can rise.

Isorymes: Lines of equal frost.

Isoseismals: Lines of equal seismic activity.
Isotherms: Isoptoles of temperature.

Isthmus: A narrow strip of land joining two land masses, viz., the isthmus of Panama joining North and South America.

Karst region or Karstland: Limestone region in which most of the drainage is underground, the surface being dry and barren.

Katabatic wind: Local wind caused by the flow of air down mountain slopes and valleys.

Lagoon: Part of sea partially cut off from it by deposits of sand or coral, viz., Chilika Lake in Odisha.

Lapse rate: The rate of change of temperature in atmosphere with height; it is said to be positive when temperature decreases with height, as it normally does at night, and negative when temperature increases with height, as in temperature inversion.

Latitude: The angular distance of a point on the earth's surface north or south of the equator, as measured from the centre of the earth. Latitudinal lines are also called parallels of latitude.

Leaching: The process by which soluble substances are washed out of the upper layers of the soils into lower layers by percolating rainwater.

Leeward: The side or direction sheltered from the wind.

Light year: Distance travelled by light in one year, the speed being 186,000 miles per second. The unit is used for measuring the distance of stars from the earth.

Lithosphere: The solid crust of the earth.

Löss: A deposit of fine silt or dust generally held to have been transported to its present situation by wind.

Longitude: The angular distance measured along the equator, between the meridian through a given point and a standard or prime meridian.

Lunar month: The interval of time in which the moon makes one complete revolution around the earth-about 29.5 days.

Magnetic storms: Large, irregular variations or disturbances in the earth's magnetic field.

Meridian: A line of longitude, or half of one of the great circles that pass through the poles and cut the equator at right angles.

Mesophyte: A plant that requires a moderate amount of moisture. Most common trees and shrubs are mesophytes.

Mestizo: Offspring of a European and an American Indian—the term is used mostly in South America.

Meteors: Small pieces in the atmosphere appearing as shooting stars.

Midnight sun: A phenomenon observed in high latitudes around midsummer night cycle and may thus be visible even at midnight.

Monsoon: A type of wind system in which there is complete reversal or almost so, of prevailing wind direction from season to season.

Table: The debris or fragments of rock material brought down with the movement of glacier.

Mulatto: The offspring of a white and a black person, commonly used in America.

Nivation: Erosion due to action of snow.

Nomadism: The practice, among certain primitive people, of frequently changing their habitation. These people keep moving residence in search of food and fresh pasture for animals. People following this mode of life are called nomads.

Oasis: Area in the desert where water is available.

Ocean Current: Movement of the surface water of the ocean.

Opisometer: Instrument used for measuring distances on a map.

Orbit: Path of a heavenly body through space in relation to some selected point.

Orographic rain: Rain caused by mountains standing in the path of moisture-laden winds.

Outwash Plain: Alluvial plain formed by streams originating from the melting ice of a glacier.

Pampas: The mid-latitude grasslands of South America.

Pastoralism: Practice of breeding and rearing cattle. Some pastoral communities may be nomadic in their habits.

Pedology: The science of the study of soils.

Pelagic: Belonging to the open sea.

Peninsula: A stretch of land almost surrounded by water.

Perigee: The point in the orbit of moon or a planet or in the apparent orbit of the sun, nearest to the earth.

Perihelion: The position of the earth in its orbit or any other body, nearest to the sun.

Permafrost: Ground that is permanently frozen.

Petroleum: The study of the composition, structure and history of rocks forming the crust of the earth.

Phenology: Science dealing with the effects of seasonal changes upon animal and plant life.

Phytogeography: The study of the distribution of plants, on the earth, in relation to environment.

Piedmont: Belonging to or related to the foot of a mountain.

Planetary winds: The general distribution of winds throughout the lower atmosphere which is determined by differences in insolation and would be set up similarly on any rotating planet possessing an atmosphere.

Planimeter: Instrument for measuring irregular plane areas on maps.

Plateau: Extensive level or near level area of elevated land.

Prairies: Mid-latitude grasslands of North America.
Precipitation: Falling water (in liquid or solid form, as the case may be) from the atmosphere to the earth.

Pressure gradient: Rate at which pressure declines horizontally on the earth's surface.

Psychrometer: Instrument used for measuring humidity of the atmosphere.

Radiation: Process by which a body emits radiant energy, viz.—in the form of heat.

Rain shadow: Area having relatively lower average rainfall because it is sheltered from the prevailing rain-bearing winds by a range of mountains or hills.

Reef: Ridge of rocks lying near the surface of the sea, which may be visible at low tide, but usually covered by water.

Reg: A stony desert. A sandy desert is called an erg.

Rhumb line or loxodrome: Line on the earth's surface which cuts all meridians at the same angle.

Saprophyte: A plant which lives on decaying organic matter. Most such plants are fungi.

Satellite: A relatively small body revolving around a planet.

Savanna: An area of tropical grassland with scattered trees.

Seismic focus or deep focus: Point below the earth's surface where an earthquake originates.

Seismograph: Instrument used for measuring and recording earthquake shocks.

Seismology: Science of the study of earthquakes.

Selvas: Dense equatorial forests of the Amazon basin in South America.

Sericulture: The culture of silkworms for production of raw silk.

Sidereal day: The period of time during which a star describes a complete circle in its apparent journey around the pole star, representing the period of one rotation of the earth on its axis and equal to 23 hours 56 minutes 4 seconds. It is thus about 4 minutes shorter than the mean solar day.

Sleet: Precipitation consisting of a mixture of snow and rain.

Smog: Fog heavily laden with smoke.

Snow-line: Lower limit of perpetual snow. The snow above this line does not melt completely even in summer.

Soil erosion: The wearing away and loss of soil mainly by the action of wind and water.

Solar constant: Intensity of the sun's radiation in space at the mean distance of the earth from the sun.

Solar day: The average period taken by the earth in making one rotation on its axis in relation to the sun-24 hours.

Solstice: The time during summer or winter when the sun is vertically above the point which represents its farthest distance north or south of the equator—the two tropics.

Steppe: Mid-latitude grasslands of Eurasia.

Strait: Narrow stretch of sea connecting two extensive areas of sea.

Syncline: Trough or inverted arch of a fold in rock strata.

Sublimation: Change of state of water from solid to vapour directly or vice-versa.

Taiga: Coniferous forestland of Siberia.

Temperature inversion: Condition when the temperature is found to be increasing instead of decreasing with height.

Theodolite: Instrument used for measuring angular distances in the vertical plane (elevation) and the horizontal plane (azimuth).

Thermograph: Self-recording thermometer— Instrument for measuring temperature.

Tidal range: Average difference in water level between high and low tide at one place.

Topographic map: Map on sufficiently large scale to show the detailed surface features of an area.

Trans-humance: Practice among pastoral communities to move with their animals seasonally between two regions of different climate.

Tributary: Smaller river which joins a larger river.

Tropics: The Tropic of Cancer and the Tropic of Capricorn located at degrees N and S, respectively, are the northward and southward limits up to which the sun's vertical rays can reach.

Tropical Zone: The area bounded by the two tropics is called the tropical zone.

Troposphere: A plant which acts as hygrophyte in one season and xerophyte in the other.

Tsunami: A large sea wave caused by an earthquake originating on the sea bed.

Van Allen's Radiation Belts: Named after the physicist who discovered them, these are two bands of the outermost layer of the atmosphere (magnetosphere), at heights of 3,000 and 16,000 km above the earth's surface. Here the ionized particles trapped by the earth's magnetic field from the solar radiation, concentrate.

Viticulture: The culture of grape-vine.

Volcano: Vent in the earth's crust caused by magma forcing its way to the surface through which molten or solid rock flow from the interior of the earth.

Watershed: Elevated boundary line separating headstreams which are tributaries to different river systems or basins.

Weather: Condition of the atmosphere at certain time or over a certain period of time as described by meteorological phenomena including temperature, atmospheric pressure and humidity.

Weathering: Decay and disintegration of rocks of the earth's crust by exposure to the atmosphere; it is one of the main processes of denudation.

Willy-willy: Tropical cyclone in the Pacific near the east coast of Australia.
Indian Polity and Constitution

Constitution: Constitution is the foundational law of a country which ordains the fundamental principles on which the government (or the governance) of that country is based. It lays down the framework and principal functions of various government and its citizens. With the exception of the United Kingdom (U.K.), almost all democratic countries possess a written constitution. India also possesses an elaborate written constitution which was enacted by a constituent assembly specifically set up for the purpose.

Our Constitution: Our present constitution—the first Constitution of India framed and given to themselves by the people of India was adopted by the Constituent Assembly on 26 November, 1949. It came into full operation with effect from 26 January, 1950. The Constitution as originally adopted had 22 parts, 395 articles and 8 schedules. Its present text is as amended from time to time.

1. Evolution of Indian Constitution

Although the systems of ancient India do have their reflections in the Constitution of India, the direct sources of the Constitution lie in the administrative and legislative developments of the British period. A concise and chronological description of the Acts, documents and events that culminated in the framing of the world’s largest written Constitution is given here.

Administrative & Legislative Reforms Before 1857

Regulating Act of 1773
- This Act was based on the report of a committee headed by the British Prime Minister Lord North.
- Governance of the East India Company was put under British parliamentary control.
- The Governor of Bengal was nominated as Governor General for all the three Presidencies of Calcutta, Bombay and Madras. Warren Hastings was the first such Governor General.
- A Supreme Court was established in Calcutta (now Kolkata).
- Governor General was empowered to make rules, regulations and ordinances with the consent of the Supreme Court.

Facts India Act of 1784
- It was enacted to improve upon the provisions of Regulating Act of 1773 to bring about better discipline in the Company’s system of administration.
- A 6-member Board of Controllers was set up which was headed by a minister of the British Government. All political responsibilities were given to this board.
- Trade and commerce related issues were under the purview of the Court of Directors of the company.
- Provinces had to follow the instructions of the Central Government, and Governor General was empowered to dismiss the failing provincial government.
Charter Act of 1793
- Main provisions of the previous Acts were consolidated in this Act.
- Provided for the payment of salaries of the members of the Board of Control from Indian revenue.
- Courts were given the power to interpret rules and regulations.

Charter Act of 1813
- Trade monopoly of the East India Company came to an end.
- Powers of the three Councils of Madras, Bombay and Calcutta were enlarged, they were also subjected to greater control of the British Parliament.
- The Christian Missionaries were allowed to spread their religion in India.
- Local autonomous bodies were empowered to levy taxes.

Charter Act of 1833
- The Governor General and his Council were given vast powers. This Council could legislate for the whole of India subject to the approval of the Board of Control.
- The Council got full powers regarding revenue, and a single budget for the country was prepared by the Governor General.
- The East India Company was reduced to an administrative and political entity and several Lords and Ministers were nominated as ex-officio members of the Board of Control.
- For the first time the Governor-General’s Government was known as the ‘Government of India’ and his Council as the ‘Indian Council’.

Charter Act of 1853
- This was the last of the Charter Acts and it made important changes in the system of Indian legislation.
- This Act followed a report of the then Governor General Dalhousie for improving the administration of the company.
- A separate Governor for Bengal was to be appointed.
- Legislative and administrative functions of the Council were separately identified.
- Recruitment of the Company’s employees was to be done through competitive exams.
- British Parliament was empowered to put Company’s governance of India to an end at any suitable time.

Administrative & Legislative Reforms After 1857

Government of India Act, 1858
- British Crown decided to assume sovereignty over India from the East India Company in an apparent consequence of the Revolt of 1857, described as an armed sepoys mutiny by the British historians and remembered as the First War of Independence by the Indians.
- The first statute for the governance of India, under the direct rule of the British Government, was the Government of India Act, 1858.
- It provided for absolute (British) imperial control over India without any popular participation in the administration of the country.

Indian Polity and Constitution

Charter Act of 1833
- The powers of the crown were to be exercised by the Secretary of State for India, assisted by a council of fifteen members, known as the Council of India.
- The country was divided into provinces headed by a Governor or Lieutenant Governor aided by his Executive Council.
- The Provincial Governments had to function under the superintendence, direction and control of the Governor General in all matters.
- All the authority for the governance of India was vested in the Governor General in Council who was responsible to the Secretary of State.
- The Secretary of State was ultimately responsible to the British Parliament.

Indian Councils Act, 1861
- This is an important landmark in the constitutional history of India. By this Act, the powers of the crown were to be exercised by the Secretary of State for India, assisted by a council of fifteen members (known as the Council of India). The Secretary of State, who was responsible to the British Parliament, governed India through the Governor General, assisted by an Executive council.
- This Act enabled the Governor General to associate representatives of the Indian people with the work of legislation by nominating them to his expanded council.
- This Act provided that the Governor General’s Executive Council should include certain additional non-official members also while transacting legislative business as a Legislative Council. But this Legislative Council was neither representative nor deliberative in any sense.
- It decentralised the legislative powers of the Governor General’s Council and vested them in the Governments of Bombay and Madras.

Indian Councils Act, 1892
- The non-official members of the Indian Legislative Council were to be nominated by the Bengal Chamber of Commerce and the Provincial Legislative Councils while the non-official members of the Provincial Councils were to be nominated by certain local bodies such as universities, district boards, municipalities, zamindars etc.
- The Councils were to have the power of discussing the Budget and addressing questions to the Executive.

Morley-Minto Reforms and the Indian Councils Act, 1909
- Reforms recommended by the then Secretary of States for India (Lord Morley) and the Viceroy (Lord Minto) were implemented by the Indian Councils Act, 1909.
- The maximum number of additional members of the Indian Legislative Council (Governor General’s Council) was raised from 16 (under the Act of 1892) to 60 (excluding the Executive Councillors).
- The size of Provincial Legislative Councils was enlarged by including elected non-official members so that the official majority was gone.
- An element of election was also introduced in the Legislative Council at the centre also but here the official majority there was maintained.
- The Legislative Councils were empowered to move resolutions on the Budget and on any matter of public interest, except certain specified subjects, such as the Armed forces, Foreign Affairs and the Indian States.
Indian Polity and Constitution

The Government of India Act, 1915

- This act was passed to consolidate the provisions of the preceding Government of India Acts.
- Responsible Government in the Provinces was to be introduced, without impairing the responsibility of the Governor (through the Governor General) for the administration of the Province, by resorting to devices known as ‘Dyarchy’ or dual government.
- The subjects of administration were to be divided into two categories, Central and Provincial.
- Central subjects were those which were exclusively kept under the control of the Central Government.
- The provincial subjects were sub-divided into ‘transferred’ and ‘reserved’ subjects.
- The transferred subjects were to be administered by the Governor with the aid of Ministers responsible to the Legislative Council in which the proportion of elected members was raised to 70 per cent.
- The reserved subjects were to be administered by the Governor and his Executive Council with no responsibility to the Legislature.
- The previous Central control over the provinces in administrative, legislative and financial matters was relaxed. Sources of revenue were divided into two categories so that the provinces could run the administration with the revenue raised by the provinces themselves.
- The provincial budget was separated from the central budget.
- The provincial legislature was empowered to present its own budget and levy its own taxes relating to the provincial sources of revenue.
- The Central Legislature, retained power to legislate for the whole country on any subject.
- The control of the Governor General over provincial legislation was retained by providing that a Provincial Bill, even though assented to by the Governor, would become law only when assented to also by the Governor General.
- The Governor was empowered to reserve a Bill for the consideration of the Governor General if it was related to some specified matters.
- The Governor General in Council continued to remain responsible only to the British Parliament through the Secretary of State for India.
- The Indian Legislature was made more representative and, for the first time bi-cameral.
- The Upper House was named the Council of State. This was composed of 60 members of whom 34 were elected.
- The Lower House was named the Legislative Assembly. This was composed of about 144 members of whom 104 were elected.
- The electorates were arranged on a communal and sectional basis, developing the Morley-Minto device further.
- The Governor General’s overriding powers in respect of Central legislation were retained as follows:
  - (a) His prior sanction was required to introduce Bills relating to certain matters;
  - (b) he had the power to veto or reserve for consideration of the Crown any Bill he thought required such action;
  - (c) he had the power to certify Bills not passed by the Indian Legislature;
  - (d) he could make Ordinances, in case of emergency.

Simon Commission

- This commission, headed by Sir John Simon, constituted in 1927 to inquire into the working of the Act of 1919, placed its report in 1930. The report was examined by the British Parliament and the Government of India Bill was drafted accordingly.

The Government of India Act, 1935

- The Act of 1935 provided a federation, taking the Provinces and the Indian States (native states) as units.
- It was optional for the Indian States to join the Federation, and since they never joined, the Federation never came into being.
- The Act divided legislative powers between the Centre and Provinces.
- The executive authority of a Province was also exercised by a Governor on behalf of the Crown and not as a subordinate of the Governor General.
- The Governor was required to act with the advice of Ministers responsible to the Legislature.
- In certain matters, the Governor was required to act ‘in his discretion’ without ministerial advice and under the control and directions of the Governor General, and, through him, of the Secretary of State.
- The executive authority of the Centre was vested in the Governor General (on behalf of the Crown).
- Counsellors or Council of Ministers responsible to the Legislature was not appointed although such provisions existed in the Act of 1935.
- The Central Legislature was bi-cameral, consisting of the Federal Assembly and the Council of State.
- In six provinces, the legislature was bi-cameral, comprising a Legislative Assembly and a Legislative Council. In other provinces, the Legislature was uni-cameral.
- Apart from the Governor General’s power of veto, a Bill passed by the Central Legislature was also subject to veto by the Crown.
- The Governor General could prevent discussion in the Legislature and suspend the proceedings on any Bill if he was satisfied that it would affect the discharge of his special responsibilities.
- The Governor General had independent powers of legislation, concurrently with those of the Legislature.
On some subjects no bill or amendment could be introduced in the legislature without the Governor General's previous sanction.

A three-fold division in the Act of 1935—There was a Federal List over which the Federal Legislature had exclusive powers of legislation. There was a Provincial List of matters over which the Provincial Legislature had exclusive jurisdiction. There was a Concurrent List also over which both the Federal and Provincial Legislatures had competence.

The Governor General was empowered to authorise either the Federal or the Provincial Legislature to enact a law with respect to any matter which was not enumerated in the above noted Legislative Lists.

Dominion Status, which was promised by the Simon Commission in 1929, was not conferred by the Government of India Act, 1935.

Cripps Mission

In March 1942, Sir Stafford Cripps, a member of the British cabinet came with a draft declaration on the proposals of the British Government.

These proposals were to be adopted at the end of the Second World War provided the Congress and the Muslim League could accept them.

According to the proposals:

★ The Constitution of India was to be framed by an elected Constituent Assembly by the Indian people.
★ The Constitution should give India Dominion Status.
★ There should be one Indian Union comprising all the Provinces and Indian States.
★ Any Province (or Indian State) not accepting the Constitution would be free to retain its constitutional position existing at that time and with such non-accepting Provinces the British Government could enter into separate Constitutional arrangements.

Cabinet Mission Plan

In March 1946, Lord Attlee sent a Cabinet Mission to India consisting of three Cabinet Ministers, namely Lord Pethick Lawrence, Sir Stafford Cripps and Mr. A.V. Alexander.

The object of the Mission was to help India achieve its independence as early as possible, and to set up a Constituent Assembly.

The Cabinet Mission rejected the claim for a separate Constituent Assembly and a separate State for the Muslim.

According to Cabinet Mission Plan there was to be a Union of India, comprising both British India and the States, and having jurisdiction over the subjects of Foreign Affairs, Defence and Communication. All residuary powers were to be vested in the Provinces and the States.

The Union was to have an Executive and a Legislature consisting of representatives of the Provinces and the States.

Any decision involving a major communal issue in the legislature was to require present and voting as well as a majority of all the members present and voting, group could be competent to determine the provincial subjects.

The Mountbatten Plan

The plan for transfer of power to the Indians and partition of the country was laid down in the Mountbatten Plan.

It was given a formal shape by a statement made by the British Government on 3rd June, 1947.

The Indian Independence Act, 1947 of the British Parliament

In pursuance of this Act, the Government of India Act, 1935, was amended by the Adaptation Orders, both in India and Pakistan, for setting up an interim Constituent Assembly to draft the future Constitution of the country.

From the 15th August, 1947 India ceased to be a Dependency, and the suzerainty of the British Crown over the Indian States and the treaty relations with Tribal Areas lapsed from that date.

The office of the Secretary of State for India was abolished.

The Governor-General and the Governors lost extraordinary powers of legislations to compete with the Legislature.

The Central Legislative of India, composed of the Legislative Assembly and the Council of States, ceased to exist on August 14, 1947.

The Constituent Assembly itself was to function also as the Central Legislature with complete sovereignty.

2. Constituent Assembly and Making of the Constitution

The Cabinet Mission envisaged the establishment of a Constituent Assembly to frame a Constitution for the country. Members of the Constituent Assembly were elected by the Provincial Legislative Assemblies.

Each Province and each Indian State were allotted seats in proportion of its population, roughly in the ratio of one to a million. The seats so ascertained were distributed among the main communities in each Province. The main communities recognised were Sikh, Muslim and General.

Important Committees of the Constituent Assembly and their Chairman

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Name of the Committee</th>
<th>Chairman</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Committee on the Rules of Procedure</td>
<td>Dr. Rajendra Prasad</td>
</tr>
<tr>
<td>2.</td>
<td>Steering Committee</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Finance and Staff Committee</td>
<td>Pt. Jawaharlal Nehru</td>
</tr>
<tr>
<td>4.</td>
<td>Ad hoc Committee on the National Flag</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Union Constitution Committee</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Union Powers Committee</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>State Committee</td>
<td>Sardar Vallabhbhai Patel</td>
</tr>
<tr>
<td>8.</td>
<td>Advisory Committee on Fundamental Rights, Minorities and Tribal and Excluded Areas</td>
<td>Dr. B.R. Ambedkar</td>
</tr>
<tr>
<td>9.</td>
<td>Drafting Committee</td>
<td>Alladi Krishnaswami Ayyar</td>
</tr>
<tr>
<td>10.</td>
<td>Credential Committee</td>
<td>B.Pattabhi Sitaramayya</td>
</tr>
<tr>
<td>11.</td>
<td>House Committee</td>
<td>K. M. Munshi</td>
</tr>
<tr>
<td>12.</td>
<td>Order of Business Committee</td>
<td></td>
</tr>
<tr>
<td>SL</td>
<td>Name of the Committee</td>
<td>Chairman</td>
</tr>
<tr>
<td>----</td>
<td>---------------------------------------------------------------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>13</td>
<td>Committee on the Functions of the Constituent Assembly</td>
<td>G. V. Mavalankar</td>
</tr>
<tr>
<td>14</td>
<td>Minorities Sub-Committee</td>
<td>H. C. Mookherjee</td>
</tr>
<tr>
<td>15</td>
<td>Fundamental Rights Sub-Committee</td>
<td>J. B. Kripalani</td>
</tr>
<tr>
<td>16</td>
<td>North-East Frontier Tribal Areas and Assam Excluded &amp; Partially Excluded Areas Sub-Committee</td>
<td>Gopinath Bardoloi</td>
</tr>
<tr>
<td>17</td>
<td>Excluded and Partially Excluded (areas other than A. V. Thakkar those in Assam) Sub-Committee</td>
<td>A. V. Thakkar</td>
</tr>
</tbody>
</table>

The total number of members of the Constituent Assembly was 385, of whom 93 were representatives from the Indian States and 292 from the Provinces (British India).

After the partition of India number of members of the Constituent Assembly came to 299, of whom 284 were actually present on the 26th November, 1949 and signed on the finally approved Constitution of India. The Constituent Assembly, which had been elected for undivided India, held its first meeting on December 9, 1946, and reassembled on August 14, 1947, as the sovereign Constituent Assembly for the dominion of India.

It took two years, eleven months and eighteen days for the Constituent Assembly to finalise the Constitution.

Objective Resolution was moved in the first session of the Constituent Assembly (on 13 December, 1946) by Pt. Jawahar Lal Nehru which was adopted after considerable deliberation and debate in the Assembly on 22 January, 1947. The following objectives were embodied in the resolution:

- To foster unity of the Nation and to ensure its economic and political security, to have a written Constitution, and to proclaim India as a Sovereign Democratic Republic.
- To have a federal form of Government with the distribution of powers between the centre and states.
- To guarantee and secure justice, equality, freedom of thought, expression, belief, faith, worship, vocation, association and action to all the people of India.
- To provide adequate safeguards for minorities, backward and tribal areas and depressed and other backward classes.
- To maintain the integrity of the territory of the republic and its sovereign rights on land, sea and air according to justice and the law of civilised nations.
- To attain rightful and honoured place in the world and make its full and willing contribution to the promotion of the world peace and the welfare of mankind.

The principles of the Constitution were outlined by various committees of the Assembly, and there was a general discussion on the reports of these Ambedkar as the Chairman on August 29, 1947.

The Drafting Committee, headed by Dr. B. R. Ambedkar, submitted a Draft constitution of India to the President of the Assembly on 21 February, 1948.

The members of the Drafting Committee were N. Gopalswamy Ayyangar, Alladi Krishnaswamy Ayyar, K. M. Munshi, Mohd. Saadullah, B. L. Mitter (later replaced by N. Madhava Rao), Dr. D. P. Khaitan (replaced on death by T. T. Krishnamachari).

The third and final reading of the draft was completed on November 26, 1949. On this date, the signature of the President of the Assembly was appended to it and the Constitution was declared as passed.

The provisions relating to citizenship, elections and provisions of Parliament etc. were implemented with immediate effect, that is, from the 26th November, 1949.

3. Different Sources of the Indian Constitution

Although the skeleton of the constitution was derived from the Government of India Act 1935, many provisions were imported from other constitutions of the world. Some of them are listed below along with the Government of India Act, 1935:

- Constitution of India Act, 1935: This Act formed the basis or 'blueprint' of the constitution of India with the features of Federal system, office of Governor, emergency powers etc. Besides, the Constitution of India has borrowed from the:
  - Constitution of Britain: Law making procedures, Rule of Law, Single citizenship, Bi-cameral Parliamentary system, office of CAG.
  - Constitution of USA: Independence of judiciary, judicial review, fundamental rights, removal of Supreme Court and High Court judges, Preamble and functions of President and Vice-president.
  - Constitution of Canada: Federation with strong Centre, to provide residiary powers to the Centre, Supreme Court's advisory jurisdiction.
  - Constitution of South Africa: Amendment with 2/3rd majority in Parliament and election of the Members of Rajya Sabha on the basis of proportional representation.

4. Important Articles of the Constitution

<table>
<thead>
<tr>
<th>Articles</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I</td>
<td>Art. 1-4 The Union and its territory.</td>
</tr>
<tr>
<td>Part II</td>
<td>Art. 5-11 Citizenship</td>
</tr>
</tbody>
</table>


Part III  Fundamental Rights
Art. 12  Definition
Art. 13  Laws inconsistent with or in derogation of the fundamental rights

Right to Equality
Art. 14  Equality before law
Art. 15  Prohibition of discrimination on grounds of religion, race, caste, sex or place of birth
Art. 16  Equality of opportunity in matters of public employment
Art. 17  Abolition of untouchability
Art. 18  Abolition of titles

Right to Freedom
Art. 19  Protection of certain rights regarding freedom of speech etc.
Art. 20  Protection in respect of conviction for offences
Art. 21  Protection of life and personal liberty
21A  Right to education
Art. 22  Protection against arrest and detention in certain cases

Right against Exploitation
Art. 23  Prohibition of traffic in human beings and forced labour
Art. 24  Prohibition of employment of children in factories etc.

Right to Freedom of Religion
Art. 25  Freedom of conscience and free profession, practice and propagation of religion
Art. 26  Freedom to manage religious affairs
Art. 27  Freedom as to payment of taxes for promotion of any particular religion
Art. 28  Freedom as to attendance at religious instruction or religious worship in certain educational institutions

Cultural and Educational Rights
Art. 29  Protection of interests of minorities
Art. 30  Right of minorities to establish and administer educational institutions

Saving of certain Laws
Art. 31A  Saving of laws providing for acquisition of estates etc.
Art. 31B  Validation of certain Acts and Regulations
Art. 31C  Saving of laws giving effect to certain directive principles

Right to Constitutional Remedies
Art. 32  Remedies for enforcement of rights conferred by this Part
Art. 33  Power of Parliament to modify the rights conferred by this Part in their application to Forces etc.
Art. 34  Restriction on rights conferred by this Part while martial law is in force in any area
Art. 35  Legislation to give effect to the provisions of this Part

Part IV  Directive Principles of State Policy
Art. 36  Definition

Part IVA  Art. 51A Fundamental Duties

Part V  The Union

Chapter-I : The Executive
Art. 52  The President of India
Art. 53  Executive power of the Union
Art. 54  Election of President
Art. 61  Procedure for impeachment of the President
Art. 63  The Vice-President of India
Art. 64  The Vice-President to be ex-officio Chairman of the Council of States
Art. 65  The Vice-President to act as President or to discharge his functions during casual vacancies in the office, or during the absence of President
Art. 66  Election of Vice-President
Art. 72  Power of President to grant pardons etc. and to suspend, remit or commute sentences in certain cases
Art. 74  Council of Ministers to aid and advise President
Art. 76  Attorney General for India
Chapter II: Parliament

Art. 79 Constitution of Parliament
Art. 80 Composition of the Council of States (Rajya Sabha)
Art. 81 Composition of the House of the People (Lok Sabha)
Art. 82 Duration of Houses of Parliament
Art. 83 Qualification for membership of Parliament
Art. 84 Sessions of Parliament, prorogation and dissolution
Art. 85 Right of President to address and send messages to Houses
Art. 86 Special address by the President
Art. 87 Rights of Ministers and Attorney General as respects Houses
Art. 88 The Chairman and Deputy Chairman of the Council of States
Art. 89 Vacation and resignation of, and removal from, the office of Deputy Chairman
Art. 90 The Speaker and Deputy Speaker of the House of the People
Art. 91 Vacation and resignation of, and removal from, the offices of Speaker and Deputy Speaker
Art. 92 Power of the Deputy Speaker or other person to perform the duties of the office of, or to act as, Speaker
Art. 93 Secretariat of Parliament
Art. 94 Oath or affirmation by members
Art. 95 Voting in Houses, power of Houses to act notwithstanding vacancies and quorum
Art. 96 Powers, privileges etc of the Houses of Parliament and of the members and committees thereof
Art. 97 Salaries and allowances of members
Art. 98 Provisions as to introduction and passing of Bills
Art. 99 Joint sitting of both Houses in certain cases
Art. 100 Special procedure in respect of Money Bills
Art. 101 Definition of 'Money Bills'
Art. 102 Assent to Bills
Art. 103 Annual financial statement (Budget)
Art. 104 Procedure in Parliament with respect to estimates
Art. 105 Appropriation Bills
Art. 106 Supplementary, additional or excess grants
Art. 107 Votes on account, votes of credit and exceptional grants
Art. 108 Rules of procedure
Art. 109 Regulation by law of procedure in Parliament in relation to financial business
Art. 110 Language to be used in Parliament
Art. 111 Restriction on discussion in Parliament
Art. 112 Courts not to inquire into proceedings of Parliament

Chapter III: Legislative Powers of the President

Art. 113 Power of President to promulgate Ordinances during recess of Parliament

Chapter IV: The Union Judiciary

Art. 124 Establishment and Constitution of Supreme Court
Art. 125 Salaries etc. of Judges
Art. 126 Appointment of acting Chief Justice
Art. 127 Appointment of ad hoc Judges
Art. 128 Attendance of retired Judge at sittings of the Supreme Court
Art. 129 Supreme Court to be a Court of record
Art. 130 Seat of Supreme Court
Art. 131 Original jurisdiction of Supreme Court
Art. 132 Appellate jurisdiction of Supreme Court in appeals from High Court in certain cases
Art. 133 Appellate jurisdiction of Supreme Court in appeals from High Court in regard to civil matters
Art. 134 Appellate jurisdiction of Supreme Court in regard to criminal matters
Art. 135 Certificate for appeal to the Supreme Court
Art. 136 Jurisdiction and powers of the Federal Court under existing law to be exercisable by the Supreme Court
Art. 137 Special leave to appeal by the Supreme Court
Art. 138 Review of judgements or orders by the Supreme Court
Art. 139 Enlargement of the jurisdiction of the Supreme Court
Art. 141 Law declared by Supreme Court to be binding on all Courts
Art. 142 Power of President to consult Supreme Court
Art. 143 Civil and judicial authorities to act in aid of the Supreme Court

Chapter V: Comptroller and Auditor-General of India

Art. 144 Comptroller and Auditor-General of India
Art. 145 Duties and powers of the Comptroller and Auditor-General

Part VI: The States


Part VII: The Union Territories

Art. 239-241 The Union Territories

Part VIII: The Panchayats

Art. 243-245 The Panchayats

Part IX: The Municipalities

Art. 243-P to 243-ZG The Municipalities

Part IXA: The Co-operative Societies

Art. 243-ZH to 243-ZT The Co-operative Societies

Part X: The Scheduled and Tribal Areas

Art. 244-244A The Scheduled and Tribal Areas

Part XI: Relations between The Union and the States

Art. 245-263 Relations between The Union and the States
Part XII  Art. 264-300 Finance, property, contracts and suits; Distribution of revenue between Union and States; Finance Commission; Borrowing Property, Contracts, Rights, Liabilities, Obligations and Suits
Part XIII  Art. 301-307 Trade, commerce and intercourse within India
Part XIV  Services Under The Union and The States
Part XV  Art. 309 Recruitment and conditions of service of persons serving the Union or a State
Art. 310 Tenure of office of persons serving the Union or a State
Art. 311 Dismissal, removal or reduction in rank of persons employed in civil capacities under the Union or a State
Art. 312 All-India Services
Art. 315 Public Service Commissions for the Union and for the States
Art. 316 Appointment and term of office of members
Art. 317 Removal and suspension of a member of a Public Service Commission
Art. 318 Power to make regulations as to conditions of service of members and staff of the Commission
Art. 320 Functions of Public Service Commissions
Art. 321 Power to extend functions of Public Service Commissions
Art. 323 Reports of Public Service Commissions
Part XIV A  Art. 323A-323B Tribunals
Part XV  Elections
Art. 324 Superintendence, direction and control of elections to be vested in an Election Commission
Art. 325 No person to be ineligible for inclusion in, or to claim to be included in a special electoral roll on grounds of religion, race, caste or sex
Art. 326 Elections to the House of the People and to the Legislative Assemblies of States to be on the basis of adult suffrage
Art. 327 Power of Parliament to make provision with respect to elections to legislatures
Art. 328 Power of Legislature of a State to make provision with respect to elections to such Legislature
Art. 329 Bar to interference by Courts in electoral matters
Part XVI  Art. 330-342 Special provisions for certain classes
Part XVII  Art. 343-351 Official languages
Part XIX  Miscellaneous
Art. 361A Protection of publication of proceedings of Parliament and State Legislatures
Art. 363 Bar to interference by courts in disputes arising out of certain treaties agreements etc.
Art. 363A Recognition granted to Rulers of Indian States to cease and give up purses to be abolished
Art. 364 Special provisions as to major ports and aerodromes

Schedules of the Indian Constitution

The Constitution of India at the time of its adoption had only eight Schedules to which four more were added during the succeeding sixty-five years.

1st Schedule  28 States and 7 Union Territories with Territorial demarcations

2nd Schedule
Part 'A'  Salary and emoluments of the President and Governors of the States
Part 'B'  Omitted
Part 'C'  Salary and emoluments of the Speaker/Deputy Speaker or Chairman/Vice Chairman of the Lok Sabha, Rajya Sabha and State Legislative Assemblies or Councils.
Part 'D'  Salary and emoluments of the judge of the Supreme Court and High Courts
Part 'E'  Salary and emoluments of the Comptroller and Auditor General of India

3rd Schedule  Forms of oath and affirmations of members of legislatures, ministers and judges.

4th Schedule  Allocation of seats to States and Union Territories in the Rajya Sabha.

5th Schedule  Administration and control of Scheduled Areas and STs.

6th Schedule  Administration of Tribal Areas of North-Eastern States

7th Schedule  Distribution of power between the Union and the State Government. (Union List, State List and Concurrent List)

8th Schedule  Description of 22 languages recognised by the Constitution.

9th Schedule  Validation of certain Acts and Regulations

10th Schedule  Provisions as to disqualification on ground of defection (Anti-defection Law introduced by the 52nd Constitutional Amendment Act). This Schedule followed latest developments by 91st amendment to the constitution in 2003.

11th Schedule  Powers, authority and responsibilities of Panchayats, 29 subjects over which the Panchayats have jurisdiction (refer to the 73rd Constitutional Amendment Act).

12th Schedule  Powers, authority and responsibilities of Municipalities, 18 subjects over which the Municipalities have jurisdiction (refer to the 74th Constitutional Amendment Act).
5. Some important Amendments of the Constitution

1st Constitutional Amendment Act, 1951: This amendment added Article 15(6) and Article 19(6) and brought changes in the right to private property in pursuance with the decision of Supreme Court concerning fundamental rights. Ninth schedule to the Constitution was also added by it.

7th Constitutional Amendment Act, 1956: Through this amendment the implementation of State Reorganization Act, was made possible. The categories of States into Part A, Part B and Part C ceased henceforth. Part C states were redesignated as Union Territories. The seats in the Rajya Sabha and in the Union and State Legislatures were reallocated. It also effected changes regarding appointment of additional and acting judges, High Courts and their jurisdictions etc.

10th Constitutional Amendment Act, 1961: Incorporated Dadra and Nagar Haveli as Union Territory.

12th Constitutional Amendment Act, 1962: Inclusion of territories of Goa, Daman and Diu into the Indian Union.


14th Constitutional Amendment Act, 1962: Pondicherry, Karaikal, Mahé and Yemnapady, the former French territories, were specified in the Constitution as the Union Territory of Pondicherry (now Puducherry). Enabled the UTs of Himachal Pradesh, Manipur, Tripura, Goa, Daman and Diu and Pondicherry to have Legislatures and Councils of Ministers.

15th Constitutional Amendment Act, 1963: It raised the age of retirement of a High Court Judge from 60 to 62. Extended the jurisdiction of a High Court to issue writs under Art. 226 to a Government or authority situated outside its territorial jurisdiction where the cause of action arises within such jurisdiction.

16th Constitutional Amendment Act, 1963: Changes were effected in Art. 19 to enable the Parliament to make laws providing reasonable restrictions on the freedom of expression in larger interests of sovereignty and integrity of India. Amendments were made in the form of oath contained in the third Schedule with emphasis on upholding the sovereignty and integrity of India.

19th Constitutional Amendment Act, 1966: Art. 324 was amended to clarify the duties of the Election Commission. It deprived the Election Commission of the power to appoint election tribunals for deciding election disputes of members of Parliament and State Legislatures.

21st Constitutional Amendment Act, 1967: Sindhi language was included as 15th regional language in the Eighth Schedule.

24th Constitutional Amendment Act, 1971: It was a retaliatory act of the parliament’s power to amend any part of the Constitution, including Fundamental Rights by amending Art. 368 and 13. It made obligatory for the President to give assent to Amendment Bills, when they are presented to him/her.

25th Constitutional Amendment Act, 1971 (came into force on 20.04.1972): Inadequacy of Compensation. This amendment came primarily in the wake of the Bank Nationalisation case and the word ‘amount’ was substituted in place of ‘compensation’ in Article 31.

It also provided that no law passed by the State to give effect to Directive Principles specified under clauses (b) and (c) of Art. 39 can be declared void on the ground that it was inconsistent with Fundamental Rights conferred by Arts. 14, 19 and 31.

26th Constitutional Amendment Act, 1971: This amendment withdrew the recognition to the rulers of Princely States and their privy purses were abolished.

30th Constitutional Amendment Act, 1972 (w.e.f. 27.02.1973): It provided that only such appeals can be brought to the Supreme Court which involve a substantial question of law. The valuation aspect of Rs. 20,000 for appeals in civil cases to the Supreme Court was abolished.

31st Constitutional Amendment Act, 1973: By this amendment, the seats of the Lok Sabha was increased from 525 to 545 but reduced the representation of U.T.s in Lok Sabha from 25 to 20.

35th Constitutional Amendment Act, 1974 (w.e.f. 01.03.1975): Acceded status of Associate State to Sikkim by ending its protectorate kingdom status which was a novel concept introduced in the Constitution.

36th Constitutional Amendment Act, 1975: Made Sikkim a full fledged State of the Union of India.

38th Constitutional Amendment Act, 1975: Clarified that declaration of emergency by the President and promulgation of Ordinance by the President or Governor cannot be challenged in any Court on any ground.

39th Constitutional Amendment Act, 1975: The disputes or questions regarding elections of President, Vice-President, Prime Minister and Speaker of Lok Sabha were taken out of the purview of judicial review of the Supreme Court or High Courts.

42nd Constitutional Amendment Act, 1976 (Mini Constitution): The 42nd Amendment made fundamental changes in the constitutional structure and it incorporated the words ‘SOCIALIST’, ‘SECULAR’ and ‘INTEGRITY’ in the Preamble. Fundamental Duties were added in Part IV-A. Directive Principles were given precedence over Fundamental Rights and any law made to this effect by the Parliament was kept beyond the scope of judicial review by the Court. It made the power of Parliament supreme so far as amendment to the Constitution was concerned. It authorised the Supreme Court to transfer certain cases from one High Court to another and redefined the writ jurisdiction of the High Courts. It provided for Administrative Tribunals for speedy justice. It empowered the Centre to deploy armed forces in any State to deal with the grave law and order situation. It authorised the President to make Proclamation of Emergency for any part of the country or to whole of India. It made it obligatory for the President to act on the advice of the Council of Ministers. Tenure of the Lok Sabha and the State Assemblies was increased by one year.

43rd Constitutional Amendment Act, 1977 (w.e.f. 13.04.1978): The 43rd Amendment omitted many articles inserted by 42nd Amendment. It restored the jurisdiction of the Supreme Court and the High Courts, which had been curtailed under the 42nd Amendment.

44th Constitutional Amendment Act, 1978 (w.e.f. June-September, 1979): The amendment was brought by the Janata Party Government which repealed
some of the changes effected by 42nd Amendment, omitted a few and provided alterations. Right to property was taken away from the list of Fundamental Rights. Proclamation of Emergency by the President could be questioned in a court. It brought the revocation of a Proclamation under Parliamentary control. In Article 356, the word ‘internal disturbance’ was replaced by the words ‘armed rebellion’. It authorised the President to refer back the advice of the Council of Ministers for reconsideration, but made it binding on the President. The power of the Court to decide disputes regarding the publication of proceedings of Parliament and State Legislatures was provided.

52nd Constitutional Amendment Act, 1985: This amendment was brought about during the Rajiv Gandhi regime with a view to put an end to political defections. It added a new Schedule to the Constitution containing the rules for disqualification in case of defection from the Parliament or State Legislature.

55th Constitutional Amendment Act, 1986 (w.e.f. 20.02.1987): The formation of Arunachal Pradesh took place with special powers given to the Governor. It also provided for a 30-member State Assembly.

57th Constitutional Amendment Act, 1987: Goa was made a full-fledged State with a State Assembly but Daman and Diu stayed as UT.

59th Constitutional Amendment Act, 1988: It provided for reservation of seats for Scheduled Tribes of Nagaland, Meghalaya, Mizoram and Arunachal Pradesh in the Lok Sabha. Seats were also reserved for the Scheduled Tribes of Nagaland and Meghalaya in the State Assembly.

58th Constitutional Amendment Act, 1987: An authoritative text of the Constitution in Hindi was provided to the people of India by the President.

60th Constitutional Amendment Act, 1988 (w.e.f. 28.03.1989): It brought about an amendment to Article 326 for the reduction of voting age from 21 to 18 years.

62nd Constitutional Amendment Act, 1989: It increased the period of reservation of seats provided to the Scheduled Castes and Scheduled Tribes for another 10 years i.e. up to 2000 A.D. The reservation for Anglo-Indians through the medium of education, was also extended up to 2000 A.D.

55th Constitutional Amendment Act, 1990 (w.e.f. 12.03.1992): A National Commission for Scheduled Castes and Scheduled Tribes with wide powers was provided to take care of the cause of SCs/STs.

66th Constitutional Amendment Act, 1990: This amendment was made to provide for the inclusion of 55 new land reform Acts passed by the States into the Ninth Schedule.

69th Constitutional Amendment Act, 1991 (w.e.f. 01.02.1992): Arts. 239-AA and 239-AB were inserted in the Constitution to provide for a National Capital Territory designation to Union Territory of Delhi with a legislative Assembly and Council of Ministers.

70th Constitutional Amendment Act, 1992: Altered Art. 54 and 368 to include members of legislative assemblies of Union Territories of Delhi and Pondicherry in the electoral college for the election of the President.

71st Constitutional Amendment Act, 1992: It included Manipuri, Konkani and Nepalese languages in the 8th Schedule.

72nd Constitutional Amendment Act, 1992 (w.e.f. 24.04.1993): The institution of Panchayati Raj received Constitutional guarantee, status and legitimacy. XIIth Schedule was added to deal with it. It also inserted part IX, containing Arts. 243P to 243ZG and the XIIIth Schedule which deals with the items concerning Municipalities.

77th Constitutional Amendment Act, 1995: By this amendment a new clause 4AA was added to Art. 16 which authorised the State to make provisions for Scheduled Castes and Scheduled Tribes with regard to promotions in Government jobs.

78th Constitutional Amendment Act, 1995: This amended the Ninth Schedule of the Constitution to insert 27 Land Reform Acts of various States. After this, the new number of Acts included in the Ninth Schedule went up to 284.

79th Constitutional Amendment Act, 1999: Amended Art. 334 to extend the reservation of seats for SCs/STs and Anglo-Indians in the Lok Sabha and in the State Legislative Assemblies up to 60 years from the commencement of the Constitution (i.e., till 2010).

80th Constitutional Amendment Act, 2000: Amended Art. 269 and substituted a new Article for Art. 270 and abolished Art. 272 of the Constitution. This was passed on the recommendation of the Tenth Finance Commission. This amendment was deemed to have come into operation from 1st April 1996. The Amendment widened the scope of the Central taxes and duties on the consignment of goods levied by the Government of India and distributed among States.

81st Constitutional Amendment Act, 2000: Amended Art. 16(1) of the Constitution and added a new clause (4-B) after clause (4-A) to Art. 16(1) of the Constitution. The new clause (4-B) ends the 50% ceiling on reservation for Scheduled Caste and Scheduled Tribes and other backward classes in the Lok Sabha and the Assembly.

82nd Constitutional Amendment Act, 2000: This amendment restored the relaxation in qualifying marks and standards of evaluation in both job reservation and promotions to Scheduled Caste and Scheduled Tribes which was set aside by a Supreme Court’s judgement in 1996.

84th Constitutional Amendment Act, 2001 (w.e.f. 21.02.2002): This amendment provided that till the publication of the relevant figures of the first census after 2026, the ascertainment of the population of a State for following purposes shall be made on the basis of the census shown against each of them:

> Election of the President under Art. 55—1971 census.
> Allotment of seats to each State in Lok Sabha—1971 census.
> Division of State into territorial Lok Sabha constituencies — 1991 census.
6. Some Special Features of the Indian Constitution

- The Constitution of India is the lengthiest and the most comprehensive of all the written Constitutions of the world.
- Originally the Constitution consisted of 395 Articles divided into 22 parts and 8 Schedules.
- Now it consists of about 442 Articles divided into 22 parts and 12 Schedules.
- Unlike the federal Constitutions of the USA and Australia the Indian Constitution lays down provisions relating to the Governmental machinery not only in the Centre but also in the States.
- The Indian Constitution provides for matters of administrative detail.
- The Constitution contains detailed provisions relating to Centre-State relations including the emergency provisions.
- Special status has been given to Jammu & Kashmir and some other states such as Nagaland, Mizoram, Assam, Gujarat etc.
- Under the Constitution the people of India are the ultimate sovereign.
- The Constitution of India establishes a parliamentary form of Government both at the Centre and in the States.
The Indian Constitution, though written, is sufficiently flexible.

The Constitution declares certain Fundamental Rights of the individual. It is a unique feature of the Indian Constitution that it makes the citizens' duties a part of the basic law of the land.

One of the most important and unique features of the Indian Constitution is the provisions of Directive Principles of State Policy to secure a truly welfare State.

The Indian Constitution distributes the legislative subjects on which the Parliament and State Legislature can enact laws under three lists viz. Union List, State List and Concurrent List.

The Indian Constitution unlike other federal Constitutions provides for a single unified judiciary with the Supreme Court at the apex, the High Courts in the middle and the Subordinate Courts at the bottom.

There are provisions in the Constitution to ensure independence of judiciary.

The Constitution of India has adopted a balance between the American system of Judicial Supremacy and the British principle of Parliamentary Supremacy.

The most remarkable feature of the Indian Constitution is that being a federal Constitution it acquires a unitary character during the time of emergency.

Under the Indian Constitution every adult above 18 years of age has been given the right to elect representatives for the legislature without prescribing any qualification based either on sex, property, education or the like.

A distinctive feature of the Indian Constitution is that it provides for the establishment of a Secular State. Regardless of their religious beliefs, all Indian citizens enjoy equal rights.

The State can not discriminate against anyone on the ground of religion or caste, nor can it compel anybody to pay taxes for the support of any particular religion.

The Indian Constitution has special reservation of seats for the Scheduled Castes and Tribes in public appointments and in educational institutions and in the Union and State Legislatures.

An outstanding feature of the Constitution is Panchayati Raj. The idea for organising village Panchayats was provided in the Constitution under Article 40 of Part IV which received Constitutional legitimacy through the 73rd Amendment to the Indian Constitution.

7. Federal and Unitary Features of the Indian Union

India is different from the United States of America because in United States the federation is based on an agreement between different States, and the States have the right to secede from the Union.

The Indian Constitution has the features both of a federal and unitary forms of Government.

Federal features

* Distribution of powers between Union and the States has been made as per the three lists.
* The Union Government as well as the State Governments have to function strictly in accordance with the Constitution. They can neither alter the distribution of powers nor override the dictates of the Constitution. An amendment to it must be passed by the Parliament and if an amendment affects the federal structure it must be ratified by at least half the State Legislatures.
* Like other federal states our country also has an independent Judiciary as an essential feature.

Unitary features of the Indian Constitution

* In a federation, people enjoy dual citizenship, that of the Centre and of the State to which they belong. But the Indian Constitution provides every Indian with single citizenship.
* The most important subjects are included in the Union List which has been allocated to the centre.
* The centre can legislate on the subjects in the concurrent list.
* Residual powers belong to the Centre.
* Single Constitutional Framework has been provided for the Centre as well as for the State.
* The proclamation of National emergency can immediately turn the federal system of India into a Unitary one.
* In a federation, each State should get equal representation irrespective of its size or population. But in the Rajya Sabha in India, States are represented on the basis of population. Besides, the President has the power to nominate twelve members to the Rajya Sabha.
* The Governors of the States are appointed by the President and they continue to hold office only during his pleasure.
* The Indian Constitution provides for single judiciary, a single system of civil and criminal law and command All India Services.
* The authority of the Comptroller and Auditor-General and the Chief Election Commissioner uniformly prevails over the Union as well as States.

8. The Preamble

The Preamble to the Constitution states the object which the Constitution seeks to establish and promote, and also aids the legal interpretation of the Constitution where the language is found ambiguous.

The ideals embodied in the Objectives Resolution is faithfully reflected in the Preamble to the Constitution, which, as amended in 1976, summaries the aims and objects of the Constitution.

Text of the Preamble: “We, the People of India having solemnly resolved to constitute India into a Sovereign Socialist Secular Democratic Republic and to secure to all citizens Justice, social, economic and political; Liberty of thought, speech, and faith and worship; Equality of status and of opportunity; and expression, belief, faith and worship None shall at any time subject any citizen to religion or caste and the State shall have power to prevent the incitement of enmity or hatred towards any citizen by religious, racial, caste, community or autres this constitution.”
9. Lapse of Paramountcy

When the Indian Independence Act 1947 was passed, it declared the lapse of suzerainty (paramountcy) of the crown, in sec. 7(1)(b) of the Act.

As from the appointed day—the suzerainty of His Majesty over the Indian States lapses, and with it, all treaties and agreements in force at the date of the passing of this Act between His Majesty and the rulers of Indian States, all functions exercisable by His Majesty at the date with respect to Indian States, all obligations of His Majesty existing at that date towards Indian States or the rulers thereof, and all powers, rights, authority, or jurisdiction exercisable by His Majesty at that date in or in relation to Indian States by treaty, grant, usage, sufferance or otherwise...

Of the states situated within the geographical boundaries of the Dominion of India, all (numbering 552) save Hyderabad, Kashmir, Bahawalpur, Junagarh and the N.W.F. (North-West Frontier) states (Chitral, Phulra, Dir, Swat and Amb) had acceded to the Dominion of India by the 15th August, 1947, i.e. before the appointed day itself.

10. Integration and Merger of Indian States

The main objective of shaping the Indian States into sizeable or viable administrative units was sought to be achieved by a three-fold process of integration (known as the 'Patel Scheme' after Sardar Vallabbhbhai Patel, Minister-in-charge of Home Affairs)—

1. 216 states were merged into respective Provinces, geographically contiguous (connected) to them.
   - These merged states were included in the territories of the states in Part B in the First Schedule of the constitution.
   - The process of merger started with the merger of Orissa and Chhattisgarh States with the then Province of Orissa on January 1, 1948.

2. 61 states were converted into Centrally administered areas and included in Part C of the First Schedule of the Constitution.

3. The third form of integration was the consolidation of groups of units, known as Union of States.
   - As many as 275 states were integrated into 5 Unions — Madhya Bharat, Patiala and East Punjab States Union, Rajasthan, Saurashtra and Travancore-Cochin. These were included in the States in Part B of the First Schedule.
   - The other three States included in Part B were—Hyderabad, Jammu and Kashmir and Mysore.
   - Jammu and Kashmir acceded to India on October 26, 1947, and so it was included as a state in Part B, but the Government of India agreed to take the accession subject to confirmation by the people of the state, and a constituent Assembly subsequently confirmed it, in November, 1956.
   - Hyderabad did not formally accede to India, but the Nizam issued a Proclamation recognising the necessity of entering into a constitutional relationship with the Union of India and accepting the Constitution of India subject to ratification by the Constituent Assembly of the State, and the Constituent Assembly of that state ratified this.

   It is noteworthy here that the Raipramukhs of the five Unions as well as the Rulers of Hyderabad, Mysore, Jammu and Kashmir all adopted the Constitution of India, by Proclamations.

   The process of integration culminated in the Constitution (7th Amendment) Act, 1956, which abolished Part B states as a class and included all the states in Part A and B in one list.

   The special provisions in the constitution relating to Part B states were consequently omitted. The Indian States thus lost their identity and became on uniform political organisation embodied in the Constitution of India.

11. The Union and its Territories

- Article 1 lays down that India, i.e. Bharat, shall be a Union of States. The Territory of India shall consist of 1. the Territories of the States, 2. the Union Territories and 3. any Territories that may be acquired.

- Article 1 of the Constitution describes India as a Union of States not as a federation of states. Union of India is not the result of an agreement, nor has any State the right to secede from it.

- The Federation is called a Union of States, because it is indestructible.

- The Union Territories are not included in the 'Union of States'. Whereas the expression 'Territory of India' includes the States, the Union Territories and such other territories as may be acquired by India.

- The States and their territories are specified in the First Schedule to the Constitution. The Constitution empowers the Parliament for the admission or establishment of new States.

- Article 2 provides that Parliament may by law admit new States into the Union of India or establish new States on such terms and conditions as it deems fit.

- The Parliament has admitted the French settlements of Pondicherry, Karaikal, Mahe and Yennam, the Portuguese settlements of Goa, Diu and Daman and Sikkim, etc. into India after independence.

- Article 3 of the Constitution empowers the Parliament to form a new State by altering boundaries of existing States.
12. Reorganization of States

> A Bill seeking to create a new State or alter boundaries of existing States can be introduced in either House of the Parliament, only on the recommendation of the President.

> President refers the State Reorganization Bill to the State Legislature concerned for its opinion, fixing a time limit.

> Parliament is not bound to accept or act upon the views of the State Legislature on a state Reorganization Bill. The State Reorganization Bill requires simple majority in both Houses of the Parliament.

> It is not necessary to obtain the views of legislatures of Union territories before a Bill affects their boundaries or names is introduced.

> The States Reorganization Act, 1956 reorganised the boundaries of different States to establish a new State of Kerala and merge the former States of Madhya Bharat, Pepsu, Saurashtra, Travancore, Cochin, Ajmer, Bhopal, Coorg, Kutch and Vindhya Pradesh in other adjoining States and thus 14 states and 6 Union Territories were established in India.

> The Bombay Reorganization Act, 1960, divided the State of Bombay to establish two States of Gujarat and Maharashtra.

> In 1962 Nagaland was created as a separate State.

> In 1966, Punjab was divided into Punjab and Haryana.

> Union Territory of Himachal Pradesh was made the State of Himachal Pradesh by an Act of 1970.

> States of Manipur, Tripura, Meghalaya and Union Territories of Mizoram and Arunachal Pradesh were established in 1971. Later Mizoram and Arunachal Pradesh achieved statehood in 1986.

> Sikkim was made part of India by 36th Amendment of the Constitution.

> In 1987 Goa was made a separate State of the Union.

> Chhattisgarh came into existence on 1st November, 2000.

> Uttarakhand (now Uttarakhand) came into existence on 8th November, 2000.

> The State of Jharkhand, which was established on 15th November, 2000 is the newest (28th) State of India.

> The Union Government (on 30 July, 2013) gave a go ahead to create “Telangana” (the proposed 29th State) bifurcating Andhra Pradesh.

> Telangana came into being on 2nd June, 2014 and is the outcome of 15th Lok Sabha.

13. Citizenship

> The Constitution of India provides for a single and uniform citizenship for the whole of India.

> Citizenship of India was granted to every person who domiciled in the territory of India at the commencement of the constitution and who was born in the territory of India or—

> Either of whose parents was born in the territory of India or five years immediately preceding commencement of the Constitution.

> Who had been ordinarily residing in the territory of India for not less than

14. Fundamental Rights

> Indian citizens have the following rights under the Constitution which aliens do not possess:

> Some of the Fundamental Rights enumerated in Part III of the Constitution, e.g. Articles 15, 16, 19, 29, 30.

> Only citizens are eligible for offices of the President, Vice-President, Judge of the Supreme Court or a High Court, Attorney-General, Governor of a State, Member of a legislature etc.

> Only citizens have the right to vote.

> Enemy aliens are not entitled to the benefit of the procedural provisions in clauses (1)-(2) of Article 22 relating to arrest and detention.

> The Citizenship Act, 1955, provides for the acquisition of Indian citizenship in the following ways:

> Generally, every person born in India on or after January, 1950, shall be a citizen of India if either of his parents was a citizen of India at the time of his birth.

> A person who was outside India on or after 26 January, 1950, shall be a citizen of India by descent, if his father was a citizen of India at the time of that person’s birth.

> A person can apply for and get registered as a citizen of India by the competent authority if he satisfies the conditions laid down.

> A person residing in India for more than 7 years and having adequate knowledge of a constitutionally recognised Indian language can seek citizenship by naturalisation, provided he is not a citizen of a country where Indian citizens are prevented from becoming citizens by naturalisation.

> If any new territory becomes a part of India, the persons of the territory become citizens of India.

> Citizenship of India may be lost by:

> Renunciation of citizenship.

> Termination of citizenship, if a citizen of India voluntarily acquires the citizenship of another country.

> Deprivation of citizenship by the Government of India.

15. Fundamental Rights

> Six Fundamental Rights have been provided by the Constitution:

> 1. Right to equality

> 2. Right to liberty

> 3. Right against exploitation

> 4. Right to freedom of religion

> 5. Cultural and educational rights

> 6. Right to constitutional remedy

> Article 14 of the constitution provides that the State shall not deny any person equality before the law or equal protection of the laws within the territory of India.

> Exceptions to the provision of equality before law, allowed by the Indian Constitution are:

> The President or the Governor of a State is not answerable to any Court for the exercise and performance of the powers and duties of his office.

> No
Article 18 ensures Abolition of titles. It prevents the State from conferring any title.

This ban is only against the State and not against other public institutions, even though they may be used as titles.

The State is not debarred from awarding military or academic distinctions, the State is not prevented from conferring any distinction or award which can be reciprocated as a title and therefore does not come within the Constitutional prohibition.

Article 19 provides the six freedoms of:

- Speech and expression;
- Assemble peacefully and without arms;
- Form associations or unions;
- Move freely throughout the territory of India;
- Reside and settle in any part of the territory of India; and
- Practise any profession, or to carry on any occupation, trade or business.

State can impose restrictions on the freedom of speech in the interest of the sovereignty and integrity of India, the security of the State, friendly relations with foreign States, public order, decency or morality, or in relation to contempt of Court, defamation or incitement to an offence.

Restrictions can be imposed on freedom of movement and reside and settle in the interest of general public or for protection of interests of any Scheduled Tribe.

State can prescribe the professional or technical qualifications necessary for practising any profession or carrying on any occupation, trade or business. State can exclude any citizen from a business or industry run by the Government or a body of Government.

There is no specific provision in the Constitution guaranteeing the freedom of the press because freedom of the press is included in the wider freedom of expression which is guaranteed by freedom of expression under Art. 19.

Article 20 guarantees certain protection in respect of conviction for offences. It prohibits:

- Retrospective criminal legislation, commonly known as ex post facto legislation;
- Double jeopardy or punishment for the same offence more than once;
- Compulsion to give self-incriminating evidence.

Article 21 (A) makes the right of education for children of the age of 6 to 14 years a fundamental right. [Ref: 86th Amendment Act, 2002]

Article 21 of Constitution provides that no person shall be deprived of his life or personal liberty except according to the procedure established by law.

Under the ‘Due Process’ Clause of the American Constitution, the Court has assumed the power of declaring unconstitutional any law which deprives a person of his liberty without reasonableness and fairness.

In England courts have no power to invalidate a law made by Parliament.

In the case of Gopalan Supreme Court held that our Constitution had embodied the English concept.
In Maneka’s case the Supreme Court held that a law made by the State which seeks to deprive a person of his personal liberty must prescribe a procedure for such deprivation which must not be arbitrary, unfair or unreasonable. It follows that such law shall be invalid if it violates the principle of natural justice.

Article 22 provides that no person who is arrested shall be detained in custody without being informed of the grounds for such arrest.

No arrested person can be denied the right to consult, and to be defended by a legal practitioner of his choice.

Every person who is arrested and detained in custody is to be produced before the nearest magistrate within a period of twenty-four hours of arrest excluding the time necessary for the journey from the place of arrest to the court of the magistrate and no such person can be detained in custody beyond that period without the authority of a magistrate.

The above safeguard is not available to an enemy alien and a person arrested or detained under a law providing for preventive detention.

The Constitution authorises the Legislature to make laws for preventive detention for the security of State, the maintenance of public order, or the maintenance of supplies and services essential to the community, or for reasons connected with Defence and Foreign Affairs [Ref.: Art. 22].

Article 23 provides Right against Exploitation in the following respects:

Traffic in human beings and beggar and other similar forms of forced labour are prohibited.

The State can impose compulsory service for public purposes, and in imposing such service the State cannot make any discrimination on grounds only of religion, race, caste or class or any of them.

Special provision for the protection of children is made in Art. 24 which provides that no child below the age of fourteen years can be employed to work in any factory or mine or engaged in any other hazardous employment.

Article 25-28 provides Right to Freedom of Religion.

Article 25 provides freedom of conscience and free profession, practice and propagation of religion subject to public order, morality and health.

Under Art. 25 State can regulate religious activities and provide for social reforms and throw open Hindu religious institutions of public character to all sections of Hindus.

Article 26 guarantees following rights to all religious groups subject to public order, morality and health:

- Establish and maintain institution for religious and charitable purposes;
- Manage its own affairs in matters of religion;
- Own and acquire movable and immovable property;
- Administer such property in accordance with law.

The State cannot compel any citizen to pay any taxes for the promotion or maintenance of any particular religion or religious institution [Ref.: Art. 27].

No religious instruction can be provided in any educational institution wholly maintained out of State funds [Ref.: Art. 28].

Where a religious community is in the minority, the Constitution enables it to preserve its culture and religious interests by providing that the State shall not impose upon it any culture other than the community’s own culture [Ref.: Art. 29(1)].

Such community shall have the right to establish and administer educational institutions of its choice and the State shall not, in granting aid to educational institutions maintained by a minority community on the ground that it is under the management of a religious community [Ref.: Art. 30].

Full compensation has to be paid if the State seeks to acquire the property of a minority educational institution [Ref.: Art. 30 (1A)].

The Fundamental Rights are guaranteed by the Constitution not only against the action of the Executive but also against that of the Legislature.

Right to constitutional remedy, which was termed ‘soul of the constitution’ by Dr. B.R. Ambedkar, has been guaranteed by Art. 32 of the Constitution.

The Writs

For enforcement of fundamental rights, the judiciary has been armed with the power to issue the writs.

The power to issue these writs for the enforcement of the Fundamental Rights is given by the Constitution to the Supreme Court [Ref.: Art. 32] and High Courts [Ref.: Art. 226].

Supreme Court has the power to issue writs only for the purpose of enforcement of the Fundamental Rights whereas under Art. 226 a High Court can issue writs for the purpose of enforcement of Fundamental Rights and/or for the redress of any other injury or illegality.

Supreme Court can issue a writ against any person or Government within the territory of India, while High Court can issue a writ against a person, Government or other authority only if they are located within the territorial jurisdiction of the High Court.

A writ of Habeas Corpus calls upon the person who has detained another to produce the latter before the court, in order to let the court know on what ground he has been confined and to set him free if there is no legal justification for the imprisonment. The words ‘habeas corpus’ literally mean ‘to have a body’. This writ may be addressed to an official or a private person, who has another person in his custody.

Mandamus literally means a command. It commands the person to whom it is addressed to perform some public or quasi-public legal duty which he has refused to perform and the performance of which can not be enforced by any other adequate legal remedy. Mandamus can not be granted against the President, or the Governor of a state, for the exercise and performance of the powers and duties of his office.

The writ of prohibition is a writ issued by the Supreme Court or a High Court to exceed an inferior court forbidding the latter to continue proceeding therein in excess of its jurisdiction or to usurp a jurisdiction with which it is not legally vested.

While mandamus is available not only against judicial authorities but also against administrative authorities, prohibition and certiorari are issued only against judicial or quasi-judicial authorities.
Though prohibition and certiorari are both issued against Courts or Tribunals exercising judicial or quasi-judicial powers, certiorari is issued to quash or review orders of the Court or Tribunal while prohibition is issued to prevent the ultra vires order or decision. Prohibitions may be made only after the order has been made.

Quo warranto is a proceeding whereby the court enquires into the legality of the claim which a party asserts to a public office, and to oust him there from if his enjoyment is not well founded.

The conditions necessary for the issue of a writ of quo warranto are as follows:
- The office must be public and it must be created by a statute or by the constitution itself.
- The office must be a substantive one and not merely the function or employment of a servant at the will and during the pleasure of another.
- There has been a contravention of the Constitution or a statute or statutory instrument, in appointing such person to that office.

The limitations on the enforcement of the fundamental rights are as follows:
- Parliament has the power to modify the application of the Fundamental Rights to the members of the Armed Forces, Police Forces or intelligence organisations so as to ensure proper discharge of their duties and maintenance of discipline amongst them (Ref.: Art. 33).
- When martial law is in force, Parliament may indemnify any person in the service of the Union or a State for any act done by him (Ref.: Art. 34).
- Certain fundamental rights guaranteed by the Constitution may remain suspended, while a Proclamation of Emergency is made by the President under Art. 352.

Right to Information
- Right to information has been granted to every citizen of India under Right to Information Act, 2005 which came into force on 12th October, 2005.
- It is not a Fundamental Right but it entails a clause for penalty in case of delay in giving information to the applicant.
- Information Commission has been set up at central and state levels to oversee implementation of the Act.

15. Directive Principles of State Policy

The Directive Principles are contained in Part IV of the Constitution. They aim at providing the social and economic base of a genuine democracy.

Important Directive Principles

Broadly speaking, there are three types of Directive Principles aimed at providing social and economic justice and ushering in a welfare state.

1. Socio-Economic Principles: They require the State:
   - (a) to provide adequate means of livelihood to all citizens;
   - (b) to prevent concentration of wealth and means of production and ensure equitable work of men as well as women;
   - (c) to secure equal pay for equal leisure for all workers;
   - (d) to ensure a decent standard of living and children and youth to prevent their exploitation; and
   - (f) to make efforts to secure the right to work, education and public assistance in case of unemployment, sickness, old age etc.

2. Gandhian Principles: These are the embodiment of the Gandhian programme for reconstruction. These include:
   - (a) the establishment of village panchayats to function as units of self government;
   - (b) the promotion of educational and economic interests of weaker sections of society;
   - (c) the promotion of cottage industries;
   - (d) the prohibition of intoxicating drugs and drinks;
   - (e) prevention of the slaughter of cows, calves and other milch cattle etc.

3. Liberal Principles: The principles are based on liberal thinking and emphasise the need for:
   - (a) a uniform civil code for the country;
   - (b) free and compulsory education for all children up to the age of 14 years;
   - (c) separation of the judiciary and executive;
   - (d) organisation of agriculture and animal husbandry along scientific lines;
   - (e) securing the participation of workers in the management of industries;
   - (f) safeguarding the forests and wildlife of the country; and
   - (g) protecting monuments and places of artistic or historical importance.

The real significance of the directive principles lies in the fact that they intend to provide social and economic democracy in the country without which political democracy is a farce.

Difference Between Fundamental Rights and Directive Principles

- Fundamental rights constitute limitations upon State action, while the Directive Principles are instruments of instruction to the Government.
- The directives require to be implemented by legislation while fundamental rights are already provided in the Constitution.
- The Directives are not enforceable in the Courts and do not create any Justiciable rights in favour of the individuals, while the Fundamental Rights are enforceable by the Courts (Ref.: Arts. 32, 37, 226(1))
- In case of any conflict between fundamental rights and directive principles the former should prevail in the Courts.
- 42nd Amendment Act ensured that though the directives themselves are not directly enforceable, it would be totally immune from unconstitutionality on the ground of contravention of the fundamental rights conferred by Arts. 14 and 19.
- This attempt to confer a primacy upon the directives against the fundamental rights was foiled by the decision of the Supreme Court in Minerva Mills Case to the effect that a law would be protected by Art. 31C only if it has been made to implement the directive in Art. 39(b)-(c) and not any of the other Directives included in Part IV.

Directives Provided outside Part IV of the Constitution

- State and every local authority within the state to provide adequate facilities for education in the mother-tongue at the primary stage of education to children belonging to linguistic minority groups. [Ref.: Art 350 A]
- Union to promote spread of Hindi language and to develop it as a medium of expression of all the elements of the composite culture of India. [Ref.: Art. 351]
The claims of the members of the Scheduled Castes and the Scheduled Tribes shall be taken into consideration, consistently with the maintenance of efficiency of administration, in the making of appointments to services and posts in connection with the affairs of the union or a state. [Ref.: Art. 335]

> Though the Directives contained in Arts. 335, 350A and 351 are not included in Part IV, Courts have given similar attention to them meaning that all parts of the Constitution should be read together.

16. Fundamental Duties

> The Fundamental Duties are eleven in number, incorporated in Art. 51A [Part IV A], which has been incorporated by the 42nd Amendment Act, 1976.

> Under this Article, it is the duty of every citizen of India:

  1. to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
  2. to cherish and follow the noble ideals which inspired our National Struggle for freedom;
  3. to uphold and protect the sovereignty, unity and integrity of India;
  4. to defend the country;
  5. to promote harmony and the spirit of common brotherhood amongst all the people of India;
  6. to value and preserve the rich heritage of our composite culture;
  7. to protect and improve the natural environment;
  8. to develop the scientific temper and spirit of inquiry;
  9. to safeguard public property;
  10. to strive towards excellence in all spheres of individual and collective activity;
  11. to provide opportunities for education to his child or ward as the case may be between the age of six and fourteen years.

Note: The 11th Fundamental Duty was added by the 86th Constitutional Amendment Act, 2002.

> There is no provision in the Constitution for direct enforcement of any of the Fundamental Duties nor for any sanction to prevent their violation.

17. Procedure for Amending the Constitution

> The alteration of certain provisions of the Constitution are not considered amendment of the constitution. Such provisions can be altered by the Parliament by a simple majority.

> Other provisions of the Constitution can be changed only by the process of ‘amendment’ prescribed in Art. 368.

> In the case of provisions which affect the federal structure, a ratification by the Legislatures of at least half of the states, is required before the Bill is presented to the President for his assent. Such provisions are:

  * The manner of election of the President [Ref: Arts. 54, 55].
  * Extent of the executive power of the Union and the States [Ref: Arts. 73, 162].
  * The Supreme Court and the High Courts [Art. 241, Chap. IV of part V, Chap. V of part VI].
  * Distribution of legislative power between the Union and the States [Chap.]

> Any of the Lists in the 7th Schedule; ★ Representation of the States in Parliament [Arts. 80-81, 4th Schedule]; ★ Provisions of Art. 368 itself.

> There is no separate Constituent body provided for by our Constitution for the amending process.

> An amendment of the Constitution can be initiated only by the introduction of a Bill for the purpose in either House of Parliament.

> The Amendment Bill should be passed by each House by a special majority i.e., more than 50% of the total membership of that House and by a majority of not less than two-thirds of the members of that House present and voting. Constitution stands amended in accordance with the terms of the Amendment Bill after President’s assent is accorded to it.

The blend of rigidity and flexibility in the procedure for amendment

> The procedure for amendment is ‘rigid’ in so far as it requires a special majority and a special procedure.

> There is no separate body for amending the Constitution, as exists in some other countries (e.g., a Constitutional convention).

> The State Legislatures cannot initiate any Bill or proposal for amendment of the Constitution.

> Subject to the provisions of Art. 368, Constitution Amendment Bills are to be passed by the Parliament in the same way as Ordinary Bills.

> The procedure for joint session is not applicable to Bills for amendment of the Constitution.

> The previous sanction of the President is not required for introducing any Bill for amendment of the Constitution.

> The requirement relating to ratification by which the state Legislatures is more liberal than the corresponding provisions in the American constitution. The latter requires ratification by three fourths of the states.

> The amendment of Art. 368 in 1971 has made it obligatory for the President to give his assent to a Bill for amendment of the Constitution, when it is presented to him after its passage by the Legislature [Ref: 24th Amendment 1971].

Whether Fundamental Rights are Amendable

> Until the case of Golak Nath, Supreme Court held that no part of our Constitution was unamendable.

> In Golak Nath’s case (1967) a majority of six judges, in a special bench of eleven, overruled the previous decisions and held that if any of such rights is to be amended, a new Constituent Assembly must be convened for making a new Constitution or radically changing it.

> Constitution (24th Amendment) Act, 1971, held that an amendment of the Constitution passed in accordance with Art. 368, will not be law within the meaning of Art. 13 and the validity of a Constitution Amendment Act shall not be questioned on the ground that it takes away or affects a fundamental right [Ref.: Art. 368(3)]

> Validity of the 24th Constitution Amendment Act itself was challenged in the case of Keshavananda Bharati.
The Doctrine of Basic Features

The Supreme court held in the case of Keshavananda Bharati that there are certain basic features of the Constitution of India, which cannot be altered by an amendment under Art. 368.

Article 31C, introduced by 25th Amendment Act provided that if any law seeks to implement the directive principles contained in Art. 39(b) (c) i.e., regarding socialistic control and distribution of the material resources of the country, such law shall not be void on the ground of contravention of Art. 15 or 19. The Supreme Court later held that Art. 368 did not empower the Parliament to take away judicial review, in the name of ‘amending’ the Constitution.

The 42nd Amendment 1976 inserted two clauses in Art. 368 to the effect that Constitution Amendment Act “shall be called in Question in any court on any ground”. These clauses were nullified by the Supreme Court in the Mina Mills Case.

There are three implications of the decision in Keshavananda Bharati’s Case:

1. Any part of the Constitution may be amended as per the procedure laid down in Art. 368.
2. No referendum or reference to Constituent Assembly is required to amend any provision of the Constitution. Basic features of the Constitution cannot be amended.
3. There is no limited list of basic features. In so many decisions the Supreme Court has declared different things a basic features. Prominent among them are the following:
   - Supremacy of the Constitution.
   - Rule of law.
   - The principle of separation of powers.
   - The objectives specified in the Preamble to the Constitution.
   - Judicial review; Art. 32.
   - Federalism.
   - Secularism.
   - The Sovereign, Democratic, Republican structure.
   - Freedom and dignity of the individual.
   - Unity and integrity of the Nation.
   - The Principle of equality, not every feature of equality, but the quintessence of equal justice.
   - The ‘essence’ of fundamental rights in Part III.
   - The concept of social and economic justice to build a Welfare State.
   - The balance between fundamental rights and directive principles.
   - The Parliamentary system of Government.
   - The principle of free and fair elections.
   - Limitations upon the amending power conferred by Art. 368.
   - Independence of the Judiciary.
   - Effective access to justice.
   - Powers of the Supreme Court under Arts. 32, 136, 141, 142.

18. Executive of the Union

The President

The President is the head of the Union Executive.

- The President of India is indirectly elected by an electoral college, in accordance with the system of proportional representation by means of the single transferable vote.
- The electoral college for the President consists of:
  - The elected members of both Houses of Parliament;
  - The elected members of the Legislative Assemblies of the states;
  - The elected members of the Legislative Assemblies of Union Territories of Delhi and Pondicherry (now Puducherry) [Ref: Art. 54].
- In the President’s election vote value of an MLA = Total number of elected members of state + 1000
- Total population of the state
- In the President’s election vote value of an MP = The sum of vote value of elected members of all the Legislative Assemblies of India
- Indirect election of the President is supported on two grounds:
  - Direct election by a large electorate of people would be very costly.
  - Real power is vested in the Ministry, so, it would be anomalous to elect the President directly without giving him real powers.

Qualifications for election as President are:

- Be a citizen of India;
- Have completed the age of thirty-five years;
- Be qualified for election as a member of the House of the People;
- Must not hold any office of profit under the Government of India or the Government of any State or under any local or other authority subject to the Control of any of the said Governments [Art. 58];
- A sitting President or Vice-President of the Union or the Governor of any state or a Minister either for the Union or for any state is not disqualified for election as President [Ref: Art. 58];
- The President’s term of office is five years from the date on which he enters upon his office.
- President can submit resignation in writing under his hand addressed to the Vice-President of India.
- The only ground for impeachment of President specified in Art 61(1) is ‘violation’ of the Constitution.
- An impeachment is a quasi-judicial procedure in Parliament.
- Either House may prefer the charge of violation of the Constitution by the President provided that:
  - A resolution containing the proposal is moved after a 14 days’ notice in writing signed by not less than 1/4 of the total number of members of that House; and
  - The resolution is then passed by a majority of not less than 2/3 of the total membership of the House.
- Charge preferred by one House is investigated by the other House.
The President has the right to appear and to be represented at such investigation.

> If a resolution is passed by not less than 2/3 of the total membership of the investigating House declaring that the charge had sustained, the President shall be removed from office (Ref.: Art. 61).

> The President shall not be a member of either House of Parliament or of a House of the Legislature of any State.

> If a member of either House of Parliament or a House of the Legislature of any State is elected President, he shall be deemed to have vacated his seat in that House.

> A vacancy in the office of the President can be caused in any of the following ways:
  1. On the expiry of his term of five years.
  2. By his death.
  3. By his resignation.
  4. On his removal by impeachment.
  5. Otherwise, e.g., on the setting aside of his election as President.

> An election to the office of the President must be completed before the expiration of the term.

> The outgoing President continues to hold office, notwithstanding that his term has expired, until his successor enters upon the office (Ref.: Art. 56 (1) (c)). There is no scope for the Vice-President getting a chance to act as President in this case.

> If vacancy arises other than by expiry of the term an election to fill the vacancy must be held within six months from the date of occurrence of the vacancy.

> If a mid-term vacancy arises in the office of the President, Vice-President acts as President until a new President is elected.

### Presidents of India

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name</th>
<th>Tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. Rajendra Prasad (1884-1963)</td>
<td>26 Jan., 1950–13 May, 1962</td>
</tr>
<tr>
<td>2</td>
<td>Dr. S. Radhakrishnan (1888-1975)</td>
<td>13 May, 1962–13 May, 1967</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Zakir Husain (1897-1969)</td>
<td>13 May, 1967–03 May, 1969</td>
</tr>
<tr>
<td>13</td>
<td>Sri Pranab Mukherjee (b. 1935)</td>
<td>25 July, 2012–—</td>
</tr>
</tbody>
</table>

### Powers of President

#### Administrative power

> The President is the formal head of the administration. All executive actions of the Union are expressed to be taken in the name of the President (Ref.: Art. 77).

> All officers of the Union are the President’s subordinates, and he or she has a right to be informed of the affairs of the Union (Art. 78, 53(1)).
The President has the right to address either Houses or their joint sitting at any time and to require the attendance of members for this purpose [Ref: Art. 86(1)].

In the Rajya Sabha 12 members are nominated by the President from persons having special knowledge or practical experience of literature, science, art and social service [Ref: Art. 80(1)].

The President is empowered to nominate not more than two Anglo-Indian members to the Lok Sabha, if that community is not adequately represented in that House [Ref: Art. 331].

Previous sanction or recommendation of the President is required for introducing legislation on following matters:

- A Bill for the formation of new states or the alteration of boundaries of existing states [Ref: Art. 3].
- A Bill providing for any of the matters specified in Art 31A(1)
- A money Bill [Ref: Art. 117(1)].
- A Bill involving expenditure from the Consolidated Fund of India [Ref: Art. 117(3)].
- A Bill affecting taxation in which States are interested.
- State Bills imposing restrictions upon the freedom of trade [Ref: Art. 304].

A Bill becomes an Act of the Indian Parliament only after it receives the assent of the President.

When a Bill is presented to the President for assent:

- He may declare his assent to the Bill;
- He may withhold his assent to the Bill;
- He may, in the case of Bills other than Money Bills return the Bill for reconsideration of the Houses, with or without a message suggesting amendments. If the Bill is passed again by both Houses of Parliament with or without amendment and again presented to the President it would be obligatory upon him to declare his assent to it [Ref: Art. 111].

The veto power of the Indian President is a combination of the absolute, suspensive and pocket vetoes.

President of India has the power of disallowance or return for reconsideration of a Bill of the state legislature, which are reserved for his consideration by the Governor of the State [Ref: Art. 201]. A Money Bill so reserved, can not be returned by the President.

It is not obligatory upon the President to give his assent even to the Bills reconsidered by the state legislature [Ref: Art. 201].

The President can legislate by Ordinances at a time when it is not possible to have a Parliamentary enactment on the subject, immediately [Ref: Art. 123].

Pardoning Power:

President as well as the Governors possess power to grant pardon [Ref: Arts 72, 161].

Pardon rescinds (abolishes or revokes) both the sentence and the conviction and absolve the offender from all punishment and disqualifications.

Commutation merely substitutes one form of punishment for another of a lighter character.

Remission reduces the amount of sentence without changing its character.

Respite means awarding a lesser sentence instead of the penalty prescribed in view of pregnancy of a woman offender etc.

Repeal means a stay of execution of a sentence, e.g. pending a proceeding for pardon or commutation.

Comparison Between Pardoning Powers of the President and a Governor

President has the power to grant pardon, reprieve, respite, suspension, remission or commutation, in respect of punishment or sentence by court-martial. Governor has no such power.

President's powers extend up to the executive power of the union. Governor's powers extend up to the executive power of the state.

Governor has no power to pardon in case of sentence of death, but he can suspend, remit or commute a sentence of death. Only President can pardon a death sentence.

Emergency power:

The President has extraordinary powers to deal with a situation of emergency.

Miscellaneous powers:

The President has the Constitutional authority to make rules and regulations relating to various matters.

He/she has the power to give instruction to a Governor to promulgate an Ordinance if a Bill containing the same provisions requires previous sanction of the President.

President has the power to refer any question of Public importance for the opinion of the Supreme Court.

President has the power to appoint certain commissions for the purpose of reporting on specific matters, such as, Commissions to report on the administration of Scheduled Areas and welfare of Scheduled Tribes and backward classes; the Finance Commission; Commission on Official Language; an Inter-State Council.

President has some special powers relating to Union Territories or territories which are directly administered by the Union.

The President shall have certain special powers in respect of the administration of Scheduled Area and Tribes, and Tribal Area in Assam.

The President has certain special powers and responsibilities regarding the administration of the Scheduled Caste.

The Vice-President

Vice-President is indirectly elected by means of single transferable vote.

State Legislatures do not take part in the election of Vice-President.

The electoral college for Vice-President consists of the members of both Houses of Parliament [Ref: Art. 66(1)].

To be elected as Vice-President of India a person must be:

- A Citizen of India.
- Over 35 years of Age.
- Must hold an office of profit save that of President, Vice-President, Governor or Minister for the Union or a state [Ref: Art. 66].
- Qualified for election as a member of the Rajya Sabha.

In case a member of the Legislature is elected Vice-President, he shall be deemed to have vacated his seat in the House to which he belongs.
As the head of the Council of Ministers, the Prime Minister (PM) is the head of the Government. Also, he/she is the leader of his/her party or of a coalition of parties in Parliament and usually the Leader of the Popular House. The PM enjoys large powers of patronage. All the ministers are appointed at his/her recommendation and stand dismissed at his/her demand.

The PM allocates work among the ministers. Also, he/she can change their portfolios at will.

The PM is the channel of communication between the Council of Ministers and the President.

Ministers get the salaries and allowances etc as payable to members of parliament. In addition, they get a sumptuary allowance at a varying scale and a residence, free of rent. Cabinet Ministers attend meeting of the Cabinet.

Ministers of State are not members of the Cabinet and they can attend a Cabinet Meeting only if invited to attend any particular meeting.

A Deputy Minister assists the Minister in discharge of his duties and takes no part in Cabinet meetings.

There is no bar to the appointment of a non-MLA as a Minister, but he cannot continue as a Minister for more than 6 months unless he secures a seat in either House of Parliament.

Though the ministers are collectively responsible to the legislature, they are individually responsible to the President.

A Minister can take part in the proceedings of both Lok Sabha and Rajya Sabha, but he/she can vote only if he/she is a member of that House.

The Attorney-General for India

The Attorney-General is the first Law Officer of the Government of India, who gives advice on legal matters and performs other duties of a legal character as assigned to him by the Prime Minister.

The Attorney-General for India is appointed by the President and holds office during the pleasure of the President. He must have the same qualifications as are required to be a judge of the Supreme Court.

He discharges the functions conferred upon him by the Constitution or any other law [Ref: Art. 76].

The Attorney-General for India is not a member of the Council of Ministers. But he has the right to speak in the Houses of Parliament or in any Committee thereof, but he has no right to vote [Ref: Art 88].

He is entitled to the privileges of a member of Parliament [Art. 105(4)]. In the performance of his official duties, the Attorney-General has the right of audience in all Courts in the territory of India.

He is not a whole-time counsel for the Government nor a Government servant.

The Comptroller & Auditor-General of India

The CAG controls the entire financial system of the Union as well as the States [Ref: Art. 148].

Though appointed by the President, the Comptroller and Auditor-General can be removed only on an address from both Houses of Parliament on the ground of proved misbehaviour or incapacity.
His salary and conditions of service are laid down by Parliament and can not be varied to his disadvantage during his term of office.

The term of office of the Comptroller and Auditor-General (CAG) is 6 years from the date on which he assumes office.

CAG vacates office on attaining the age of 65 years even without completing the 6-year term. He can resign by writing under his hand, addressed to the President of India. He can be removed by impeachment [Ref.: Arts. 146(1); 124(4)].

His salary is equal to that of a Judge of the Supreme Court.

Other conditions of his service are similar to an I.A.S. of the rank of Secretary to the Government of India.

He is disqualified for any further Government office after retirement.

The salaries etc. of the Comptroller and Auditor-General and his staff and the administrative expenses of his office are charged upon the Consolidated Fund of India and thus non-votable [Ref: Art. 148 (6)].

The main duties of the Comptroller and Auditor-General are:
- To audit and report on all expenditure from the Consolidated Fund of India and of each state and each Union Territory having a Legislative Assembly as to whether such expenditure has been in accordance with the law.
- To audit and report on all expenditure from the Contingency Funds and Public Accounts of the Union and of the states.
- To audit and report on all trading manufacturing profit and loss accounts etc. kept by any department of the Union or a state.
- To see that rules and procedures in that behalf are designed to secure an effective check on the assessment, collection and proper allocation of revenue.
- To audit and report on the receipts and expenditure of all bodies and authorities substantially financed from the Union or State revenues, Government companies, and other corporations or bodies, if so required by the laws relating to such corporations or bodies.

19. The Parliament of India

The Parliament of India consists of the President, the Lok Sabha and the Rajya Sabha. [Ref: Art. 79].

The President is a part of the Legislature, even though he or she does not sit in Parliament.

The main functions of Parliament are:
- Providing the cabinet.
- Control of the Cabinet.
- Legislation i.e. making laws [Ref.: Arts. 107; 108; 245]
- Financial control.

A Bill passed by the House of Parliament can not become law without the President's assent.

Rajya Sabha and Lok Sabha

The Rajya Sabha is composed of not more than 250 members of whom 12 are nominated by the President and 238 are representatives of the states and the Union Territories elected by the method of indirect election [Ref.: Art. 80].

The 12 nominated members are chosen by the President from amongst persons specialised in science, art, literature and social service.

Representatives of each State are elected by the elected members of the Legislative Assembly of the state in accordance with the system of proportional representation by means of the single transferable vote.

Prescribed composition of the Lok Sabha is:
- Not more than 530 representatives of the States; ★ Not more than 20 representatives of Union Territories; ★ Not more than 2 members of the Anglo-Indian community, nominated by the President.
- The Lok Sabha at present consists of 543 members (530 members are directly elected from the States and 13 from UTs).

The representatives of the States are directly elected by the people of the States on the basis of adult suffrage.

Every citizen who is not less than 18 years of age and is not otherwise disqualified is entitled to vote at such election [Ref.: Art. 326].

There is no reservation for any minority community other than the Scheduled Castes and the Scheduled Tribes [Ref.: Arts. 330, 341, 342].

The Council of State is not subject to dissolution. It is a permanent body. 1/3 of its members retire on the expiration of every second year.

The normal term of the Lok Sabha is 5 years, but it may be dissolved earlier by the President.

The normal term of Lok Sabha can be extended by an Act passed by Parliament itself during Emergency.

The extension can not be made for a period exceeding one year at a time.

The extension can not continue beyond a period of six months after the proclamation of Emergency ceases to operate.

Parliament must meet at least twice a year and not more than six months shall elapse between two sessions of Parliament.

A session is the period of time between the first meeting of Parliament and prorogation of Parliament.

The period between prorogation of Parliament and its re-assembly in a new session is called recess. Within a session, there are a number of daily sittings separated by adjournments which postpone the further consideration of a business for a specified time.

The sitting of a House can be terminated by dissolution, prorogation or adjournment:
- While the powers of dissolution and prorogation are exercised by the President on the advice of the Council of Ministers. The power to adjourn the daily sittings of Lok Sabha and Rajya Sabha belongs to the Speaker and the Chairman, respectively.

A dissolution brings Lok Sabha to an end so that there must be a fresh election while prorogation merely terminates a session. Adjournment does not put an end to the session of Parliament but merely postpones the further transaction of business for a specified time, hours, days or weeks.

On dissolution of the Lok Sabha all matters pending before the House lapse. If these matters have to be pursued, they must be re-introduced in the next House after fresh election.
When a Money Bill is transmitted from the Lok Sabha to the Rajya Sabha, the Speaker may certify that it is a Money Bill [Ref.: Art. 110(4)]

The decision of the Speaker on whether a Bill is Money Bill is final.

While the office of Speaker is vacant or the Speaker is absent from a sitting of removal is under consideration, the House, the Deputy Speaker presides, except when a resolution for his own removal is under consideration.

Chairman and Deputy Chairman of the Rajya Sabha

Vice-President of India is ex-officio Chairman of the Rajya Sabha and functions as the Presiding Officer of that House so long as he does not officiate as the President.

When the Chairman acts as the President of India, the duties of the Chairman are performed by the Deputy Chairman.

The Chairman may be removed from his office only if he is removed from the office of the Vice-President.

The powers of Chairman in the Rajya Sabha are similar to those of the Speaker in the Lok Sabha except that the Speaker has certain special powers like certifying a Money Bill, or presiding over a joint sitting of the two Houses.

Privileges of Parliament

The privileges of each House can be divided into two groups:

- Those which are enjoyed by the members individually.
- Those which belong to each House of Parliament, as a collective body.

The privileges enjoyed by the members individually are:

- Freedom from Arrest exempts a member from arrest during the continuance of a meeting of the House or Committee thereof of which he is a member and during a period of 40 days before and after such meeting or sitting.
- This immunity is confined to arrest in civil cases and not in criminal cases or under the law of Preventive Detention.
- A member cannot be summoned, without the leave of the House to give evidence as a witness while Parliament is in session.
- There is Freedom of Speech within the walls of each House.
- The limitation on freedom of speech is that no discussion can take place in Parliament with respect to the conduct of any judge of the Supreme Court or of a High Court in the discharge of his duties except upon a motion for removal of the judge [Ref.: Art. 121].

The privileges of the House collectively are:

- The right to publish debates and proceedings and to restrain publication by others.
- The right to exclude others.
- The right to regulate internal affairs of the House.
- The right to publish Parliamentary misbehaviour.
- The right to punish members and outsiders for breach of its privileges.
The Legislative Procedures in Parliament

The different stages in the legislative procedure in Parliament relating to Bills other than Money Bills are as follows:

1. Introduction of a Bill in either House of Parliament 2. Motion for introduction 3. Report by Select Committee 4. Passing of the Bill in the House where it was introduced 5. Passage in the other House 6. President’s Assent

Money Bills and Financial Bills

A Bill is called a Money Bill if it contains only provisions dealing with all or any of the following matters:

- The imposition, abolition, remission, alteration or regulation of any tax.
- The regulation of the borrowing of money by the Government.
- The custody of or the withdrawal of moneys from the Consolidated Fund of India.
- The appropriation of moneys out of the Consolidated Fund of India.
- The declaring of any expenditure to be expenditure charged on the Consolidated Fund of India.
- The receipt of money on account of the Consolidated Fund of India or the public account of India or the custody or issue of such money or the audit of the accounts of the Union or of a State.

The procedure for passing of Money Bills in Parliament is:

A Money Bill can not be introduced in the Rajya Sabha.

- After a Money Bill has been passed by the Lok Sabha, it is transmitted to the Rajya Sabha (with the Speaker’s certificate that it is a Money Bill). The Rajya Sabha can neither reject a Money Bill nor amend it. It must, within a period of fourteen days from the date of receipt of the Bill, return the Bill to the Lok Sabha with its recommendations. Lok Sabha may accept or reject all or any of the recommendations of the Rajya Sabha. It is up to the Lok Sabha to accept or reject the recommendations of the Rajya Sabha. If the Lok Sabha accepts any of the recommendations the Money Bill is deemed to have been passed by both Houses with the amendment recommended by the Rajya Sabha and accepted by the Lok Sabha. If a Money Bill is not returned by the Rajya Sabha within fourteen days, it shall be deemed to have been passed by both Houses in the form in which it was passed by the Lok Sabha (Ref: Art. 109).

- Only those Financial Bills are Money Bills which bear the certificate of the Speaker as such.

- Financial Bills which do not receive the Speaker’s certificate are of two classes (Art. 117):
  (a) A Bill which contains any of the matters specified in Art. 110 but does not consist solely of those matters. It can be introduced in Lok Sabha only on the recommendation of President. Rajya Sabha can amend or reject such Bills.
  (b) Any Ordinary Bill which contains provisions involving expenditure from the Consolidated Fund (Ref: Art. 117(3)).

Joint Sittings

The President can summon Lok Sabha and Rajya Sabha for a joint sitting in case of disagreement between the two Houses in following ways:

- If, after a Bill has been passed by one House and transmitted to the other House—
  - the Bill is rejected by the other House;
- the Houses have finally disagreed about the amendments to be made in the Bill; or
- more than six months have elapsed from the date of the reception of the Bill by the other House without the Bill being passed by it.

The Speaker presides the joint sitting. In the absence of the Speaker, Deputy Speaker or Chairman of Rajya Sabha or Deputy Chairman of Rajya Sabha or a person chosen by the MPs may preside (Art. 118(4)) in the same order.

Financial Legislation in Parliament

At the beginning of every financial year, on behalf of the President of India, a statement of the estimated receipts and expenditure of the Government of India for that year is laid before both the Houses of Parliament.

This is known as the ‘annual financial statement’ (i.e., the ‘Budget’) (Ref. Art. 112).

It also states the ways and means of meeting the estimated expenditure.

- The Annual Financial Statement or the Budget contains:
  - Estimates of expenditure.
  - Ways and means to raise the revenue.
  - An analysis of the actual receipts and expenditures of the closing year and the causes of any surplus or deficit in relation to such year.
  - An explanation of the economic policy and spending programme of the Government in the coming year and the prospects of revenue.
  - Estimates relating to expenditure charged upon the Consolidated Fund of India are not put to vote of Parliament but each House can discuss any of these estimates. Estimates of other expenditure are submitted in the form of demands for grants to the Lok Sabha and it has the power to assent, or to refuse to assent to any demand.

- No demand for a grant can be made except on the recommendation of the President. (Ref. Art. 113).

The scrutiny of budget proposals is done by the Parliament’s Committee on Estimates in order to:

- Report to the House about the effect on economy, improvements in organisation, administrative reform etc.
- Suggest alternative policies.
- Examine whether the money is well laid out.
- Suggest the form in which estimates are to be presented to Parliament.
- The report of the Estimates Committee is not debated in the House.

- The Comptroller and Auditor General is the guardian of the public purse and it is his function to see that not a paisa is spent without the authority of Parliament.

- The report of the Comptroller and Auditor General laid before the Parliament, is examined by the Public Accounts Committee.

- Public Accounts Committee is a committee of the Lok Sabha (having 15 members from that House), but seven members of the Rajya Sabha are also associated with this Committee, in order to strengthen it.

- Public Accounts Committee examines that:
  - The money disbursed was legally available and used for the right purpose.
  - The expenditure conforms to the authority which governs it.
  - Every re-appropriation has been made in accordance with the rules framed by competent authority.
### Parliamentary Terms

#### Question Hour
The day’s business normally begins with the Question Hour during which questions asked by the members are answered by the Ministers. The different types of questions are:

1. **Starred Question** is one for which an oral answer is required to be given by the Minister on the floor of the House. Supplementary questions can be asked to such questions and no supplementary questions can be asked with regard to such questions.

2. **Unstarred Question** is one for which the Minister lays on the table a written answer. A 10-day notice has to be given to ask such questions and no supplementary questions can be asked with regard to such questions.

3. **Short Notice Question** is one for which can be asked by members on matters of public importance of an urgent nature. It is for the Speaker to decide whether the matter is of urgent nature or not. The member has also to State reasons for asking the question while serving notice.

#### Zero Hour
This period follows the Question Hour and generally begins at noon. Usually the time used by the members to raise various issues for discussion.

#### Cut Motion
A motion that seeks reduction in the amount of a demand presented by the Government is known as a cut motion. Such motions are admitted at the Speaker’s discretion. It is a device through which members (generally of the Opposition) can draw the attention of the Government to a specific grievance or problem. There are three types of cut motions:

1. **Disapproval of policy cut** which is to express disapproval of the policy underlying a particular demand, says that ‘the amount of the demand be reduced by Re. 1’.

2. **Economy cut** asks for a reduction of the amount of the demand by a specific amount. The aim is to affect economy in the expenditure.

3. **Token cut** is a device to ventilate specific grievances within the sphere of the Government’s responsibility. The grievance has to be specified. Usually the motion in the form, "the amount of the demand be reduced by Rs. 100”.

#### Adjournment Motion
It is a motion to adjourn the proceedings of the House so as to take up for discussion some matter of urgent public importance. Any member can move the motion and, if more than fifty members support the demand, the Speaker grants permission for the motion. The notice for such a motion has to be given before the commencement of the sitting on the day.

#### Calling Attention Motion
A member may, with prior permission of the Speaker, call the attention of a Minister to any matter of urgent public interest or ask for time to make a Statement.

#### Privilege Motion
It is a motion moved by a member if he feels that a Minister has committed a breach of privilege of the House or of any one or more of its members by withholding facts of a case or by giving a distorted version of acts.

#### Point of Order
A member may raise a point of order if the proceedings of the House do not follow the normal rules. The presiding officer decides whether the point of order raised by the member should be allowed.
Vote on Account: As there is usually a gap between the presentation of the Budget and its approval, the vote on account enables the Government to draw some amount from the Consolidated Fund of India to meet the expenses in the intervening period.

Guillotine: On the last of the allotted days at the appointed time the Speaker puts every question necessary to dispose of all the outstanding matters in connection with demands for grants. This is known as guillotine. The guillotine concludes the discussion on demands for grants.

Quorum: It is the minimum number of members whose presence is essential to transact the business of the House. Article 100 provides that the quorum of either House shall be one-tenth of the total number of members of the House.

No-Confidence Motion: According to the Constitution, the Council of Ministers stays in office only so long as it enjoys the confidence of the Lok Sabha; once the confidence is withdrawn the Government is bound to resign. The rules of parliamentary procedure accordingly provide for moving a motion to ascertain this confidence. The motion is generally known as the 'no-confidence motion'.

Censure Motion: A censure motion differs from a no-confidence motion in that the latter does not specify any ground on which it is based, while the former has to mention the charges against the Government for which it is being moved. A censure motion can be moved against the Council of Ministers or against an individual Minister for failing to act or for some policy. Reasons for the censure must be precisely enumerated. The Speaker decides whether or not the motion is in order, and no leave of the House is required for moving it.

Lame-duck Session: Session held when a new parliament has been elected but the old Parliament meets for the last time before it is dissolved. The lame-ducks are the members of the parliament who have not got re-elected.

Shadow Cabinet: A Parliament practice prevalent in the UK where senior members of the Opposition cover the areas of responsibility of the actual cabinet. They will form the cabinet if their party is elected to the government.

Leader of the Opposition

Government has given statutory recognition to the leaders of the Opposition in the Lok Sabha and Rajya Sabha.

Necessary legislation to this effect was passed by Parliament in 1977 and the Rules framed thereunder were brought into effect on November 1, 1977.

For the first time Y.B. Chavan of the Congress (I) was given the official status of Leader of the Opposition in the Lok Sabha with the rank of a Cabinet Minister.

The Funds

All money received by the Government of India is credited to the Consolidated Fund of India, or the Public account of India.

The consolidated Fund of India consists of:

- All revenues received by the Government of India
- All loans raised by the Government of India
- All money received by Government in repayment of loans [Ref: Art. 266(1)]
- All other public money received by or on behalf of the Government of India is credited to the Public Accounts of India.

The method of election may encourage separatist tendencies.

Powers of Governor

The Governor has no diplomatic or military powers like the President, but he has executive, legislative and judicial powers analogous to those of the President.
Executive: Governor has the power to appoint Council of Ministers, Advocate General and the members of the State Public Service Commission.

The Ministers as well as Advocate General hold office during the pleasure of the Governor but the Members of the State Public Service Commission can be removed only by the President on the report of the Supreme Court and in some cases on the happening of certain disqualifications [Ref.: Art. 317].

The Governor has no power to appoint Judges of the State High Court but he is entitled to be consulted by the President in the matter [Ref.: Art. 217(1)].

Like the President the Governor has the power to nominate members of the Anglo-Indian community to the Legislative Assembly of his State.

To the Legislative Council, the Governor can nominate persons having special knowledge or practical experience of literature, science, art, co-operative movement and social service [Ref.: Art. 171(5)].

‘Co-operative movement’ is not included in the corresponding list for Rajya Sabha.

Legislative: Governor is a part of the State Legislature and he has the right of addressing and sending messages, and of summoning, proroguing and dissolving the State Assembly.

Judicial: The Governor has the power to grant pardons, reprieves, respites, or remission etc. of punishments [Ref.: Art. 161].

Emergency: The Governor has no emergency powers to counter external aggression or armed rebellion.

He has the power to report to the President if Government of the State cannot be carried on in accordance with the Constitution [Ref.: Art. 356].

Chief Minister and The State Council of Ministers

Chief Minister is the head of the State Council of Ministers.

The Chief Minister is appointed by the Governor.

The other Ministers are appointed by the Governor on the advice of Chief Minister.

Any person may be appointed a Minister but he must become member of the legislature within six months of such appointment.

The Council of Ministers is collectively responsible to the Legislative Assembly of the state but individually responsible to the Governor.

The relation between the Governor and his Ministers is similar to that between the President and his Ministers.

Discretionary functions of the Governor

The functions which are specially required by the Constitution to be exercised by the Governor in his discretion are:

☆ The Governor of Assam can determine the amount payable by the State of Assam to the District Council, as royalty accruing from licences for minerals. ☆ Where a Governor is appointed administrator of an adjoining Union Territory, he can function as such administrator independently of his Council of Ministers.

☆ The President may direct that the Governor of Maharashtra or Gujarat shall have a special responsibility for taking steps for the development of Vidarbha

and Surashtra. ☆ The Governor of Nagaland has similar special responsibility with respect to law and order in that State. ☆ Governor of Manipur has special responsibility to secure the proper functioning of the Committee of the Legislative Assembly consisting of the members elected from the Hill Areas of that State. ☆ Governor of Sikkim has special responsibility for peace and equitable arrangement for ensuring the social and economic advancement. ☆ The Governor has the power to dismiss an individual Minister at any time. ☆ The Governor can dismiss a Council of Ministers or the Chief Minister, only when the Council of Ministers has lost confidence of the Legislative Assembly and the Governor does not think fit to dissolve the Assembly.

The Advocate-General

Each state has an Advocate-General, an official corresponding to the Attorney-General of India and having similar functions for the State.

He is appointed by the Governor of the state and holds office during the pleasure of the Governor.

Only a person who is qualified to be a judge of a High Court can be appointed Advocate-General. He receives such remuneration as the Governor may determine.

He has the right to speak and to take part in the proceedings of, but no right to vote in, the Houses of the Legislature of the state [Ref.: Art. 177].

The State Legislature

Some states have bi-cameral Legislature (having two Houses). The Seven States having two Houses are Andhra Pradesh, Telangana, Bihar, Karnataka, Maharashtra, Uttar Pradesh and Jammu & Kashmir.

In the remaining States, the Legislature is uni-cameral and has the Legislative Assembly only.

For creation or abolition of Legislative Council, the Legislative Assembly of the State should pass a resolution by a special majority followed by an Act of Parliament [Ref. : Art. 169].

The size of the Legislative Council may vary but its membership should not be more than 1/3 of the membership of the Legislative Assembly but not less than 40.

Legislative Council is a partly nominated and partly elected body.

Election to the Legislative Council is indirect and in accordance with proportional representation by single transferable vote.

5/6 of the total number of members of the Council is indirectly elected and 1/6 is nominated by the Governor.

1/3 of the total members of the Council is elected by local bodies such as municipalities, district boards.

1/12 is elected by graduates of three years' standing residing in the State.

1/12 is elected by teachers of secondary schools or higher educational institutions.

<table>
<thead>
<tr>
<th>The Strength of Legislative Councils</th>
<th>State</th>
<th>Total Seats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Telangana</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Bihar</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Jammu &amp; Kashmir</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Karnataka</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Maharashtra</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>99</td>
<td></td>
</tr>
</tbody>
</table>
1/3 is elected by members of the Legislative Assembly from amongst persons who are not members of the Assembly.

The remainder is nominated by the Governor from persons specialised in literature, science, art, co-operative movement and social service.

The Court cannot question the *bona fides* or propriety of the Governor's nomination in any case.

The Legislative Assembly of each State is directly elected on the basis of adult suffrage from territorial constituencies.

The Number of members of the Assembly can not be more than 500 nor less than 60.

The Assembly in Mizoram and Goa have only 40 members each. While the Assembly in Sikkim has only 32 members.

Governor can nominate one member of the Anglo-Indian community in the Assembly [Ref.: Art. 333].

The duration of the Legislative Assembly is five years. It may be dissolved sooner than five years, by the Governor.

The term of five years may be extended by the Parliament in case of a Proclamation of Emergency by the President for not more than one year at a time [Ref.: Art. 172(1)].

Legislative Council (Vidhan Parishad) is a permanent body like the Council of State (Rajya Sabha).

The Legislative Council is not dissolved. One-third of the members of Legislative Council retire on the expiry of every second year [Ref.: Art. 172(2)].

A Legislative Assembly has its Speaker and Deputy Speaker and a Legislative Council has its Chairman and Deputy Chairman, and the provisions relating to them are analogous to those relating to the corresponding officers of the Union Parliament.

Qualifications for membership of State Legislature are:

- Should be a citizen of India;
- For Legislative Assembly, not less than twenty-five years of age and for Legislative Council not less than thirty years of age;
- Should possess other qualifications prescribed in that behalf by or under any law made by Parliament [Ref.: Art. 173].

### The Strength of Legislative Assembly in States/U.Ts

<table>
<thead>
<tr>
<th>State/U.T.</th>
<th>Strength</th>
<th>State/U.T</th>
<th>Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uttar Pradesh</td>
<td>403</td>
<td>Haryana</td>
<td>90</td>
</tr>
<tr>
<td>West Bengal</td>
<td>294</td>
<td>Jammu-Kashmir</td>
<td>87*</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>288</td>
<td>Jharkhand</td>
<td>81</td>
</tr>
<tr>
<td>Bihar</td>
<td>243</td>
<td>Uttar Pradesh</td>
<td>70</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>234</td>
<td>Delhi (NCT)</td>
<td>70</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>230</td>
<td>Himachal Pradesh</td>
<td>68</td>
</tr>
</tbody>
</table>

### Comparison of Legislative Procedures between Bi-cameral State Legislature and the Parliament

- For Money Bills, the position is the same.
- For other Bills the only power of the Council is to interpose a delay of 3 months. In case of disagreement, the Bill is second time referred to the Legislative Council and this time the Council has no power to withhold the Bill for more than a month [Ref.: Art. 197(2)(b)].

### Governor's Power of Veto

- When a Bill is presented before the Governor after its approval by the Houses of the Legislature, the Governor can:
  - Declare his assent to the Bill, in that case it would become law at once.
  - Declare that he withholds his assent to the Bill, such a Bill fails to become a law.
  - Declare that he withholds his assent to the Bill (other than a Money Bill) and the Bill is returned with a message.
  - Reserve a Bill for the consideration of the President. Such reserving is compulsory where the law in question would derogate the powers of the High Court.

### Power of Governor to Promulgate Ordinances

- The Governor can promulgate Ordinance only when the Legislature, or both Houses thereof, are not in session.
- It must be exercised with the aid and advice of the Council of Ministers.
- The Ordinance must be laid before the State Legislature when it reassembles.
- An Ordinance ceases to have effect after 6 weeks from the date of re-assembly, unless disapproved earlier by that Legislature.
- The Governor himself is competent to withdraw the Ordinance at any time.
- The scope of the Ordinance-promulging power of the Governor is confined to the subjects in Lists II and III of the Seventh Schedule.
21. Special Position of Jammu & Kashmir

- The jurisdiction of the Parliament in relation to Jammu & Kashmir is confined to the Union List, and the Concurrent List.
- Residuary power belongs to the Legislature of Jammu & Kashmir.
- Proclamation of Emergency under Art. 352 on the ground of internal disturbance has no effect in the State of Jammu & Kashmir, without the concurrence of the Government of India.
- No decision affecting the disposition of the State can be made by the Government of India, without the consent of the Government of the State.
- The Union has no power to suspend the Constitution of the State on the ground of failure to comply with the directions given by the Union under Art. 365.
- Arts. 356-357 relating to suspension of constitutional machinery have been extended to Jammu & Kashmir by the Amendment Order of 1964. But "failure" would mean failure of the constitutional machinery of Jammu & Kashmir.
- The Union has no power to make a Proclamation of Financial Emergency with respect to the State of Jammu & Kashmir under Art. 360.
- Jammu & Kashmir has its own Constitution made by a separate Constituent Assembly and promulgated in 1957.
- The Constitution of Jammu & Kashmir (accepting the provisions relating to the relationship of the State with the Union of India), can be amended by an Act of the Legislative Assembly of the State, passed by not less than 2/3 majority.
- No alteration of the area or boundaries of Jammu & Kashmir can be made by Parliament without the consent of the Legislature of the State.
- The jurisdictions of the Comptroller and Auditor-General, the Election Commission, and the Special Leave jurisdiction of the Supreme Court have been extended to Jammu & Kashmir.

22. Panchayats

- Part IX of the Constitution envisages a three-tier system of Panchayats:
  - Panchayat at the village level;
  - The District Panchayat at the district level;
  - The Intermediate Panchayat in States where the population is above 20 lakhs.
- All the seats in a Panchayat are filled by direct election.
- The electorate is named 'Gram Sabha'.
- The Chairperson of each Panchayat is elected according to the law passed by the State.
- Seats are reserved in Panchayat for Scheduled Castes, and Scheduled Tribes in proportion to their population [Art. 243D].
- Out of the reserved seats, 1/3 is reserved for women belonging to Scheduled Castes and Scheduled Tribes. 1/3 of the total seats to be filled by direct election in every Panchayat is reserved for women.
- A State can make similar reservation for Chairpersons in the Panchayats.
- Every Panchayat can continue for 5 years from the date of its first meeting. It can be dissolved earlier in accordance with State law.
- A Panchayat reconstituted after premature dissolution, continues only for the remainder of the period. But if the remainder of the period is less than 6 months, it is not necessary to hold elections.
- All persons above 21 years of age and qualified to be a member of the State Legislature are qualified as a member of a Panchayat [Art. 243F].
- Panchayats can be entrusted to prepare and implement plans for economic development and social justice.
- A State can authorise a Panchayat to levy, collect and appropriate taxes, duties, tolls etc.
- After the 73rd amendment of the Constitution (25 April, 1993), every 5 years the States appoint a Finance Commission to review the financial position of the Panchayats and make recommendations.
- State Election Commission consisting of a State Election Commissioner is appointed by the Governor for superintendence, direction and control of elections to Panchayats [Art. 243K].
- The Community Development Programme was launched on Oct. 2, 1952.
- The Democratic Decentralisation was implemented for the first time in 1958 in some areas of Andhra Pradesh on experimental basis.
- The Panchayati Raj was introduced for the first time on Oct. 2, 1959 in Nagaur District of Rajasthan by the Prime Minister Jawahar Lal Nehru.
- Rajasthan is the first state in India, where Panchayati Raj was implemented in the whole state.
23. Municipalities

PART IXA gives a constitutional foundation to the local self-government units in urban areas.

Most provisions for municipalities are similar to those contained in PART IX, e.g., Structure, Reservation of Seats, Functions, Sources of Income etc.

Nagar Panchayat is for an area being transformed from a rural area to an urban area.

Municipal Corporation is for a smaller urban area.

Municipal Corporation is for a larger urban area. The municipal corporation is the topmost urban local government.

The members of a municipality are generally elected by direct election.

The Legislature of a State can provide for representation in municipalities of:
- Persons having special knowledge or experience in municipal administration.
- Members of Lok Sabha, State Assembly, Rajya Sabha and Legislative Council.
- The Chairpersons of Ward Committees.

Note: If the population is 3 lacs or more Ward Committees are constituted.

Two Committees constituted for preparing development plan are:
- A District Planning Committee at the district level
- A Metropolitan Planning Committee at the metropolis level

24. The Supreme Court

Every Judge of the Supreme Court after consulting the Chief Justice of the Supreme Court, is appointed by the President of India.

In appointment of the Chief Justice of India, President can consult such Judges of the Supreme Court and the High Court as he thinks appropriate.

A person is qualified for appointment as a judge of the Supreme Court, if he is:
- A citizen of India
- Has been a High Court Judge for at least 5 years
- Has been an Advocate of a High Court, or two or more courts in succession for at least 10 years [Ref.: Art. 124(3)].

No minimum age or fixed period of office is prescribed for appointment as a Judge of the Supreme Court.

A Judge of Supreme Court ceases to be so, on:
- Attaining the age of 65 years; resignation in writing addressed to the President; resignation in writing addressed to the Speaker or the Chairman.
- On being removed by the President. The only grounds for such removal are proved misbehaviour and incapacity [Ref.: Art. 124(4)].

Procedure for removal or impeachment of a Supreme Court Judge:
- A motion addressed to the President signed by at least 100 members of the Lok Sabha or 50 members of the Rajya Sabha is delivered to the Speaker or the Chairman.
- The motion is investigated by a Committee of 3 (2 Judges of the Supreme Court and a distinguishedJurist).
- If the Committee finds the Judge guilty, the report of Committee is considered in the House where the Motion is pending.

25. The High Court

The High Court is the head of the Judiciary in the State.

Every Judge of a High Court is appointed by the President.

In making appointment as a High Court Judge, President can consult the Chief Justice of India, the Governor of the State and also the Chief Justice of that High Court.

A Judge of the High Court can hold office until the age of 62 years.

A High Court Judge can leave his office:
- By resignation in writing addressed to the President.
- By being appointed a Judge of the Supreme Court or being transferred to any other High Court by the President.
- By removal by the President.

The mode of removal of a Judge of the High Court is same as that of a Judge of the Supreme Court.

The qualifications for being a Judge of the High Court are:
- Be a citizen of India. Not above 62 years of age. Must have held for at least 10 years a judicial office in territory of India or experience of at least 10...
years as advocate of a High Court, or of two or more such courts in succession in India.

- Salaries and allowances of the High Court Judges are charged on the Consolidated Fund of the State [Art. 202(3) (d)].
- After retirement a permanent Judge of High Court can not plead or act in a Court or before any authority in India, except the Supreme Court and a High Court in which he has not worked.

The High Courts : Seats and Jurisdiction

<table>
<thead>
<tr>
<th>Name</th>
<th>Established</th>
<th>Territorial Jurisdiction</th>
<th>Seat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allahabad</td>
<td>1866</td>
<td>Uttar Pradesh</td>
<td>Allahabad (Bench at Lucknow)</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>1934</td>
<td>Andhra Pradesh, Telangana, Hyderabad</td>
<td></td>
</tr>
<tr>
<td>Bombay</td>
<td>1862</td>
<td>Maharashtra, Dadra &amp; Nagar and Arunachal Pradesh</td>
<td>Bombay (Benches at Haveli, Goa, Daman &amp; Diu, Nagpur, Panji, Aurangabad)</td>
</tr>
<tr>
<td>Calcutta</td>
<td>1862</td>
<td>West Bengal, Andman &amp; Nicobar Islands</td>
<td>Kolkata (Bench at Port Blair)</td>
</tr>
<tr>
<td>Delhi</td>
<td>1966</td>
<td>Delhi</td>
<td></td>
</tr>
<tr>
<td>Guwahati</td>
<td>1948</td>
<td>Assam, Nagaland, Micor and Arunachal Pradesh</td>
<td>Guwahati (Benches at Kohima, Aizawl and Itanagar)</td>
</tr>
<tr>
<td>Gujarat</td>
<td>1960</td>
<td>Gujarat</td>
<td>Ahmedabad</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>1966</td>
<td>Himachal Pradesh</td>
<td>Shimla</td>
</tr>
<tr>
<td>Karnataka</td>
<td>1884</td>
<td>Karnataka</td>
<td>Bengaluru (Bench-Dharwad and Gulbarga)</td>
</tr>
<tr>
<td>Kerala</td>
<td>1958</td>
<td>Kerala &amp; Lakshadweep</td>
<td>Ermakulam</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>1966</td>
<td>Madhya Pradesh</td>
<td>Jabalpur (Bench-Indore, Gwalior)</td>
</tr>
<tr>
<td>Madras</td>
<td>1862</td>
<td>Tamil Nadu &amp; Puducherry</td>
<td>Chennai (Bench-Madurai)</td>
</tr>
<tr>
<td>Orissa</td>
<td>1948</td>
<td>Odisha</td>
<td>Cuttack</td>
</tr>
<tr>
<td>Patna</td>
<td>1916</td>
<td>Bihar</td>
<td>Patna</td>
</tr>
<tr>
<td>Punjab &amp; Haryana</td>
<td>1975</td>
<td>Punjab, Haryana, Chandigarh</td>
<td>Chandigarh</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>1949</td>
<td>Rajasthan</td>
<td>Jodhpur (Bench-Jaipur)</td>
</tr>
<tr>
<td>Sikkim</td>
<td>1975</td>
<td>Sikkim</td>
<td>Gangtok</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>2000</td>
<td>Chhattisgarh</td>
<td>Bilaspur</td>
</tr>
<tr>
<td>Uttarakhand</td>
<td>2000</td>
<td>Uttarakhand</td>
<td>Nainital</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>2000</td>
<td>Jharkhand</td>
<td>Ranchi</td>
</tr>
<tr>
<td>Manipur</td>
<td>2013</td>
<td>Manipur</td>
<td>Imphal</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>2013</td>
<td>Meghalaya</td>
<td>Shillong</td>
</tr>
<tr>
<td>Tripura</td>
<td>2013</td>
<td>Tripura</td>
<td>Agartala</td>
</tr>
</tbody>
</table>

26. Inter-State Council

- Inter-State Council was constituted in April, 1990 under Art. 263.
- Inter-State Council consists of Prime Minister, 6 Union Cabinet Ministers, the Chief Ministers of all the States and administrators of all UTs.
- The Sarkaria Commission recommended the constitution of a permanent Inter-State Council for co-ordination among States and with the Union. (Justice R.S. Sarkaria died in 2007.)
- Inter-State Council is chaired by the Prime Minister and it meets thrice a year.

27. Finance Commission

- The Constitution provides for the establishment of a Finance Commission (Art. 270, 273, 275 and 280) by the President. The first Finance Commission was constituted in 1951.

Finance Commissions of India

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Constituted</th>
<th>Chairman</th>
<th>Report Implementation Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1951</td>
<td>K.C. Niyogi</td>
<td>1952-1957</td>
</tr>
<tr>
<td>2</td>
<td>1956</td>
<td>K. Santhanam</td>
<td>1957-1962</td>
</tr>
<tr>
<td>4</td>
<td>1964</td>
<td>Dr. P. V. Rajamannar</td>
<td>1966-1969</td>
</tr>
<tr>
<td>5</td>
<td>1968</td>
<td>Mahavir Tyagi</td>
<td>1969-1974</td>
</tr>
<tr>
<td>6</td>
<td>1972</td>
<td>Brahmanand Reddy</td>
<td>1974-1979</td>
</tr>
<tr>
<td>7</td>
<td>1977</td>
<td>J.M. Schelet</td>
<td>1979-1984</td>
</tr>
<tr>
<td>8</td>
<td>1982</td>
<td>Y.B. Chavan</td>
<td>1984-1989</td>
</tr>
<tr>
<td>11</td>
<td>1996</td>
<td>A.M. Khusro</td>
<td>2000-2005</td>
</tr>
<tr>
<td>12</td>
<td>Nov, 2002</td>
<td>C. Rangarajan</td>
<td>2005-2010</td>
</tr>
<tr>
<td>13</td>
<td>Nov, 2007</td>
<td>Dr. Vijay L. Kelkar</td>
<td>2010-2015</td>
</tr>
<tr>
<td>14</td>
<td>Jan, 2013</td>
<td>Y.V. Reddy</td>
<td>2015-2020</td>
</tr>
</tbody>
</table>

- The Finance Commission consists of a Chairman and four other members.
- According to the qualifications prescribed by the Parliament, the chairman is selected among persons who have had experience in public affairs, while the members are selected among persons who:
  - are or have been or are qualified to be appointed judges of the High Court;
  - or
  - have special knowledge of the finance and accounts of government; or
  - have had experience in financial matters and administration; or
  - have special knowledge of economics.
- The members of the commission hold office for such period as may be specified by the President in his orders and are eligible for reappointment.
28. Planning Commission/NITI Aayog

Planning Commission was not mentioned in the Constitution.

Planning Commission was an economic advisory body set up by a resolution of the Union Cabinet in March, 1950.

Pt. Jawahar Lal Nehru was the first and Narendra Modi is the last chairman of Planning Commission.

The Planning Commission consisted of the Chairman, four Ministers as part time members and seven full-time members.

Prime Minister had been the Chairman of Planning Commission.

Main functions of the Planning Commission were:
- To prepare an integrated Five Year Plan for the most effective and balanced utilisation of the country’s resources for economic and social development.
- To act as an advisory body to the Union Government and State Governments.

On 15th August, 2014 the Prime Minister Narendra Modi announced that a new institution would be formed in place of the Planning Commission.

On 1st January, 2015 the ‘NITI Aayog’ was announced.

NITI Aayog

On the 1st January, 2015, by resolution the Government of India constituted a ‘NITI Aayog’ (NITI stands for National Institution for Transforming India).

The Prime Minister of India is the chairperson and Chief Ministers of all the States and Lt. Governor of Andaman & Nicobar Islands (UT) are the members of NITI Aayog’s Governing Council.

The Aayog will have five full-time members, two permanent members, four Union Ministers as ex-officio members and three Union Ministers as special invitees.

Arvind Pangariya (An Indo-US economist and ex-chief Economist of Asian Development Bank) is the first Vice Chairman of the NITI Aayog.

The first meeting of the newly constituted planning body, the NITI Aayog was held on 6 February, 2015.

- President can make proclamation of emergency under Art. 352 in case of war, external aggression, armed rebellion or threat thereof or only on recommendation of the Cabinet.
- Every such proclamation must be laid before Parliament and it ceases to be in operation unless it is approved by resolutions of both Houses of Parliament with special majority within one month from the date of its issue.
- The proclamation gets a fresh lease of 6 months from the date it is approved by both Houses of Parliament.
- After the 44th amendment, proclamation of emergency under Art. 352 can be made in respect of whole of India or only a part thereof.
- During proclamation of emergency, the Union can give directions to any State regarding the exercise of the executive power (Ref. Art. 353(a)).
- During emergency, Parliament can extend the normal life of the Lok Sabha for one year at a time, and not exceeding 6 months after the proclamation has ceased to operate.
- Normal life of Lok Sabha was extended only once in 1976.
- During emergency, Parliament can legislate regarding State subjects.
- During emergency, the President can modify the provisions of the Constitution relating to the allocation of financial resources (Art. 268–279) between the Union and the States by his own Order. Such Order is subject to approval by Parliament (Art. 354) and has no effect beyond the financial year in which the Proclamation itself ceases to operate.

Effects of emergency on Fundamental Rights:

- Art. 358 provides that the rights provided by Art. 19, would be non-existent against the State during emergency.
- Under Art. 359, the right to move the Courts for the enforcement of the rights can be suspended, by Order of the President.
- Articles 20 and 21 cannot be suspended during emergency.

The first proclamation of emergency under Art. 352 was made by the President on October 26, 1962 in view of Chinese aggression in the NEFA.

For the first time on June 25, 1975 proclamation of emergency under Art. 352 was made on the ground of “internal disturbance”.

A proclamation of emergency for failure of constitutional machinery can be made by the President when the Constitutional Government of State cannot be carried on for any reasons (Ref. Art. 356).

During Emergency under Art. 352, the Centre does not get power to suspend the State Government.

33. Public Service Commissions

- Constitution provides a Public Service Commission for the Union, a Public Service Commission for each State or a Joint Public Service Commission for a group of States.
- A Joint Public Service Commission can be created by Parliament in pursuance of a resolution passed by the State Legislatures concerned.
- The Union Public Service Commission can serve the needs of a State, if so requested by the Governor of that State and approved by the President (Ref. Art. 315).
- The appointment, determination of number of members of the Commission and their conditions of service is done by:
  - The President in the case of the Union or a Joint Commission, and
  - The Governor of the State in the case of a State Commission.
- Conditions of service of a member of the Public Service Commission can not be varied to his disadvantage after his appointment (Art. 318).
- Half of the members of a Commission should be persons who have held office under the Government of India or of a State for at least 10 years (Art. 316).
- The term of service of a member of a Commission is 6 years from the date of his entering upon office, or until the age of retirement, whichever is earlier.
- Age of retirement for a member of UPSC is 65 years.
- Age of retirement for a member of PSC of a State or a Joint Commission is 62 years.
- Services of a member of a Public Service Commission can be terminated by:
  - Resignation in writing addressed to the President (to the Governor in the case of a State Commission).
  - Removal by the President.
- President can remove a member if he is:
  - adjudged insolvent; or
  - engages himself in paid employment outside the duties of his office; or
  - is infirm in mind or body; or
  - found guilty of misbehaviour by the Supreme Court.
- Even in the case of a State Commission, only the President can remove a member, while Governor has only the power to pass an interim order of suspension.
- The expenses of the Commission are charged on the Consolidated Fund of India or of the State (as the case may be) (Ref. Art. 322).
Disabilities imposed upon the Chairman and members of the Commission for future employment under the Government are:

- The Chairman of the UPSC is ineligible for further employment either under the Government of India or under the Government of a State.
- The Chairman of a State Public Service Commission is eligible for appointment as the Chairman or member of the Union Public Service Commission or as the Chairman of any other State Public Service Commission, but not for any other employment either under the Government of India or under the Government of a State.
- A member of a State Public Service Commission is eligible for appointment as the Chairman of a State Public Service Commission and Chairman or member of UPSC, but not for any other employment either under the Government of India or under the Government of a State.
- The Public Service Commissions are advisory bodies. Government can accept its recommendation or depart from it.

**Functions of Public Service Commission:**

- To conduct examination for appointments to the services of the Union and States.
- To advise on any matter so referred to them and on any other matter which the President or the Governor of a State may refer to the appropriate Commission
- To exercise such additional functions as may be provided for by an Act of Parliament or of the Legislature of a State.

### 34. Election

The general election is held on the basis of adult suffrage.

- Every person who is a citizen of India and not less than 18 years of age is entitled to vote at the election, provided he is not disqualified by law.
- Election to Parliament or the Legislature of a State can be called in question only by an election petition in the High Court, with appeal to the Supreme Court
- The exclusive forum for adjudicating disputes relating to the election of the President and Vice-President is the Supreme Court

**Election Commission**

- In order to supervise the entire procedure and machinery for election and for some other ancillary matters, the Constitution provides for this independent body.
- The Election Commission is independent of executive control to ensure a fair election.
- The Election Commission consists of a Chief Election Commissioner and two other Election Commissioners.
- President can determine the number of Election Commissioners

**Chief Election Commissioner (CEC)**

- The President appoints the Chief Election Commissioner who has a tenure of 6 years, or up to the age of 65 years, whichever is earlier.
- The CEC enjoys the same status and receives the same salary and perks as available to judges of the Supreme Court.
- The Chief Election Commissioner can be removed from his office only in a manner and on the grounds prescribed for removal of judge of the Supreme Court.
- Other Election Commissioners can be removed by the President on the recommendation of the Chief Election Commissioner.
- The Election Commission has the power of superintendence, direction and conduct of all elections to Parliament and the State Legislatures and of elections to the offices of the President and Vice-President.
- Regional Commissioners can be appointed by the President in consultation with the Election Commission for assisting the Election Commission

**Chief Election Commissioner of India**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name</th>
<th>Date of Appointment</th>
<th>Date of Retirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td>N. Gopalaswami</td>
<td>20 April, 2009-29 July, 2010</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>H. S. Bhakta</td>
<td>19 April, 2015-</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Naseem Zaidi</td>
<td>19 April, 2015-</td>
<td></td>
</tr>
</tbody>
</table>

- The main functions of the Election Commission are:
  1. The preparation of electoral rolls before each general election and registration of all eligible voters.
  2. The delimitation of constituencies.
  3. The recognition of various political parties and allotment of election symbols to these parties.
  4. The preparation of a code of conduct for the political parties.
36. The Official Languages

The official language of the Union is Hindi in Devanagri script [Art. 343]. English was to continue to be used as principal official language of the Union side-by-side with Hindi till 1965.

The first Official Language Commission was appointed in 1955 under Shri B.G. Kher as Chairman and it recommended that a rigid date line for change over of language should not be prescribed. This recommendation was accepted.

Language of the State/Link Language:

- Article 345 seeks to tackle the issue of the official language for each state and the language for intra-State official transactions.
- The Legislature of a State can adopt any one or more languages used in the State or Hindi for the official purposes of that State. There is also a provision for the recognition of any other language for the official purpose of a State or any part thereof, upon a substantial popular demand for it being made to the President [Ref.: Art. 347].

Language of the SC and HCs and authoritative text of laws:

- Until Parliament by law provides otherwise, English is the language of authoritative text of—
  - All proceedings in the Supreme Court and in every High Court. All Bills or amendments thereto moved in either House of Parliament or the State Legislature. All Acts passed by Parliament or the Legislature of a State. All Ordinances promulgated by the President or the Governor of a State. All orders rules, regulations and by-laws issued under Constitution or any law made by Parliament or the legislature of a State.
  - A State Legislature can prescribe the use of any language other than English for Bills and Acts passed by itself or Subordinate Legislation made thereunder.

- The languages included in the 8th Schedule of the Constitution are: Assamese, Bengali, Gujarati, Hindi, Kannada, Kashmiri, Konkani, Malayalam, Manipuri, Marathi, Nepalese, Oriya, Punjabi, Sanskrit, Sindhi, Tamil, Telugu, Urdu, Maithili, Santhali, Dogri and Bodo.

- Sindhi was inserted by the Constitution (21st Amendment) Act, 1967.
- Konkani, Manipuri and Nepali were inserted by the Constitution (71st Amendment) Act, 1992.
- Maithili, Dogri, Bodo and Sarnthali were inserted by the Constitution (92nd Amendment) Act, 2003.

- The only privileges gained by the languages included in the 8th Schedule are—
  - To have a member in the Official Language Commission.
  - To be considered for contribution towards the development of Hindi language.

37. National Symbols

- The National flag is a horizontal tricolour of deep saffron (Kesaria) at the top, white in the middle and dark green at the bottom in equal proportion. The ratio of width of the flag to its length is two to three. In the centre of the white
band is a navy-blue wheel which represents the chakra. Its design is that of the wheel which appears on the abacus of the Sarnath Lion Capital of Ashoka. Its diameter approximates to the width of the white band and it has 24 spokes. The design of the National Flag was adopted by the Constituent Assembly of India on 22 July, 1947.

Apart from non-statutory instructions issued by the Government from time to time, display of the National Flag is governed by the provisions of the Emblems and names (Prevention of Improper Use) Act, 1950 (No.12 of 1950) and the Prevention of Insults to National Honour Act, 1971 (No. 69 of 1971).

The Flag Code of India, 2002, took effect from 26 January, 2002 which brings together all such laws, conventions, practices and instructions for the guidance and benefit of all concerned.

In an important judgement in January, 2004 the Supreme Court (under the chairmanship of the Chief Justice B.N. Khare) pronounce that unfurling (hoisting) of National Flag is a fundamental right under Article 19 (1) (A).

Note: For the first time the National Flag of India was hoisted in the mid-night of 14th August, 1947.

**State Emblem**

The state emblem is an adaptation from the Sarnath Lion Capital of Ashoka. In the original, there are four lions, standing back to back, mounted on an abacus with a frieze carrying sculptures in high relief of an elephant, a galloping horse, a bull and a lion separated by intervening wheels over a bell-shaped lotus. Carved out of a single block of polished sandstone, the Capital is crowned by the Wheel of the Law (Dharma Chakra).

In the state emblem, adopted by the Government of India on 26th January, 1950 only three lions are visible, the fourth being hidden from view. The wheel appears in relief in the centre of the abacus with a bull on right and a horse on left and the outlines of other wheels on extreme right and left. The bell-shaped lotus has been omitted. The words *Satya meva Jayate* from Mundaka Upanishad, meaning ‘Truth Alone’ Triumphs, are inscribed below the abacus in Devanagari script.

The use of the state emblem of India, as the official seal of the Government of India, is regulated by the State of India (Prohibition of Improper Use) Act, 2005.

**National Anthem**

The song *Jana-gana-mana*, composed originally in Bengali by Rabindranath Tagore, was adopted in its Hindi version by the Constituent Assembly as the National Anthem of India on 24 January, 1950. It was first sung on 27 December 1950 at the Kolkata Session (Chaiman—Pt. Vishwan Narayan Dutta) of the Indian National Congress. The complete song consists of five stanzas.

Rabindranath Tagore had published it in *Tatvabodhini* in 1912 with the title ‘Bharat Bhagya Vidhata’ and translated it into English in 1919 with the title ‘Morning song of India’. The credit of composing the present tune (Music) of our national anthem goes to Captain Ram Singh Thakur (an I N A sepoy).

Playing time of the full version of the national anthem is approximately 52 seconds. A short version of the first and last lines of the stanza (Playing time approximately 20 seconds) is also played on certain occasions.

**National Song**

The song *Vande Mataram*, composed in Sanskrit by Bankimchandra Chatterji, was a source of inspiration to the people in their struggle for freedom. It has an equal status with *Jana-gana-mana*. The first political occasion when it was sung was at the 1896 session (Chairman—Rahimtulla Sayani) of Indian National Congress.

The song was published in the novel ‘Anandmath’, authored by Bankimchandra Chatterji and was adopted as the National Song on 26 January, 1950.

Playing time of this song one (1) minute and five (5) seconds (65 seconds). No body can be forced to sing the National Song.

Note: Session of Parliament begins with *Jana-gana-mana* and concludes with *Vande Mataram*.

**National Calendar**

The National Calendar based on the Saka Era, Chaitra as its first month and a normal year of 365 days was adopted from 22nd March 1957 along with the Gregorian calendar for the following official purposes: (i) Gazette of India, (ii) news broadcast by All India Radio, (iii) calendars issued by the Government of India and (iv) Government communications addressed to the members of the public.

Dates of the National Calendar have a permanent correspondence with dates of the Gregorian calendar, 1 Chaitra falling on 22 March normally and on 21 March in leap year.

**National Animal**: The magnificent tiger, *Panthera tigris*.

**National Bird**: The Indian peacock, *Pavo cristatus*.

**National Flower**: Lotus (*Nelumbo Nucifera Gaertn*).

**National Tree**: The Banyan Tree (*Ficus benghalensis*).

**National Fruit**: Mango (*Mangifera indica*).

**National Aquatic Animal**: The mammal Ganges River Dolphin (*Platanista gangetica*).

---

**38. Glossary of Constitutional Terms**

*Act of God*, is a direct, violent, sudden and irresistible act of nature, which could not be by any reasonable care have been foreseen or resisted.

*Act of Parliament*, means a bill passed by the two Houses of Parliament and assented to by President and in the absence of an express provision to the contrary, operative from the date of notification in the Gazette.

*Act of State*, means the act of sovereign power of a country or its agent (if acting intra-vires). By its very nature such an act can not be questioned by any Court of Law.

*Address of President*, is the prepared speech delivered by the President of India to both Houses of Parliament assembled together at the commencement of the first
Session after each general election to Lok Sabha and at the commencement of the first Session of each year informing Parliament of the causes of its summons which is later laid before and discussed on a formal Motion of Thanks in each House of Parliament or an address by the President of India to either House of Parliament of both Houses, assembled together on any other occasion.

**Adjournment Motion**, if Speaker gives his consent after satisfying himself that the matter to be raised is definitely urgent and of public importance and holds that the matter prepared to be discussed is in order, he shall call the member concerned who shall rise in his place and ask for leave to move the adjournment of the House. If objection to leave being granted is taken, the Speaker shall request those members who are in favour of leave being granted to rise in their places, and if not less than fifty members rise accordingly, the Speaker shall intimate that leave is granted, if not, he shall inform the House that the members have not to leave the House.

**Adjournment of House**, in Lok Sabha, the Speaker determines when sitting of House is to adjourn sine die or to a particular day or to an hour or part of same day while in Rajya Sabha it is the Chairman who determines.

**Admonition**, is a judicial or ecclesiastic censure or reprimand.

**Advocate-General**, the Attorney-General and after him, the Advocate-General of a State have precedence over other advocates.

**Affirmation**, is a solemn declaration without oath.

**Amendment**, is a device to alter a motion moved or question under discussion in the legislature, includes omission, substitution, addition and insertion of certain words, figures or marks to the clause of a bill, a resolution or a motion or to an amendment made thereof.

—is a structural improvement.

**Anglo-Indian**, is of a British birth but living or having lived long in India.

**Appeal**, is the judicial examination of the decision by a higher court of the decision of an inferior court.

**Appropriation Bill**, is the act of devoting or reserving for special or distinct purpose or of destroying to a particular end; anything set aside especially money for a specific use.

**Arrest**, is the restraining of the liberty of a man's person in order to compel obedience to the order of a court of justice, or to prevent the commission of a crime, or to ensure that a person charged or suspected of a crime may be forthcoming to answer it.

—is when one is taken into custody and restrained from his liberty.

**Assent to Bill**, is ratification, sovereign's formal acquiescence in a measure passed by legislature.

**Attorney-General**, is the Chief Law Officer of a country, legal adviser to the Chief Executive.

**Backward Classes**, the list of OBCs are prepared by the Central Government and are revised after the expiry of every 10 years.

—are the classes slow in development.

**Ballot**, is a small ball ticket or paper used in secret voting.

**Begar**, is a labour or service exacted by court or a person in power without giving remuneration.

**Bill**, is a draft of a law proposed to a lawmaking body.

—is the draft or form of an Act presented to a legislature but not enacted.

**Breach of privilege**, disregard of any of the privileges, rights and immunities of the members of Parliament individually or of either House of Parliament in its collective capacity or of its committees, also includes action which obstruct the House in the performance in its functions and thereby lower its dignity and authority such as disobedience of its legitimate order or libel upon itself, or its member or officers which are called contempt of the House.

**Budget**, refers to the statement of the estimated receipts and expenditure of the Government of India known as annual financial statement; it is caused to be laid before both Houses of Parliament by the President in respect of every financial year on such day as he may direct.

**Bulletin**, is an official notice of a public transaction or matter of public importance.

**Business to the House**, is the relative order of the items of business in the House of a legislature to be taken up on a particular day.

**Cabinet**, is a private and confidential assembly of the most considerable minister of State of concert measures for the administration of public affairs.

**Censure Motion**, is a motion moved against the government censuring its policy in some direction or an individual minister or minister of the Government.

**Certiorari**, is a writ of High Court to an inferior court to call up the records of a case therein depending that conscionable justice may be therein administered.

—is issued by the superior Court to inferior judicial or quasi-judicial body, grounds for invoking are excess of jurisdiction, violation of natural justice, fraud and terms on the face of the record. Conditions for issuing this writ are: (i) a body of persons having legal authority, (ii) to determine questions altering rights of subjects, (iii) having the duty to act judicially, (iv) act in excess of their legal authority, (v) issued on constitutional grounds also.

**Chief whip**, is the chief of the whips of different political parties in Parliament (generally the Minister of Parliamentary Affairs).

**Citizen**, is a member of a State or nation, especially one with a republican form of government, who owes allegiance to it by birth or naturalisation and is entitled to full civil rights.

**Closure**, is the Parliamentary Procedure by which debate is closed and the measure under discussion brought up for an immediate vote.

—is the procedure in deliberative assemblies whereby debate is closed.

**Coalition**, usually takes place in multi-party system in which no single party is able to command support of a working majority.

**Comptroller and Auditor-General**, is the officer who is responsible for the auditing of all public accounts.
Concurrent List, is a list of subjects appended to a federal Constitution in respect of which the federal legislature and the State of regional legislatures have power to make laws, federal law prevailing in case of conflict.

Consolidated fund, is a repository of public money which now comprises the produce of customs, excise, stamps and several other taxes, and some small receipts from the royal hereditary revenue surrendered to its public use.

Constituent Assembly, is a legislative body charged with the task of framing or revising a Constitution, set up for India after it became independent in 1947 for the purpose of framing its Constitution.

Constitution, is the system of fundamental laws and principles of a government written or unwritten.

— is the basic law defining and delimiting the principal organs of Government and their jurisdiction as well as the basic rights of men and citizens.

Contempt of court, is a disobedience or disregard of the rules, orders, process, or dignity of a court, which has power to punish for such offence by committal.

Contingency fund, is placed at the disposal of the executive to meet the unforeseen expenditure.

Court, is a place where justice is judicially administered.

Debate, is a Parliamentary discussion.

Defection, is abandonment of loyalty, duty, principle etc.,

Delegated legislation, is rules and regulations with the effect of law made by the executive under statutory sanction by Parliament.

Deprivation, is a loss of dismissal from office.

— refers to property taken under the power of eminent domain.

Deputy Speaker, is the Officer of the House of a legislature who takes the Chair during the absence of the Speaker and performs his duties in relation to all proceedings in the House.

Directive Principles of State Policy, lay down guidelines which can be implemented only by passing legislation.

Discrimination, is a difference in treatment of two or more persons or subject.

— is an act of depriving an individual or a group of equality of opportunity.

Dissolution, is the civil death of Parliament.

Doctrine of severability, is a rule of interpretation; it means that where some particular provision of statute offends against a constitutional limitation, but that be declared void by the court and not the entire statute.

Double jeopardy, is subjection of an accused person to repeated trial for the same alleged offence.

Due process of law, is the law in conformity with due process a concept adopted by the American Constitution; the process of law which hears before it condemns; judiciary can declare a law bad, if it is not in accordance with due process even though the legislation may be within the competence of the legislature concerned.

Election, is act of selecting one or more form a greater number for an office.

Election Commission, is a constitutional body created for the purpose of holding elections to Parliament, State Legislatures and Offices of President and Vice-President.

Electoral college, is an intermediary body chosen by electors to choose the representatives in an indirect election.

Electoral roll, is known as voter's list in common parlance; is the basic document on which the whole electoral process is founded.

Equal protection, all individuals and classes will be equally subjected to the ordinary law administered by the law courts.

Equality, is the state of being equal in political, economic and social rights.

Existing law, is the law in force at the passage of an Act.

Expulsion, is the unseating of members for offences committed against the House or for grave misdemeanours.

Extradition, is the surrender by a foreign State of a person accused of a crime to the State where it was committed.

Financial memorandum, is a memorandum required to accompany all bills involving expenditure.

Fundamental duties, are certain obligations on the part of a citizen which he or she owes towards the State so that the individual may not overlook his duties to the community while exercising his fundamental right or commit wanton destruction of public property or life.

Fundamental rights, is protected and guaranteed by the written Constitution of a State.

Gazette, is the official newspaper of the Government.

— Is known as the Gazette of India or the Official Gazette of a State.

Government, is an established system of political administration by which State is governed.

Habeas corpus, commands a Judge of the inferior court to produce the body of the defendant with a statement of the cause of his detention, to do and to receive whatever the higher court shall decree.

Hung Parliament, is a Parliament wherein no party has won a working majority.

Impeachment, a person found guilty may be removed from his office.

Joint sitting, is a joint sitting of both Houses of a bicameral legislature for setting a disagreement between them.

Judgment, order or sentence given by a judge or law court.

Judicial review, is the power of the court to review statutes or administrative acts and determine their constitutionality. The examination of federal and State statutes and the acts of executive officials by the Courts to determine their validity according to written Constitutions.

Judiciary, is the body of officers who administer the law.

Law, all the rules of conduct established and enforced by the authority.
Legislative relations, in case of conflict the union law prevails.

Legislature, is the body of persons in a State authorized to make, alter and repeal law. It may consist of one or two Houses with similar or different powers.

Liberty, is something which results from a permission given to or something enjoyed under sufferance by a particular person or body or persons as opposed to enjoyment by all and sundry.

Locus standi, means a place for standing, right to be heard.

Maiden speech, is one's first or earliest speech especially in Parliament.

Martial law, is arbitrary in its decisions and is not built on any settled principles.

Migration, means coming to India with the intention of residing here permanently.

Minority, is racial, religious or political groups smaller than and differing from larger controlling group of which it is a party.

Money Bill, is a bill which contains only provisions dealing with the imposition, repeal, remission, alteration or regulation of taxes etc.

Motion, is a proposal made in the House of a legislature to elicit its decision on a subject.

Oath, is a ritualistic declaration, based on an appeal to God or some revered person or object that one will speak the truth, keep a promise, remain faithful etc.

Office of profit, is an employment with fees and emoluments attached to it where pay or salary is attached to an office, it immediately and indisputably makes the office and 'office of profit'.

Official gazette, means the Gazette of India or the Official Gazette of a State.

Ordinance, is a State paper operative as a fundamental law, yet not describable as either a Constitution or a statute.

Personal liberty, consists in the power of locomotion, of changing situation or moving one's person to whatever place one's own inclination may direct, without imprisonment or restraint unless by due course of law.

Petition, is a solemn, earnest supplication or request to a superior or to a person or group in authority.

Pith and substance, is a doctrine relating to the interpretation of statutes, evolved by the Privy Council, to solve the problem of two competing legislatures.

Preamble, is an introduction, especially one to a constitutional statute etc, stating its reason and purpose.

President, is Chief executive of a Republic.

Presumption of constitutionality, is an assumption made failing proof of the contrary that an enactment is in accordance with the Constitution. The presumption upon him who attacks it to show that there has been a clear transgression of the constitutional principles.

Privilege, is an exceptional right or advantage.
Indian Economy

1. Highlights of Indian Economy

- The growth rate of Gross Domestic Product (GDP) at constant (2011-12) market prices is estimated at 7.3% in 2014-15 (Provisional Estimates). The growth of Gross Value Added (GVA) at basic prices for agriculture & allied sectors, industry sector and services sector are estimated at 0.2%, 6.1% and 10.2% respectively in 2014-15 as compared to the corresponding rates of 3.7%, 4.5% and 9.1% respectively in 2013-14.

- Overall growth in the Index of Industrial Production (IIP) was 2.8% as compared to (-0.1)% in the previous year.

- In the year 2014-15, Eight core infrastructure industries (in six sectors viz. crude oil, natural gas, refinery products, fertilizers, cement and electricity) grew by 3.6% as compared to 4.2% growth in the previous year.

- Foreign exchange reserves were US$352.5 billion at end-May 2015 as compared to US$341.4 billion at end-March 2015 and US$312.4 billion at end-May 2014.

- As per the provisional accounts released by the Controller General of Accounts for 2014-15, fiscal deficit was 4.0% of GDP and revenue deficit was 2.8% of GDP.

- The growth rate of Gross Domestic Product (GDP) at constant (2011-12) market prices is estimated at 7.3% in 2014-15 (provisional estimates), as compared to 6.9% and 5.1% in 2013-14 and 2012-13 respectively.

- The growth rate of Gross Value Added (GVA) at constant (2011-12) basic prices for agriculture & allied sectors, industry sector and services sector are estimated to be at 0.2%, 6.1% and 10.2% respectively in 2014-15 compared to the corresponding rate of 3.7%, 4.5% and 9.1% respectively in 2013-14.

- The final consumption expenditure as a percentage of GDP increased from 69.8% in 2012-13 to 71.0% in 2013-14 and further to 71.5% in 2014-15. Gross fixed capital formation (GFCF) as a percentage of GDP declined from 31.4% in 2012-13 to 29.7% in 2013-14 to 28.7% in 2014-15.

- There was a decline in the rate of gross domestic saving from 33.9% of the GDP in 2011-12 to 31.8% in 2012-13 and further to 30.6% in 2013-14. This was caused mainly by the sharp decline in the rate of household physical savings.

- All India production of food grains: As per the 3rd advance estimates released by Ministry of Agriculture on 13.05.2015, production of total food grains during 2014-15 is estimated at 251.1 million tonnes, compared to 265.6 million tonnes in 2013-14 and 257.1 million tonnes in 2012-13.

- The number of telephone subscribers in India increased to 999.7 million at the end of April 2015. The overall tele-density in India stood at 79.6 at end-April 2015; the urban tele-density was 149.1 and rural tele-density was 48.4.


- The total installed capacity for electricity was 272503.0 MW as on 31st May 2015 of which the share of thermal, hydro, renewable and nuclear sources was 69.5%, 15.3%, 13.1% and 2.1% respectively.
Current Account Deficit (CAD) narrowed sharply to US$ 27.9 billion (1.3% of GDP) in 2014-15 from US$ 32.4 billion (1.7% of GDP) in the previous year.

Net capital inflows increased to US$ 89.3 billion (4.4% of GDP) in 2014-15 from US$ 47.9 billion (2.6% of GDP) in 2013-14 owing largely to higher net inflows of FDI, portfolio investment and NRI deposits.

India’s External Debt remains within manageable limits as indicated by the external debt-GDP ratio of 23.2% at end-December 2014 vis-à-vis 23.7% at end-March 2014. External debt stock stood at US$ 461.9 billion at end-December 2014 recording an increase of 3.5% over the level at end-March 2014. Short-term external debt was US$ 85.6 billion at end-December 2014, declining of 6.7% over the level at end-March 2014. Long-term debt accounted for 81.5% of the total external debt at end-December 2014 (79.5% at end-March 2014).

The average WPI inflation rate for the last 12 months (June 2014 to May 2015) was 0.6% as compared to 6.2% during the corresponding period last year.

The budget estimates the fiscal deficit for 2015-16 is 3.9% as compared to 4.0% in 2014-15 (provisional actual). The budget estimates for revenue deficit for 2015-16 is 2.8%, the same as the provisional actual in 2014-15.

Some Major Economic Decisions in May, 2015

The Central Government notified 1st June 2015 as the date from which the rate of Service Tax of 14% would become applicable. The provisions levying Education Cess and Secondary and Higher Education Cess would also cease to have effect from same date as the same would be subsumed in the service tax rate of 14%.

The Union Cabinet has given its approval to review of Foreign Direct Investment (FDI) Policy on investments by Non-Resident Indians (NRIs), Persons of Indian Origin (PIOs) and Overseas Citizens of India (OCIs). The decision that NRI includes OCI cardholders as well as PIO cardholders is meant to align the FDI policy with the stated policy of the Government to provide PIOs and OCI parity with NRIs in respect of economic, financial and educational fields. Further the decision that NRIs investment under Schedule 4 of FEMA (Transfer or Issue of Security by Persons Resident Outside India) Regulations will be deemed to be domestic investment made by residents, is meant to provide clarity in the FDI policy as such investment is not included in the category of foreign investment. The measure is expected to result in increased investments across sectors and greater inflow of foreign exchange remittance leading to economic growth of the country.

The Union Cabinet gave approval to allow the Real Estate Investment Trusts (REITs) as an eligible financial instrument/structure under the Foreign Exchange Management Act (FEMA) 1999.

High Level Committee on Direct Tax Matters, headed by Justice A.P. Shah, was constituted to examine the levy of MAT on FIIs for the period prior to 01.04.2015. The Committee will also examine the related legal provisions, judicial/quasi judicial pronouncements and relevant aspects.

2. Economy and Economics

Economy: It is the state of a country or region in terms of the production and consumption of goods and services and the supply of money.

Economics: It is the branch of knowledge concerned with the production, consumption, and transfer of wealth.

Types of Economic System

There are four primary types of economic system in the world:

1. Traditional Economic System: A traditional economic system is the most traditional and ancient type of economy in the world. Products and services that are direct result of their beliefs, customs, traditions, religions etc. are produced in this system. There are certain elements of a traditional economy that those in more advanced economies, such as Mixed.

2. Command Economic System: In terms of economic advancement, the command economic system is the next step up from a traditional economy. The most important feature of this system is that a large part of the economic system is controlled by centralised power, often, a federal government.

3. Market Economic System: A market economy is very similar to a free market. The government does not control vital resources, valuable goods or any other major segment of the economy. In this way, organizations run by the people determine how the economy runs, how supply is generated, what demands are necessary, etc.

4. Mixed Economic System: A mixed economic system also known as a Dual Economy, is a combination of economic systems, but it primarily refers to a mixture of a market and command economy. In this type of economic system the market is more or less free of government ownership except for a few key areas (usually not the resources that a command economy controls).

3. Characteristics of Indian Economy

Main characteristics and various aspects of Indian Economy are:

1. Agrarian Economy: Even after six decades of independence, 48.9% of the workforce of India is still agriculturist and its contribution to National Income in 2013-14 is 13.9%.

2. Mixed Economy: Indian Economy is a unique blend of public and private sector, i.e. a mixed economy. After liberalisation, Indian Economy is going ahead as a capitalist economy or market economy.

3. Developing Economy: The following facts show that Indian Economy is a developing economy:

(a) National Income (is the net national income of factor cost) of India during 2013-14 at current prices is estimated at ₹ 92.4 lakh crore and at constant (2004-05) prices, at 49.3 lakh crore. At constant (2004-05) prices, the National Income has shown a growth of 4.2%, while at current prices the growth rate of National Income is 11.9%.

(b) According to Planning commission of India’s report, India has 27 crore people or 21.9% population living below Poverty Line (as on 31st March 2012).

(c) Level of unemployment is very high. Unemployment in India is mainly structural in nature because the productive capacity is inadequate to create
Lucent's General Knowledge

sufficient number of jobs. There is an acute problem of disguised unemployment days of a year for eight hours every day.

d) Savings are low in India due to low national income and high consumption expenditure. The low savings results in shortage of capital formation. Capital is an important factor of production.

e) India is the second most populated country of the world. During 2001-2011, population increased by 17.69%. With this high growth rate of population about 1.83 crore new persons are being added to Indian population every year. According to 2011 census, the total Indian population stands at a high level of 121.07 crore which is 17.5% of the world's total population. To maintain 17.5% of world population India holds only 2.42% of total land area of the world, which fails to accelerate the pace of development in the economy.

(i) India lacks in large industrialisation based on modern and advanced technology, which is a major constraint for economic growth.

**Important facts relating to characteristics of Indian Economy**

- Primary sector of Indian Economy is agriculture and the related sectors.
- Secondary sector of Indian Economy is related to industry, manufacturing, electricity etc.
- Tertiary sector of Indian Economy is related to business, transport, communication and services.
- The best indicator of economic development of any country is per capita income.

The following factors are important in Economic Development of a developing country:

1. Natural resources
2. Capital gain
3. Skilled labour force
4. Surplus sale of agriculture
5. Justified social organisation
6. Political freedom
7. Freedom from corruption
8. Technological knowledge and general education

4. Agriculture and Land Development

- Agriculture is the mainstay of the Indian Economy.
- The agricultural output, depends on monsoon as nearly 60% of area sown in is dependent on rainfall.
- Area for Land utilisation statistics is available of 30,59,03,000 hectares for 2010-11.

<table>
<thead>
<tr>
<th>SL</th>
<th>Board</th>
<th>Headquarter</th>
<th>Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coffee Board</td>
<td>Bengaluru (Karnataka)</td>
<td>Coffee Act, 1942</td>
</tr>
<tr>
<td>2</td>
<td>Rubber Board</td>
<td>Kottayam (Kerala)</td>
<td>Rubber Act (Kerala), 1917</td>
</tr>
<tr>
<td>3</td>
<td>Tea Board</td>
<td>Kolkata (West Bengal)</td>
<td>Tea Act, 1953</td>
</tr>
<tr>
<td>4</td>
<td>Tobacco Board</td>
<td>Guntur (Andhra Pradesh)</td>
<td>Tobacco Act (A.P.), 1975</td>
</tr>
<tr>
<td>5</td>
<td>The Spices Board</td>
<td>Kochi (Kerala)</td>
<td>Spices Act, 1986</td>
</tr>
<tr>
<td>7</td>
<td>Indian Grape Processing Board</td>
<td>Pune (Maharashtra)</td>
<td>2nd Jan, 2009</td>
</tr>
</tbody>
</table>

Figures provided by the Central Statistical Organisation reveal that between 1950-51 to 1960-61, the share of agriculture in GDP has been in the range of 55% to 52%. The share of agriculture indicated a sharp decline and reached a level of 13.9% in 2013-14.

- The importance of agriculture in the national economy is indicated by many facts, e.g. agriculture is the main support for India's transport systems, secure bulk transportation, and the movement of agricultural goods. Internal trade is mostly in agricultural products.
- Agricultural growth has direct impact on poverty eradication. It is also an important factor in containing inflation, raising agricultural wages and employment generation.

- The share of agriculture indicated a sharp decline and reached a level of 13.9% in 2013-14.
- The importance of agriculture in the national economy is indicated by many facts, e.g. agriculture is the main support for India's transport systems, secure bulk transportation, and the movement of agricultural goods. Internal trade is mostly in agricultural products.

- Agricultural growth has direct impact on poverty eradication. It is also an important factor in containing inflation, raising agricultural wages and employment generation.

- Besides the allied sectors like horticulture, animal husbandry, dairy and fisheries have an important role in improving the overall economic conditions and nutrition of the rural masses.

- To maintain the ecological balance, there is a need for sustainable and balanced development of both agriculture and the allied sectors.
- Commercial crops are those crops which are produced for trade purpose and not for self consumption by the farmers. It includes - Oil-seeds crops, Sugar crops, Fibre crops, Narcotic crops, Beverage crops.
- To encourage the agricultural products, the government announces the Minimum Support Price for important agricultural crops.
- The function of Agriculture Cost and Price Commission (ACPC) is to decide the minimum support prices on behalf of the government.
- Minimum Support Price (MSP) announced by the government is that price at which government is ready to purchase the crop from the farmers directly, if the crop price falls below the MSP.
- For providing facilities relating to storage of agriculture products, "National Co-operative Development and Warehousing Board" was established in 1956 and "Central Warehousing Corporation" was established in 1957. Thereafter in states also the State Warehousing Corporation were established.
- The programme of High Yielding Variety Seeds was combined with a guiding project I.A.D.P. and a target was set to extend this system of development in entire country.
- The credit of green revolution in India is given to the Agriculture Scientist Dr. Norman Borlaug. However, the contribution of Dr. M.S. Swaminathan is not less. But, its termed name is the contribution of American scientifc Dr. William Gande.
- Due to horrible famine during 1965-66 and 1966-67, the government implemented the new agriculture policy of high yielding seeds so as to increase agriculture production.
- India is the largest milk producing country in the world.
- Speedy increase in the field of milk production is called White Revolution.
- To increase the pace of White Revolution, the Operation Flood was started.
- In milk production of the country the share of Buffalo, Cow and Goat is 50%, 46% and 45% respectively.
Agricultural Production

Indian agriculture still depends upon monsoon.

Agricultural production can be divided into two parts—Foodgrains and Non-foodgrains, in which the share of foodgrains is two-third and non-foodgrains is one-third.

The percentage of plan outlay on agriculture and allied sectors to total plan outlay varied between 31.9% and 14.9% from the first Plan to Tenth Plan.

Actual outlay on the agricultural sector ranged between 18 and 24% of the total plan outlay (except during the First Plan, it was as high as 31%).

During Eleventh Plan (2007-12) the plan outlay on agriculture has declined to only 18.5%.

During the first decade of planning (1951-61) when the First and Second Five Year Plans were implemented, the annual rate of growth in agriculture was 3.3%.

During the Eleventh Plan also, the Planning Commission had fixed the target of 4% rate of growth in agriculture.

During the 11th Plan period a growth rate of 4.1% has been achieved in agricultural sector.

The Tenth Plan was the first plan which did not fix targets of crop production.

Green revolution did not cover barley, ragi and minor-millet.

The Green revolution was confined only to High Yielding Varieties (HYV) mainly rice, wheat, maize and jowar.

National Agriculture Insurance Scheme was implemented in Oct, 1999.

Land Reforms Programmes in India include

- Elimination of intermediaries
- Tenancy Reforms
- Determination of ceiling of holdings per family
- Distribution of surplus land among landless people
- Consolidation of holdings
- (Chakbandi)

By the end of first five year plan middlemen had been removed (except small areas).

The following measures were made effective for the betterment of farmers:

1. Regulation of tax
2. Security for the rights of farmers
3. Right of land ownership for the farmers

- For the reorganisation of agriculture land holding mainly two measures were taken—1. Land ceiling and 2. Chakbandi.

Land ceiling determines the maximum land which can be held by a farmer. Holding more than that area will be illegal.

Chakbandi of land means to aggregate the divided and broken land.

- The land within area less than 1 hectare, is called marginal land holding, 1 to 4 hectare area is called small land holding and the land within area more than 4 hectare, is called large land holding.

Chakbandi was implemented first time in India in the year 1920 in Baroda.

Green Revolution was started in the Third Five Year Plan.

The most positive effect of Green Revolution was on wheat. There was 500% increase in crop production.

Unorganised sources of agriculture finance are money-lenders, money-dealers, relatives, businessmen, landlords and commission agents.

Organised sources of agriculture finance are Co-operative Committees, Co-operative Banks, Commercial Banks, Regional Rural Banks, the Government etc.

Co-operative Credit Organisation started first time in 1904.

Primary Co-operative Committees provide credit for short period.

State Co-operative Agriculture and Rural Development Banks provide credit for long period.

Land Development Bank was established in the year 1919 in the form of Land Mortgage Bank. Land Development Bank provides long-term loans.

National Bank for Agriculture and Rural Development (NABARD) is the apex institution of Rural Credit. It was established on 12th July, 1982 by the merger of Agriculture Credit department and reconstruction of Agriculture and Development Corporation of the Reserve Bank of India. Its establishment is based on the recommendations of Shrivaman Committee.
Authorised share capital of NABARD was Rupees 500 crore. However, after an amendment its authorized share increased up to 5,000 crore with effect from 1st February, 2001.

NABARD's total refinancing operations grew to ₹ 1,02,089 crore during the year 2013-14, an effective growth rate of 24% over the previous year. The long term refinancing given against medium and long term loans, which is an indicator of Capital formation in the agricultural sector, stood at ₹ 21,482 crore, displaying a growth rate of 21.50% over the previous year.

Food stocks are maintained by the central government for 3 purposes:
1. Maintaining prescribed buffer stock norms for food security.
3. Market intervention to stabilise open market prices.

Minimum Buffer stock as on January, 2013 was a 99.30 metric tonnes in a year.

Major crops of India:
(a) Khari Crop: Sown in April and harvested in October. They include Rice, Jowar, Bajra, Maize, Cotton, Sugar-cane, Soyabean, Groundnut.
(b) Rabi Crop: Sown in October and harvested in March/April. They include Wheat, Barley, Gram, Tuvar, Rapeseed, Mustard.
(c) Zayad Crop: Sown during March to June. It include Watermelons, Vegetables, Moong etc.

5. National Income

National income is the measurement of flow of services and goods in an economic system.

Comparison between National income with National wealth: The national wealth is the measurement of present assets available on a given time, while the National income is the measurement of the production power of economic system in a given time period.

The figures of National income are based on the financial year (i.e., from 1st April to 31st March).

Relationship among different forms of National Products

<table>
<thead>
<tr>
<th>National Income</th>
<th>Relationship among different forms of National Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNP (MP)</td>
<td>(−D) NFI</td>
</tr>
<tr>
<td>(−D) NFI</td>
<td>GNP (FC)</td>
</tr>
<tr>
<td>(−D) NFI</td>
<td>GNP (MP)</td>
</tr>
<tr>
<td>(−D) NFI</td>
<td>GDP (MP)</td>
</tr>
<tr>
<td>(−D) NFI</td>
<td>GDP (MP)</td>
</tr>
<tr>
<td>(−D) NFI</td>
<td>GDP (FC)</td>
</tr>
<tr>
<td>(−D) NFI</td>
<td>GDP (FC)</td>
</tr>
<tr>
<td>(−D) INT</td>
<td>GDP (FC)</td>
</tr>
<tr>
<td>(−D) INT</td>
<td>GDP (FC)</td>
</tr>
<tr>
<td>(−D) INT</td>
<td>GDP (FC)</td>
</tr>
<tr>
<td>(−D) INT</td>
<td>GDP (FC)</td>
</tr>
<tr>
<td>(−D) INT</td>
<td>GDP (FC)</td>
</tr>
<tr>
<td>(−D) INT</td>
<td>GDP (FC)</td>
</tr>
<tr>
<td>(−D) INT</td>
<td>GDP (FC)</td>
</tr>
<tr>
<td>(−D) INT</td>
<td>GDP (FC)</td>
</tr>
<tr>
<td>(−D) INT</td>
<td>GDP (FC)</td>
</tr>
<tr>
<td>(−D) INT</td>
<td>GDP (FC)</td>
</tr>
</tbody>
</table>

6. Economic Planning

Economic Planning is the process in which the limited natural resources are used skillfully so as to achieve the desired goals. The concept of Economic Planning in India, is derived from Russia (then USSR).

'Planning' in India derives its objectives and social premises from the Directive Principles of State Policy enshrined in the Constitution.

In the year 1934, the proposal relating to economic planning came for the first time in the book of Vishveshwarayi titled 'Planning Economy for India'. Thereafter in 1938, the All India Congress Committee demanded for the same. In 1944 efforts were made by 8 industrialists under Bombay Plan.

Thereafter, in the same year, 'Gandhi Plan' by Mr. Mannarayan, in April 1944 the 'People's Plan' by labour leader M.N. Roy and in January 30, 1950 the 'Sarvodaya Plan' by Mr. Jai Prakash Narayan were presented.

After independence, in 1947, the committee on economic planning was constituted under the chairmanship of Jawaharlal Nehru. Thereafter, on the recommendation of this committee, Planning Commission was constituted in March, 1950 and the format of first Five Year Plan was prepared in 1951.

The Planning Commission was constituted in India in 1950 as a non-constitutional and advisory corporation. The Indian Constitution did not provide for the formation of Planning Commission.

On 1st January, 1955, the newly formed 'NITI Aayog' has replaced the Planning Commission.

The basic aim of economic planning in India is to bring about rapid economic growth through development of agriculture, industry, power, transport and communications and all other sectors of the economy.

In India, more than 11th Five Year Plans have been implemented so far. The target and achievements of these plans are given in the following table:

<table>
<thead>
<tr>
<th>Five Year Plan</th>
<th>Period</th>
<th>Target growth rate of GDP (In % age)</th>
<th>Achievement (In % age)</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Plan</td>
<td>1951-56</td>
<td>2.1</td>
<td>3.6</td>
<td>Harrod-Domar Model</td>
</tr>
</tbody>
</table>
### First Five Year Plan (1951-1956)
- The aim of this plan was to start the process of balanced development of economy. Agriculture was on top priority in this plan.
- The First Plan emphasised, as its immediate objectives the rehabilitation of refugees, rapid agricultural development so as to achieve food self-sufficiency in the shortest possible time and control of inflation.
- This plan was successful and achieved the growth rate of 3.6%, which was more than its aim.
- During this plan there was an increase of 18% in national income and 11% in per capita income.

### Second Five Year Plan (1956-1961)
- This plan was based on the P.C. Mahalanobis model.
- To establish socialist order, derived from Soviet model, the Second Plan aimed at rapid industrialisation with particular emphasis on the development of basic and heavy industries.
- In this plan, Industries and Minerals were on top priority and 20.1% of total outlay was allocated for this sector.
- Second priority was given to Transport and Communication for which 27% of total plan outlay was allocated.

### Growth Targets
The growth targets for the first three plans were set with respect to National Income. In the Fourth Plan, it was the Net Domestic Product. In the plans thereafter, it has been the Gross Domestic Product at factor cost.

### Third Five Year Plan (1961-1966)
- The aim of this plan was to make the economy independent and to reach a self-active take-off position. This plan is also called 'Gadgil Yojana'.
- This plan could not achieve its aim of 5.6% growth rate.
- In this plan, agriculture and industry both were on its priority.
- The main reason for the failure of this plan was the Indo-China war, Indo-Pakistan war and unprecedented drought.
- A growing trade deficit and mounting debt obligation led to more and more borrowings from the International Monetary Fund. The rupee was devalued in June, 1966 to little success as it soon turned out.

### Plan Holiday (From 1966-1967 to 1968-1969)
- The miserable failure of the Third Plan forced the Government to declare 'plan holiday'. Three Annual Plans were drawn in this intervening period. The economy faced another year of drought during 1966-67.
- During this period three separate plans were prepared.
- Equal priority were given to agriculture, its allied sectors and the industry sector.
- The main reason of plan holiday was the Indo-Pakistan war, lack of resources and increase in price-level.

### Fourth Five Year Plan (1969-1974)
- The two main objectives of this plan were 'growth with stability' and 'progressive achievement of self-reliance'.
- In this plan, 'Establishment of socialist order' was specially aimed.
- 'Growth with justice' and 'Garibi Hatao' (Removal of poverty) were the main objectives of this plan.
- This plan failed to achieve its aim and it achieved only 3.3% annual rate of growth as against its aim of 5.7%.
- The shortfall during this plan was due to the adversity of climate and arrival of refugees from Bangladesh.

### Fifth Five Year Plan (1974-1979)
- The Fifth Plan draft was originally drawn up as part of a long term Perspective Plan covering a period of 10 years from 1974-75 to 1984-85.
- The two main objectives of this plan were poverty eradication and attainment of self-reliance.
- During the plan, initially, the growth rate target was fixed at 5.5%, however, it was amended to 4.4% later on.
- Top priority was given to agriculture, next came industry and mines.
- Originally, the approach paper of the Fifth Plan was prepared under C. Subramaniam in 1972, but final draft of the Plan was prepared and launched by D.P. Dhar.
- This plan was generally successful. However, there was no significant decline in poverty and unemployment.
Rolling Plan (1978-1980)
- The new pattern started by Janata Government, which meant that every year performance of the plan would be assessed and a new plan based on such assessment be made for the subsequent year.
- The rolling plan started with an annual plan for 1978-79 and as a continuation of the terminated Fifth Plan.

Sixth Five Year Plan (1980-1985)
- The Janata Government originally introduced this plan for the period 1978-83, but later a new Sixth Plan replaced it, for the period 1980-85.
- The basic objective of the Sixth Plan was removal of poverty. The plan aimed at achieving economic and technological self-reliance, reducing poverty, generating employment and improving the quality of life of poorest through the Minimum Needs Programme etc.
- During this period the Indian economy made all round progress and most of the targets fixed by the Planning Commission were realised, though during the last year of the plan (1984-85) many parts of the country faced severe drought conditions.
- The target growth rate, in this plan, was fixed at 5.2% and it achieved successfully 5.7% of annual rate of growth.
- In this plan, important programmes like Integrated Rural Development Programme (IRDP), Minimum Needs Programme (MNP) were started.

Seventh Five Year Plan (1985-1990)
- The objectives of this plan include establishment of self sufficient economy, creation of more opportunities for productive employment, slowing down the rate of population growth, to provide people with adequate nutrition and energy and environmental protection. But main aim of the plan was to increase production in all sectors and to generate opportunities for employment.
- There was increase in per capita income at the rate of 3.6% per annum.
- In this plan, for the first time private sector was given priority in comparison to public sector.
- In this plan, employment generating programmes like Jawahar Rozgar Yojana were started.
- One of the major worries during this period was widening gap between the income and expenditure of the Government, which led to mounting fiscal deficit.

Annual Plans
The Eighth Five-Year Plan (1990-95) could not take off due to the fast changing political situation at the Centre. The new government, which assumed power at the Centre in June 1991, decided that the Eight Five-Year Plan would commence on April 1, 1992 and that 1990-91 and 1991-92 should be treated as separate Annual Plans. Formulated within the framework of the Approach to the Eighth Five-Year Plan (1990-95), the basic thrust of these Annual Plans was on maximisation of employment and social transformation.

Eighth Five Year Plan (1992-1997)
- The fourth version of the Eighth Plan (1992-97) was approved at a time the country was going through a severe economic crisis, a rising debt burden, ever-widening budget deficits, mounting inflation and recession in industry.
- The V. Narasimha Rao Government initiated the process of fiscal reforms as also economic reforms.
- In this plan the utmost priority was given to 'Development of Human Resources' i.e. Employment, Education and Public Health. In addition to this, the important aim made in this plan was to strengthen the basic infrastructure by the end of the decade.
- This plan was successful and got 6.8% annual rate of growth, which was more than its target of 5.6%.
- During this period, Pradhan Mantri Rozgar Yojana (PMRY) was started in the year 1993.

Ninth Five Year Plan (1997-2002)
- The Ninth Plan was launched in the fiftieth (50th) year of India's Independence.
- Planning Commission released the draft Ninth Plan document on March 1, 1998. The focus of the plan is 'Growth with Social Justice and Equity'.
- It assigned the priority to agriculture and rural development with a view to generating adequate productive employment and eradication of poverty. However, the plan failed to achieve the GDP growth target of 7% and realized only 5.35% average GDP growth.
- The recession in international economy was held responsible for the failure of ninth plan.

Tenth Five Year Plan (2002-2007)
- In the Tenth five year plan, it had been proposed to eradicate poverty and unemployment and to double the per capita income in next 10 years.
- The Tenth Plan has indicated that the current backlog of unemployment is around 35 million persons, i.e. 9% of the labour force.
- The Tenth Plan was expected to follow a regional approach rather than sectoral approach to bring down regional inequalities.

Some creditable achievements of the 10th Plan
- Gross domestic savings (as percent of GDP) at market prices averaged 28.2% in 10th Plan as against 23.1% in the 9th Plan.
- India's foreign exchange reserves reached a level of US $ 185 billion in February 2007.
- Though the 10th Plan could not achieve its target of 8% growth of GDP, but has taken the economy to a higher trajectory of growth rate at 7.6% as against 5.5% in the 9th Plan.
- Foreign investment flows were of the order of US $ 20.2 billion in 2005-06-US $ 7.7 billion in the form of Foreign Direct Investment (FDI) and US $ 12.5 billion in the form of Portfolio Investment (PI). In 2006-07, out of total inflows of the in the form of Portfolio Investment (PI). In 2006-07, out of total inflows of the order of $ 29.1 billion, FDI accounted for $ 22.1 billion (i.e. 76% of total).

Eleventh Five Year Plan (2007-2012)
- The National Development Council (NDC), country's highest policy making body, endorsed the 11th Plan document on 19th December, 2007.
It envisages an average 9% GDP growth in the first four years to end the five-year period with a growth of 10% during the terminal year 2011-12.

Earlier 7.6% growth rate in the 10th Plan and 5.52% in the 9th Plan was achieved.

Total Plan expenditure for the 11th Plan period (2007-12) has been proposed to the tune of Rs. 36,44,718 crore, which is more than the double of the Plan expenditure of the 10th Plan.

Of the total Plan expenditure fixed for the 11th Plan, Centre’s share would be Rs. 21,56,571 crore whereas the share of the States would be to the tune of Rs. 14,88,147 crore.

Gross Budgetary Support (GBS) for the Plan expenditure of 2007-12 has been fixed to Rs. 14,21,711 crore, where as it was Rs. 8,10,404 crore for the 10th Plan.

Of the GBS 74.67% will be for the Priority sectors and the rest 25.33% for non-priority sectors. For the 10th Plan it was 55.20% and 44.80% respectively.

In the 11th Plan (2007-12), overall rate of growth of GDP was 8.0%. Under-achiever was the agriculture, rate of growth of which remained low at 3.3% over the plan period, as compared to the 4% target rate of growth.

The 11th plan visualised “Faster and more inclusive growth” as its objective.

Balance of trade deficit has reached US $644 billion in this plan period (2007-12), indicating at payment crisis during the terminal year of the 11th FYP. It was this payment crisis which led to sudden depreciation of rupee in 2012, when rupee plunged from Rs. 48.70 per US dollar in February 2012 up to Rs. 58 per US dollar by June 2012.

It is noteworthy here that India’s trade deficit which was of the order of $10.69 billion in 2003-04 has shot up to $185 billion in 2011-12.

CAD (current account deficit) has been on rise since 2006-07 and by the year 2010-11 it had reached $45.9 billion.

Under the shadow of deceleration in our economic growth especially industrial growth, galloping inflation, depreciation of rupee and balance of payment problems, the 12th FYP has begun.

Twelfth Five Year Plan (2012-2017)

The Approach Paper of the 12th Plan, approved by the NDC (National Development Council) in 2011, had set a target of 9% average growth of GDP over the plan period (2012-17).

The broad vision and aspirations of the 12th FYP (Five Year Plan) are reflected in the subtitle ‘Faster, Sustainable and More Inclusive Growth’.

The 12th Plan sets an ambitious target of one lakh MW in power generation, whereas actual realization in 11th Plan was 50,000 MW, on account of slippage in public sector power projects.

It seems that Government is intending to withdraw infrastructure sector in the 12th Plan and laying more emphasis on PPP (Public Private Partnership).

The Approach Paper of 12th FYP states that India has 1017 PPP projects accounting for Rs. 4,86,603 crores.

To day India is second only to China in terms of number of PPP projects and terms of investments it is second to Brazil.

Types of planning

Imperative Planning: In this type of planning the Central Planning authority decides upon every aspect of the economy and the targets set and the processes are strictly adhered to. The type of planning is mainly practised in the socialist economies.

Indicative Planning: In this type of planning the State sets broad parameters and goals for the economy. It is different from centralised planning as unlike in the Latter, the State does not see Plan targets to the minuteness details, but only broadly indicates the targets to be achieved. It was adopted in our country since the 8th Five-Year Plan, as practised in many developed countries.

Perspective Planning: It is a type of planning for a long period of time, usually 15-20 years. As a specially trained task, it is operationalised through the Five Year Annual Plans. In such form of planning, the planners formulate a perspective Plan that broadly defines the direction desired to be taken by the economy.

Rolling Plan: Under the scheme of rolling Plans, there are three different steps. First, a plan for the current year which includes the annual budget. Second, a plan for a fixed number of years, say three, four or five. It is revised every year as per the requirements of the economy. Third, a perspective plan for 10, 15 or 20 years.

Core Plan: As per this concept, the Planning Commission asks the states to submit their projected revenue estimates. On the basis of these estimates, Planning Commission determines the expenditure heads for State Annual Plans. This helps in keeping the Plan target to realistic limits and prevents diversion of funds from the priority items to the non-plan account. The concept of ‘Core Plan’ has emerged recently.

Models of economic development

Nehru-Mahalanobis Model:

- Nehru-Mahalanobis model of development emerged as the driving force of the strategy of development adopted at the time of formulation of the Second Five Year Plan and has continued right up to the eighties.
- It aimed at enlargement of opportunities for the less privileged sections of the society.
- Growth with social justice was the goal of Nehru-Mahalanobis model since it intended to foster a self-generating path of development with an assurance to the common man that poverty, unemployment, disease and ignorance would be removed so that individuals could realise their potential with the extension of social and economic opportunities.
- In the Nehru-Mahalanobis model the State controlled the commanding heights of the economy through the public sector.

The Gandhian Model of Growth

- ‘Gandhian Plan’ was brought out by Acharya S.N. Agarwala in 1944 and was reaffirmed in 1948, formed the basis of Gandhian model of growth.
- The basic objective of this model is to raise the material as well as the cultural level of the Indian masses so as to provide a basic standard of life.
- It aims primarily at improving the economic conditions of the villages of India and hence, it lays the greatest emphasis on the scientific development of agriculture and rapid growth of cottage and village industries.
7. Unemployment

In common parlance anybody who is not gainfully employed in any productive activity is called unemployed. However, it can be of two kinds: 1. voluntary unemployment and 2. involuntary unemployment. Here we are concerned with the second category of unemployed persons.

- Hence, unemployment can be defined as a situation when persons able and willing to work are seeking jobs at the prevailing wage level but they are unable to get the same.

Unemployment in developing economies like India is not the result of deficiency of effective demand in the Keynesian sense, but a consequence of shortage of capital equipment or other complementary resources.

In India unemployment is structural in nature due to lack of productive capacity and resources.

Types of Unemployment
1. Cyclical unemployment: It is the result of depression in an economy.
2. Frictional unemployment: This kind of unemployment is temporary. It is the result of a situation when new industries drive out old ones and workers change over to better jobs.
3. Open unemployment: It refers to those who have no work to do even though they are able and willing to do work.
4. Seasonal unemployment: This occurs at certain period of the year when work load is comparatively less, and hence people are rendered jobless. For example, in the period between past harvest and next sowing, agricultural labourers are unemployed.
5. Educated unemployment: This is mainly found in urban areas. Those educated persons who are unable to get work come under this category.
6. Under-employment (Disguised employment): It results when a person contributes to production less than what he or she is capable of, for example, an engineer working as a clerk is underemployed.
7. Compulsory unemployment: It means the labour power which is ready to work on the current rate but does not get the work.
8. Seasonal unemployment: It means the unemployment of the farmers and farm labourers during non-crop seasons.

Before its replacement by the ‘NITI Aayog’ the Planning Commission had to collect data of unemployment on the basis of ‘Lakadawala Formula’ effective from 11th March, 1997 and prior to this the process to collect data was on the basis of surveys of National Sample Survey Organisation (NSSO).

In 8th Plan, the aim was to create 1 crore employment. During Ninth Plan the additional requirement of work opportunities was approximately 5 crore 30 lakhs.

In India, the data relating to unemployment are collected by National Sample Survey Organisation (NSSO). This Organisation has the following concepts with regard to unemployment:
1. **General status of unemployment**: In this category, generally, those unemployed for more than one year are included. As such it is a long-term unemployment.

2. **Weekly-unemployment**: The persons who have not got work for even one hour in a week are included in this category.

3. **Daily unemployment**: It is considered the best concept of unemployment.

   - The main reasons for unemployment in India are slow economic development, population explosion, outdated technique, improper education system and limited effect of government planning.

---

### Development and Employment Programmes: At a glance

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Programme/Plan/Institution</th>
<th>Year of beginning</th>
<th>Objective/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Community Development Programme (CDP)</td>
<td>1952</td>
<td>Over all development of rural area with people’s participation.</td>
</tr>
<tr>
<td>2</td>
<td>Intensive Agriculture Development Programme (IADP)</td>
<td>1960-61</td>
<td>To provide loan, seeds, fertilizer tools to the farmers.</td>
</tr>
<tr>
<td>3</td>
<td>Intensive Agriculture Area Programme (IAAP)</td>
<td>1964-65</td>
<td>To develop the Special harvests.</td>
</tr>
<tr>
<td>4</td>
<td>High Yielding Variety Programme (HYVP)</td>
<td>1966-67</td>
<td>To increase productivity of food grains by adopting latest varieties of inputs for crops.</td>
</tr>
<tr>
<td>5</td>
<td>Indian Tourism Development Corporation (ITDC)</td>
<td>Oct, 1966</td>
<td>To arrange for the construction of Hotels and Guest houses at various places of the country.</td>
</tr>
<tr>
<td>6</td>
<td>Green Revolution</td>
<td>1966-67</td>
<td>To increase the foodgrains, specially wheat production (Credit goes to Dr. M.S. Swaminathan in India and Nobel laureate Dr. Norman Borlaug in the world).</td>
</tr>
<tr>
<td>7</td>
<td>Nationalisation of 14 Banks</td>
<td>19 July, 1969</td>
<td>To provide loans for agriculture, rural development and other priority sectors.</td>
</tr>
<tr>
<td>8</td>
<td>Employment Guarantee Scheme of Maharashtra</td>
<td>1972-73</td>
<td>To assist the economically weaker sections of the rural society.</td>
</tr>
<tr>
<td>9</td>
<td>Accelerated Rural Water Supply Programme (ARWSP)</td>
<td>1972-73</td>
<td>For providing drinking water in the villages.</td>
</tr>
<tr>
<td>10</td>
<td>Small Farmer Development Agency (SFDA)</td>
<td>1974-75</td>
<td>For technical and financial assistance to small farmers.</td>
</tr>
<tr>
<td>11</td>
<td>Command Area Development Programme (CADP)</td>
<td>1974-75</td>
<td>To ensure better and rapid utilisation of irrigation capacities of medium and large projects.</td>
</tr>
<tr>
<td>12</td>
<td>Twenty Point Programme (TPP)</td>
<td>1975</td>
<td>Poverty eradication and raising the standard of living.</td>
</tr>
<tr>
<td>13</td>
<td>National Institution of Rural Development (NIRD)</td>
<td>1977</td>
<td>Training, investigation and advisory organisation for rural development.</td>
</tr>
<tr>
<td>14</td>
<td>Desert Development Programme (DDP)</td>
<td>1977-78</td>
<td>For controlling the desert expansion and maintaining environmental balance. Providing foodgrains to labour for the works of development.</td>
</tr>
<tr>
<td>15</td>
<td>Food for Work Programme (FWP)</td>
<td>1977-78</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Programme/Plan/Institution</th>
<th>Year of beginning</th>
<th>Objective/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Antyodaya Yojana</td>
<td>1977-78</td>
<td>To make the poorest families of the village economically independent (only in Rajasthan State).</td>
</tr>
<tr>
<td>18</td>
<td>Integrated Rural Development Programme (IRDP)</td>
<td>October 2, 1980</td>
<td>All-round development of the rural poor through a programme of asset endowment for self-employment.</td>
</tr>
<tr>
<td>19</td>
<td>National Rural Employment Programme (NREP)</td>
<td>September, 1982</td>
<td>To provide profitable employment opportunities to the rural poor.</td>
</tr>
<tr>
<td>20</td>
<td>Development of Women and Children in Rural Areas (DWCRA)</td>
<td>1980</td>
<td>To provide suitable opportunities of self-employment to the women belonging to the rural families who are living below the poverty line.</td>
</tr>
<tr>
<td>21</td>
<td>Rural Landless Employment Guarantee Programme (RLEG)</td>
<td>August 15, 1993</td>
<td>For providing employment to landless farmers and labourers.</td>
</tr>
<tr>
<td>22</td>
<td>Self-Employment to the Educated Unemployed Youth (SEEUY)</td>
<td>1983-84</td>
<td>To provide financial and technical assistance for self-employment.</td>
</tr>
<tr>
<td>23</td>
<td>Farmer Agriculture Service Centre’s (FASCC’s)</td>
<td>1983-84</td>
<td>To popularise the use of improved agricultural instruments and tool kits.</td>
</tr>
<tr>
<td>24</td>
<td>National Fund for Rural Development (NFRD)</td>
<td>February, 1984</td>
<td>To grant 100% tax rebate to donors and also to provide financial assistance for rural development projects.</td>
</tr>
<tr>
<td>25</td>
<td>Industrial Reconstruction Bank of India</td>
<td>March 1985</td>
<td>To provide financial assistance to sick and closed industrial units for their reconstruction.</td>
</tr>
<tr>
<td>26</td>
<td>Comprehensive Crop Insurance Scheme</td>
<td>April 1, 1985</td>
<td>For insurance of agricultural crops.</td>
</tr>
<tr>
<td>27</td>
<td>Council for Advancement of People’s Action and Rural Technology (CAPART) (H.Q.- New Delhi)</td>
<td>Sep. 1, 1986</td>
<td>To provide assistance for rural prosperity.</td>
</tr>
<tr>
<td>28</td>
<td>Self-Employment Programme for the Urban Poor (SEPUP)</td>
<td>April 1988</td>
<td>To provide self-employment to urban poor through provision of subsidy and bank credit.</td>
</tr>
<tr>
<td>29</td>
<td>Formation of Securities and Exchange Board of India (SEBI)</td>
<td>April 1988</td>
<td>To safeguard the interest of investors in capital market and to regulate share market.</td>
</tr>
<tr>
<td>30</td>
<td>Jawahar Rozgar Yojana</td>
<td>April 1, 1989</td>
<td>For providing employment to rural unemployed.</td>
</tr>
<tr>
<td>31</td>
<td>Nehru Rozgar Yojana</td>
<td>October 1989</td>
<td>For providing employment to urban unemployed.</td>
</tr>
<tr>
<td>32</td>
<td>Agriculture and Rural Debt Relief Scheme (ARDRS)</td>
<td>1990</td>
<td>To exempt bank loans up to Rs.10,000 of rural artisans and weavers.</td>
</tr>
<tr>
<td>SL No.</td>
<td>Programme/Plan/Institution</td>
<td>Year of Beginning</td>
<td>Objective/Description</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------------------------------------</td>
<td>------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>33</td>
<td>Scheme of Urban Micro Enterprises (SUME)</td>
<td>1990</td>
<td>To assist the urban poor people for small enterprise.</td>
</tr>
<tr>
<td>34</td>
<td>Scheme of Urban Wage Employment (SUWE)</td>
<td>1990</td>
<td>To provide wages employment after arranging the basic facilities for poor people in the urban areas where population is less than one lakh.</td>
</tr>
<tr>
<td>35</td>
<td>Scheme of Housing and Shelter Upgradation (SHASU)</td>
<td>1990</td>
<td>To provide employment by means of shelter upgradation in the urban areas where population is between 1 to 20 lakhs.</td>
</tr>
<tr>
<td>36</td>
<td>Supply of Improved Toolkits to Rural Artisans</td>
<td>July, 1992</td>
<td>To supply modern toolkits to the rural craftsmen except the weavers, tailors, embroiders and tobacco labourers who are living below the poverty line.</td>
</tr>
<tr>
<td>37</td>
<td>Employment Assurance Scheme (EAS)</td>
<td>October 2, 1993</td>
<td>To provide employment of at least 100 days in a year in villages.</td>
</tr>
<tr>
<td>38</td>
<td>Members of Parliament Local Area Development Scheme (MPLADS)</td>
<td>December 23, 1993</td>
<td>To sanction Rs. 5 crore per year to every Member of Parliament for various development works in their respective areas through DM of the district.</td>
</tr>
<tr>
<td>39</td>
<td>District Rural Development Agency (DRDA)</td>
<td>1993</td>
<td>To provide financial assistance for rural development.</td>
</tr>
<tr>
<td>40</td>
<td>Mahila Samridhi Yojana</td>
<td>October 2, 1993</td>
<td>To encourage the rural women to deposit in Post Office Savings Account.</td>
</tr>
<tr>
<td>41</td>
<td>Child Labour Eradication Scheme</td>
<td>August 15, 1994</td>
<td>To shift child labour from hazardous industries to schools.</td>
</tr>
<tr>
<td>42</td>
<td>Prime Minister’s Integrated Urban Poverty Eradication Programme (PMIUEP)</td>
<td>November 18, 1995</td>
<td>To attack urban poverty in an integrated manner in 345 towns having population between 50,000 to 1 lakh.</td>
</tr>
<tr>
<td>43</td>
<td>Group Life Insurance Scheme in Rural Areas</td>
<td>1995-96</td>
<td>To provide insurance facilities to rural people on low premium.</td>
</tr>
<tr>
<td>44</td>
<td>National Social Assistance Programme</td>
<td>1995</td>
<td>To assist people living below the poverty line.</td>
</tr>
<tr>
<td>45</td>
<td>Ganga Kalyan Yojana</td>
<td>1997-98</td>
<td>To provide financial assistance to farmers for exploring and developing ground and surface water resources.</td>
</tr>
<tr>
<td>46</td>
<td>Kasturba Gandhi Education Scheme</td>
<td>August 15, 1997</td>
<td>To establish girls schools in districts having low female literacy rate.</td>
</tr>
<tr>
<td>47</td>
<td>Swarna Jayanti Shahari Rozgar Yojana (SJRSRY)</td>
<td>December, 1997</td>
<td>To provide gainful employment to urban unemployed and under employed poor through self-employment or wage employment.</td>
</tr>
<tr>
<td>48</td>
<td>Bhagyashree Bal Kalyan Policy</td>
<td>Oct. 19, 1998</td>
<td>To uplift the girls conditions.</td>
</tr>
<tr>
<td>49</td>
<td>Rajravishwari Mahila Kalyan Yojana (RMKY)</td>
<td>Oct. 19, 1998</td>
<td>To provide insurance protection to women.</td>
</tr>
<tr>
<td>50</td>
<td>Annapurna Yojana</td>
<td>March, 1999</td>
<td>To provide 10 kg foodgrains to senior citizens (who do not get pension).</td>
</tr>
<tr>
<td>51</td>
<td>Swarnajayanti Gram Swarozgar Yojana (SJSRY)</td>
<td>April, 1999</td>
<td>For eliminating rural poverty and unemployment and promoting self-employment.</td>
</tr>
<tr>
<td>52</td>
<td>Jawahar Gram Samridhi Yojana (JGSY)</td>
<td>April 1999</td>
<td>Creation of demand driven community village infrastructure.</td>
</tr>
<tr>
<td>53</td>
<td>Jan Shree Bima Yojana</td>
<td>Aug. 10, 2000</td>
<td>Providing Insurance Security to people living below the poverty line.</td>
</tr>
<tr>
<td>54</td>
<td>Pradhan Mantri Gramdanday Yojana</td>
<td>Dec 25, 2000</td>
<td>To fulfill basic requirements in rural areas.</td>
</tr>
<tr>
<td>55</td>
<td>Antyodaya Anna Yojana</td>
<td>June, 2001</td>
<td>To provide food security to the poor.</td>
</tr>
<tr>
<td>56</td>
<td>Ashraya Bima Yojana</td>
<td>Dec 25, 2000</td>
<td>To provide compensation to labourers who have lost their employment.</td>
</tr>
<tr>
<td>57</td>
<td>Pradhan Mantri Gram Sadak Yojana (PMGSY)</td>
<td>Dec 25, 2000</td>
<td>To line all villages with Pucca Road.</td>
</tr>
<tr>
<td>60</td>
<td>Sampurna Gramin Rozgar Yojana</td>
<td>Sept. 25, 2001</td>
<td>Providing employment and food security to rural people.</td>
</tr>
<tr>
<td>63</td>
<td>Haryali Parivyojan</td>
<td>2003</td>
<td>Inaugurated on January 27, 2003 by the Prime Minister. It aims at tackling the problems of irrigation and drinking water, along with boosting tree plantation and fisheries developments in rural areas.</td>
</tr>
<tr>
<td>64</td>
<td>Social Security Pilot Scheme</td>
<td>Jan. 23, 2004</td>
<td>Scheme for labourers of unorganised sector for providing family pension, insurance and medical.</td>
</tr>
<tr>
<td>66</td>
<td>National Food for Work Programme</td>
<td>November 14, 2004</td>
<td>Inaugurated by the Prime Minister on November 14, 2004. This programme is to be implemented initially in 150 districts of the country. It aims at providing 100 days' employment in a year to all able bodied unemployed rural folk.</td>
</tr>
<tr>
<td>67</td>
<td>Janani Suraksha Yojana</td>
<td>April 12, 2005</td>
<td>Takes the place of National Maternity Benefit Scheme. It will be a part of the National Rural Health Mission (NRHM).</td>
</tr>
<tr>
<td>68</td>
<td>Mee Rahe Aajy Gyan Yojana</td>
<td>2005</td>
<td></td>
</tr>
</tbody>
</table>
3. If work is not provided to anybody within the given time, he/she will be paid a daily unemployment allowance, which will be at least one-third of the minimum wages.
4. Workers employed on public works will be entitled to medical treatment and hospitalization in case of injury at work, along with a daily allowance of not less than half the statutory minimum wage. In case of death or disability of a worker, an ex-gratia payment shall be made to his legal heirs as per provisions of the Workmen Compensation Act.
5. 5% of wages may be deducted as contribution to welfare schemes like health insurance, accident insurance, survivor benefits, maternity benefits and social security schemes.
6. For non-compliance with rules, strict penalties have been laid down.
7. For transparency and accountability, all accounts and records of the programme will be made available for public scrutiny.
8. The District Collector/Chief Executive Officer will be responsible for the programme at the district level.
9. The Gram Sabha will monitor the work of the Gram Panchayat by way of social audit.

Some Important Development and Employment Programmes

- During the Seventh Five-Year Plan, a scheme called ‘Jawahar Rozgar Yojana’ was introduced from April 1, 1989 to solve the problem of unemployment in the rural sector. The former ongoing two main rural employment programmes (RREP) and Rural Landless Employment Guarantee Programme (RLEG) were merged with Jawahar Rozgar Yojana.
- The total expenditure on Jawahar Rozgar Yojana was shared by the Centre and the State Government in the ratio of 80 : 20.
- Under the Jawahar Rozgar Yojana, 30% employment opportunities were reserved for women.
- Under the Jawahar Rozgar Yojana, it was made compulsory to spend 60% of the total expenditure on labour used in the works completed under the scheme.
- A sub-plan of Jawahar Rozgar Yojana—Indira Awas Yojana was made an independent scheme in itself on January 1, 1996.
- The Employment Assurance Scheme (EAS) was introduced on October 2, 1993, in all rural areas. The aim of this scheme is to provide work in the form of unskilled physical labour to all the employment seeking men and women (of ages between 15 years to 55 years) in rural areas. The expenditure on this scheme is shared by the Centre and the States in the ratio of 80 : 20. From 2014-15 onwards, the EAS was merged with Jawahar Rozgar Yojana.
- The Integrated Rural Development Programme (IRDP) was started on an experimental basis in 1978-79. This programme was launched in the whole country on October 2, 1980. The basic aim of IRDP was to provide assistance to rural poor families living below the poverty line.
- The Integrated Rural Development Programme is financially assisted by the Centre and States in the ratio of 50 : 50.
Under the Integrated Rural Development Programme (IRDP), the targeted group includes at least 50% families belonging to scheduled caste and scheduled tribe. Apart from this, members of the beneficiary group, 50% were females and 3% physically handicapped.

- Development of Women and Children in Rural Areas (DWCRA) and Training for Rural Youth for Self Employment (TRYSEM) were the sub-plans of the Integrated Rural Development Programme.

- The objective of TRYSEM was to provide training to those rural youth (aged 18-35 years) who belong to the families living below the poverty line. The programme was started on August 15, 1979.

Development of Women and Children in Rural Area Programme (DWCRA) was started in September, 1982. Under this programme, a group of 10-15 women was taken, who belong to the families living below the poverty line and were given training for starting any economic activity. Every group was given the economic assistance of Rs. 25,000.

Swarna Jayanti Shahari Rozgar Yojana
- The Urban Self Employment Programme and Urban Wage Employment Programmes of the Swarna Jayanti Shahari Rozgar Yojana, which substituted the original programme, various programmes operated earlier for poverty alleviation.

- SJRS is funded on 75:25 basis between the Centre and the States.

- During the 3-year period (1997-98 and 1999-2000), a total of Rs. 353 crores were spent on SJRS generating 21.8 million mandays of employment.

Swarna Jayanti Gram Swarozgar Yojana (SGSY):
- The Government introduced Swarna Jayanti Gram Swarozgar Yojana on April 1, 1999, and the previous six ongoing schemes have been merged with this scheme, they are: 1. IRDP 2. TRYSEM 3. DWCRA 4. MWS 5. SITRA 6. Ganga Kalyan Yojana. The SGSY is a holistic programme covering all the aspects of self-employment. The scheme is funded on 75:25 basis by the Centre and states.

- The Drought-prone Area Programme was started in 1973 with the objective of developing the drought-prone area and also re-establishing the environmental balance. This programme is financially assisted by the Centre and the concerned State Governments in the ratio of 50:50.

- The Desert Development Programme was started in 1977-78 to end the ill-effects of drought in desert areas and also to stop the process of desert expansion. This programme is implemented on the basis of cent-per-cent financial assistance rendered by the Central Government.

- The Rural Landless Employment Guarantee Programme (RLEG) began on August 15, 1993 and the National Rural Employment Programme (NREP) on October 2, 1994. During Seventh Five Year Plan, these programmes were merged with Jawahar Rozgar Yojana.

- Council for Advancement of People's Action and Rural Technology (CAPART) is an independent section of the Rural Development Department of the Government of India, which was established on September 1, 1986. For rural development works, 'CAPART' provides grants to voluntary organisations.

The head office of CAPART is at New Delhi.

- Following programmes are being implemented by the Ministry of the Urban Development to eradicate Urban Poverty—1. Nehru Rozgar Yojana 2. Urban Basic Services for the Poor 3. Programme of Environment Improvement of Urban Slums.

- The Nehru Rozgar Yojana began on October 1989 which was revised in March, 1990. Under this Yojana following schemes were included:— 1. Scheme of Urban Micro Enterprises—SUME 2. Scheme of Urban Wage Employment—SUWE 3. Scheme of Housing and Shelter Upgradation—SHASU.

- The Prime Minister's Rozgar Yojana (PMRY) was started on October 2, 1993 for the educated unemployed youth and initially was in operation in urban areas. From April 1, 1994 onwards the scheme is being implemented throughout the country. Its objective was to give employment to 10 lakhs educated unemployed urban youth by establishing 7 lakh micro enterprises during the Eighth Five Year Plan. During 1993-94, this yojana was implemented in urban areas only but since April 1, 1994 it was extended to the whole country.

- SHGs (Self-Help Groups) are considered eligible for financing under the PMRY, effective from December 8, 2003 (terms modified on July 30, 2004) provided all members individually satisfy the eligibility criteria laid down and total membership does not exceed twenty (20). There is also a ceiling on the loan amount.

New schemes and plans of Union and State Government

PAHAL Scheme
- More than 60% of LPG customers in the country have joined the ambitious PAHAL scheme for receiving cash subsidy so that they can buy cooking gas (LPG) at market price.

- Over 9 crore consumers, out of a total customer base of 15.33 crore, have joined the Direct Benefit Transfer for LPG (DBTL) scheme and Rs 2,262 crore in cash has been transferred to them.

- The DBTL Scheme for LPG consumers (PAHAL) was launched on November 15, 2014 in 54 districts and in the rest of the country on January 1, 2015. The scheme aims to transfer the subsidy on LPG directly into the bank accounts of over 15 crore LPG consumers.

Beti Bachao-Beti Padhao
- The 'Beti Bachao-Beti Padhao' scheme, which seeks to address gender imbalance and discrimination against the girl child, was launched by Prime Minister Narendra Modi at Panipat in Haryana.

- Mahendergarh and Jhajjar districts of Haryana are badly effected with unbalanced Sex ratios where there are just about 775 girls for 1,000 boys, the lowest in India.

- Haryana Chief Minister launched a scheme for girl child- 'Aapki Beti Humari Beti'—with an aim to combat the problem of declining child sex ratio in the state.

Sukanya Samriddhi Accounts
- Rate of interest 9.1% Per Annum (2014-15), calculated on yearly basis. Yearly compounded.

- Minimum INR 1,000 and Maximum INR 1,50,000 in a financial year. Subsequent minimum deposit in multiples of INR 100. Deposits can be made in lump-sum. No limit on number of deposits either in a month or in a Financial year.
Social Security Schemes

After providing bank accounts to crores of unbanked people under Jan Dhan Yojana, the Prime Minister has launched three social security schemes, including Atal Pension Yojana. The schemes include:

1. Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY)
2. Pradhan Mantri Suraksha Bima Yojana (PMSBY)
3. Atal Pension Yojana (APY)

These schemes were simultaneously launched at 115 locations throughout the country.

1. **Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY)**
   - Will offer a renewable one-year life cover of ₹ 2 lakhs to all saving bank account holders in the age group of 18-50 years, covering death due to any reason, for a premium of ₹ 330 per annum per subscriber.

2. **Pradhan Mantri Suraksha Bima Yojana (PMSBY)**
   - Will offer a renewable one-year accidental death-cum-disability cover of ₹ 2 lakhs for partial/permanent disability to all savings bank account holders in the age group of 18-70 years, for a premium of ₹ 12 per annum per subscriber.

3. **Atal Pension Yojana**
   - Will focus on the unorganised sector and provide subscribers a fixed minimum pension of ₹ 1,000, ₹ 2,000, ₹ 3,000, ₹ 4,000 or ₹ 5,000 per month, starting at the age of 60 years, depending on the contribution option exercised on entering at an age between 18 and 40 years.

8. Trade and Commerce

- Indian Trade was extremely developed during ancient times.
- After the British East India Company was established in 1600, the trade between India and Britain was in India's favour till 1757.
- At that time East India Company used to purchase clothes and spices in exchange for costly metals.
- The British Government decided to impose heavy duty on the clothes to destroy the structure of industries.
- During the later part of 18th Century, after Industrial revolution in Britain, there was heavy production of cheap items. To sell those cheap items in world market, the tradition of colonisation began.
- British Companies established monopoly on the sale of cotton. As a result, the Indian weaver got costly raw material and thus Indian products became costly. By 1813, Indian Handloom business was completely ruined.
- In the later part of 19th Century, the establishment of modern industries on the basis of power machines started. First time in India, the textile industries came into being.
- **First Factory of Cotton Textile** in India was established in 1818 at Ghughi near Kolkata, which failed.
- The **Second Factory of Cotton Textile** was established by a businessman Kawanji Nana Bhai in Mumbai in 1853.
- In 1855, first Jute Factory was established in Rishara (West Bengal).
- In 1853, after the establishment of railway in India industrial development got momentum here. Rapid expansion of Indian industries started due to development of the means of communication.
- **Jamsheedji Tata** established first Steel Factory in Jamshedpur in 1907.
9. New Economic Policy

- New Economic Policy is related to economic reforms. Its aim is to bring about reforms in production pattern, to obtain new technology and to use full capacity expeditiously and in toto.
- The New Economic Policy was devised and implemented, for the first time in the year 1985 during the period of Prime Minister Rajiv Gandhi.
- The second wave of new economic reforms came in the year 1991 during the period of P.V. Narasimha Rao government.
- The main reason to start new economic policy (1991) was Gulf-War and problem of balance of payment in India.
- Three main objectives of new economic policy were—Liberalisation, Privatisation, and Globalisation.
- Main sectors of new economic reform policy, 1991 were—Fiscal Policy, Monetary Policy, Value Fixation Policy, Foreign Policy, Industrial Policy, Foreign Investment Policy, Business Policy and Public Sector Policy.
- The following four main steps were taken under the Fiscal Policy, 1991:
  1. To control public expenditure strictly
  2. To expand Tax Net
  3. To observe discipline in management of funds of Central and State governments
  4. To curtail grants (subsidy)
- Under the Monetary Policy, steps were taken to control inflation.
- Measures implemented under the Industrial Reforms Policy, 1991 were:
  1. Delicensing of industries except the list of 18 industries.
  2. M.R.T.P. norms were relaxed for disinvestment.
  3. The areas reserved for public sector were opened to private sector.
- The objectives fixed for reforms in the Foreign Investment Policy, 1991 were:
  1. Direct foreign investment upto 50% was given automatic approval, in many industries.
  2. Foreign companies, involved in export activities were allowed to invest upto 51% capital.
  3. The government gave automatic approval for Technology Agreement in the industries of high priorities.
- Under the Trade Policy 1991, steps were taken to abolish the excessive protection given to many industries, for the promotion of international integration of economy.
- The measures implemented to bring efficiency and market discipline under the Public Sector Policy, 1991 were as under:
  1. Number of reserved industries decreased to 8. Presently these are only four.
  2. The work of rehabilitation of sick industries handed over to Board of Industrial Rehabilitation.
  3. Industries were made powerful with the help of Memorandum of Understandings (MoU).
  4. Voluntary Retirement Schemes started to cut down the size of work force.

Economic Reforms

- Economic Reforms were introduced in 1991 in India. First Generation Reforms were aimed at stabilization of Indian economy and were macro level in nature. It includes liberalisation and deregulation of industry, financial sector reforms, taxation reforms etc. Second Generation Reforms aimed at structural changes and are micro level in nature. It will include labour reforms, land reforms, capital market reforms, expenditure reforms and power sector reforms etc.
- Since economic reform, poverty has been declining from 36% in 1993 to 26% by the end of 10th plan. But as far as inequality is concerned it has increased. A World Bank Report 1999-2000 confirms this rise in inequality.
- The New Economic Reforms Policy, by making progress from 1991 to 2005-06 has become more open, liberal and global.
- Disinvestment means to decrease the share of government in the industries.
- In 1996, Disinvestment Commission was constituted to review, give suggestions and make regulations on the issue of disinvestment.
- Shri G.V. Ramakrishna was the first Chairman of Disinvestment Commission.
- In the year 1992, National Renewable Fund was constituted for rehabilitation of displaced labourers of sick industrial units affected due to industrial modernization, technological development etc.
- ‘Navratna’ is a company which is rising at world level. To encourage these companies, the government has given them complete autonomy.
- In the second phase of economic reforms programme, the main aim is to eradicate poverty from the country and development at the rate of 7 to 8%.

Some Important Terminology Relating to the New Economic Reforms Policy

- Privatisation: To increase participation of private sector in the public sector companies by capital investment or by management or both or to hand over a public sector unit to a private company is called Privatisation.
- Liberalisation: Liberalisation is the process by which government control is relaxed or abolished. In this process privatisation is also included.
- Globalisation: The process of amalgamation of an economy with world economy is called Globalisation. It is signified by lower duties on import and export. By doing so, that sector will also get private capital and foreign technology.
- Disinvestment: To reduce the government share in the public sector is called disinvestment.

10. Indian Financial System

- Indian Financial System is a system in which People, Financial Institutions, Banks, Industrial Companies and the Government demand for fund and the same is supplied to them.
- There are two parts of Indian Financial System—first demand side and second supply side. The representative of demand side can be Individual investor, Industrial and Business Companies, Government etc and the representative of supply side will be Banks, Insurance Companies, Mutual Fund and other Financial Institutions.
The Indian financial system, which refers to the borrowing and lending of funds or to the demand for and supply of funds of all individuals, institutions, companies and of the Government consists of two parts, viz., the Indian money market and the Indian capital market.

The Indian money market is the market in which short-term funds are borrowed and lent. The capital market in India, on the other hand, is the market for medium-term and long-term funds.

The Indian financial system performs a crucial role in economic development of India through saving-investment process, also known as capital formation.

The financial system is commonly classified into:

1. Industrial finance
2. Agricultural finance
3. Development finance
4. Government finance

Devaluation means lowering the official value of the local money in terms of foreign currency or gold.

Balance of Payments (BoP) is a systematic record of all the economic transactions between one country and the rest of the world in a given period.

Balance of Trade (BoT) is the difference between the value of goods exported and the value of goods imported per annum. Services not included in BoT.

BOP is divided in current account and capital account.

EXIM Policy 2000-01 introduced Special Economic Zones Scheme (SEZ).

1994-95, Indian Rupee was made fully convertible on current account.

Fiscal Policy is the policy relating to public revenue and public expenditure and allied matters.

Usually, the Indian money market is classified into organised sector and the unorganised sector.

The unorganised sector consists of indigenous bankers including the Non-Banking Financial Companies (NBFCs). Besides, these two, there are many sub-markets in the Indian money market.

The organised banking system in India can be broadly divided into three categories, viz., the central bank of the country known as the Reserve Bank of India, the commercial banks and the co-operative banks which includes private sector and public sector banks and also foreign banks.

The highest financial institution in organized sector is Reserve Bank of India and in addition to this Banks of Public Sector, Banks of Private Sector, Foreign Banks and other financial institutions are also part of organized sector.

The Reserve Bank of India regulates and controls the money of the country.

The RBI was established under the Reserve Bank of India Act, 1934 on 1st April, 1935 with a capital of Rs. 5 crore. It was nationalised on 1st January, 1949; on the recommendation of Parliamentary Committee in 1948. It is the Central Bank of India.

The Reserve Bank of India is the supreme monetary and banking authority in the country and has the responsibility to control the banking system in the country. It keeps the reserves of all commercial banks and hence is known as the ‘Reserve Bank’. Its financial year is 1st July to 30th June.

The Indian Capital Market

The Indian capital market is the market for long-term capital; it refers to all the facilities and institutional arrangements for borrowing and lending ‘term funds’—medium term and long-term funds.

The Capital Market in India includes:

1. Government Securities (Gilt-edged market)
2. Industrial Securities Market
3. Development financial institutions like IFCI, IDBI, ICICI, SFCs, IDBI, UTI etc
4. Financial Intermediaries like Merchant banks

Individuals who invest directly on their own in securities are also supplier of fund to capital market. The trend in the capital market is basically affected by two important factors:

1. Operations of the institutional investors in the market
2. The excellent results flowing in from the corporate sector.

The capital market in India can be classified into:

- Gilt-edged market or market for Government and semi-government securities;
- Industrial securities market;
- Development financial institutions and
- Non-banking financial companies.

The gilts-edged securities market is the market for Government and Semi government securities which carry fixed interest rates.

The industrial securities market is the market for equities and debentures of companies of the corporate sector. This market is further classified into:

(a) New issue markets for raising fresh capital in the form of shares and debentures (commonly referred to as primary market), and
(b) Old issues market (or secondary market) for buying or selling shares and debentures of existing companies—this market is commonly referred to as the stock market or stock exchange.

If shares or debentures of private corporations, primary securities of government companies or new securities and issue of bonds of public sector are sold or purchased in the capital market, then the market is called primary capital market.

<table>
<thead>
<tr>
<th>Important Share Price Index of the World</th>
<th>Stock Exchange</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share Price Index</td>
<td>Stock Exchange</td>
</tr>
<tr>
<td>1. Bovespa</td>
<td>Brazil</td>
</tr>
<tr>
<td>2. Dow Jones</td>
<td>New York</td>
</tr>
<tr>
<td>3. FTSE—100</td>
<td>London</td>
</tr>
<tr>
<td>4. HANG SENG</td>
<td>Hong Kong</td>
</tr>
<tr>
<td>5. L.P.C.</td>
<td>Mexico</td>
</tr>
<tr>
<td>6. Jakarta Composite</td>
<td>Indonesia</td>
</tr>
<tr>
<td>7. KLSE Composite</td>
<td>Malaysia</td>
</tr>
<tr>
<td>8. KOSPI</td>
<td>Korea</td>
</tr>
<tr>
<td>9. MIBTe</td>
<td>Italy</td>
</tr>
<tr>
<td>10. MID DAX</td>
<td>Frankfurt</td>
</tr>
<tr>
<td>11. NASDAQ</td>
<td>U.S.A.</td>
</tr>
<tr>
<td>12. Nikkei</td>
<td>Tokyo</td>
</tr>
<tr>
<td>13. S &amp; P</td>
<td>Canada</td>
</tr>
<tr>
<td>14. Seoul Composite</td>
<td>S. Korea</td>
</tr>
<tr>
<td>15. SHANGHAI Com</td>
<td>China</td>
</tr>
<tr>
<td>16. SET</td>
<td>Thailand</td>
</tr>
<tr>
<td>17. Straits Times Index</td>
<td>Singapore (SGX)/SIMEX</td>
</tr>
<tr>
<td>18. TAIEX</td>
<td>Taiwan</td>
</tr>
</tbody>
</table>
Stock Exchange
The stock exchange is the market for buying and selling of stocks, shares, securities, bonds and debentures etc. It increases the market ability of existing securities by providing simple method for public and others to buy and sell securities.

Credit Rating Agency in India & World
Indian credit rating industry mainly comprises of CRISIL, ICRA, CARE, ONICRA, Fitch (India Ratings & Research) & SMERA.

CRISIL: Credit Rating Information Services of India Limited, Headquarter—Mumbai
ICRA: Investment information and Credit Rating Agency, Headquarter—Gurgaon, India
CARE: Credit Analysis and Research, Headquarter—Mumbai
ONICRA: Headquarter-Gurgaon, India
SMERA: Headquarter—Mumbai
Fitch (India Ratings & Research): Headquarter—Mumbai
Standard & Poor's (S&P): Headquarter—New York, US
MOODY'S: Headquarter—New York, US
Fitch: Headquarter—New York, US

Note: CRISIL is the largest credit rating agency in India, with a market share of greater than 60%.

Some Important Share Price Index of India
BSE SENSEX: This is the most sensitive share index of the Mumbai Stock Exchange. This is the representative index of 30 main shares. Its base year is 1978-79. BSE is the oldest stock exchange of India, founded in 1875.
BSE 200: This represents 200 shares of Mumbai Stock Exchange. Its base year is 1989-90.

DOLLEX: Index of 200 BSE Dollar Value Index is called DOLLEX. Its base year is 1989-90.
NSE-50: From 28th July, 1998, its name is S & P CNX Nifty. National Stock Exchange has launched a new share Price Index, NSE-50 in place of NSE-100 in April 1996. NSE-50 includes 50 companies shares. This stock exchange was founded on Forward Committee's recommendation in 1994.
CRISIL, set up in 1988, is a credit rating agency. It undertakes the rating fixed deposit programmes, convertible and non-convertible debentures and also credit assessment of companies.
CRISIL 500 is the new share Price Index introduced by Credit Rating Agency the 'Credit Rating Information Services of India Limited' (CRISIL) on January 18, 1996.

The National Stock Exchange (NSE) has launched a new version of its online trading software called 'National Exchange for Automatic Trading' (NEAT).

Regulators in India

<table>
<thead>
<tr>
<th>Regulator</th>
<th>Sectors</th>
<th>Chairman</th>
<th>Headquarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve Bank of India (RBI)</td>
<td>Financial system and monetary policy, Money Market</td>
<td>Raghuram Rajan</td>
<td>Mumbai</td>
</tr>
<tr>
<td>Insurance Regulatory and Development Authority (IRDA)</td>
<td>Insurance industry</td>
<td>T.S. Vijayan</td>
<td>Hyderabad</td>
</tr>
<tr>
<td>Telecom Regulatory Authority of India (TRAI)</td>
<td>Telecommunication Industry</td>
<td>Rahul Khullar</td>
<td>New Delhi</td>
</tr>
<tr>
<td>Forward Markets Commission</td>
<td>Commodity Market</td>
<td>Ramesh Abhishek</td>
<td>Mumbai</td>
</tr>
<tr>
<td>Pension Fund Regulatory and Pension sector Development Authority (PFRDA)</td>
<td></td>
<td>Hemant Contractor</td>
<td>New Delhi</td>
</tr>
</tbody>
</table>

Ranking of India in different Indexes (As in March, 2015)
1. India has emerged as the second-most trusted country in the world in terms of faith reposed on its institutions. The list is topped by UAE with 84% trust.
2. Transparency International India (TII)—Corruption Index—India ranked 85th among 175 (Denmark Topped).
3. World Bank—'Ease of Doing Business' Report—India ranked 142 among the 189 countries (Singapore Top).
4. World Economic Forum’s 2015 Gender gap Index—114 (Iceland top the list, followed by Finland & Norway).
6. Human Development Index 2014–135 (Norway top, followed by Australia).
Indian Fiscal System

> Fiscal System: It refers to the management of revenue and capital expenditure finances by the state. Hence, fiscal system includes budgetary activities of the government that is revenue raising, borrowing and spending activities.

> Fiscal Policy: Fiscal Policy refers to the use of taxation, public expenditure and the management of public debt in order to achieve certain specified objectives.

> Indian Fiscal System includes or refers to the management of revenue sources and expenditure of the Central and State governments, Public debt, Deficit financing, Budget, Tax structure, etc.

> Sources of Revenue for Centre: The revenue of the Central Government consists of the following elements: 1. Tax revenue and 2. Non-tax revenue. Tax revenue comes broadly from three sources: (a) taxes on income and expenditure (b) taxes on property and capital transactions and (c) taxes on commodities and services. Non-tax revenue, consists of: (a) currency, coinage and mint (b) interest receipts and dividends and other non-tax revenue.

> Sources of Revenue for State: The main sources are: (a) state tax revenue, (b) share in central taxes, (c) income from social, commercial and economic service and profits of state-run enterprises. State tax revenue includes among others, land revenue, stamp, registration and estate duty etc.


> Under Plan expenditure comes outlay for agriculture, rural development, irrigation and flood control, energy, industry and minerals, transport, communications, Science and Technology, environment and economic services etc.

> The major non-plan expenditures are interest payments, defence, subsidies and general services.

> Expenditure of State: Like the Union Government, the State Governments too have two broad heads of expenditure: (a) Non-Development Expenditure and (b) Development Expenditure.

> Public debt of the government of India is of two kinds: Internal and External.

> Internal debt: It comprises loans raised from the open market, compensation bonds, prize bonds etc. treasury bills issued to the RBI, commercial banks etc.

> External debt: It consists of loans taken from World Bank, IMF, ADB and individual countries like USA, Japan etc.

> Deficit Financing: Deficit financing is a fiscal tool in the hands of the government to bridge the gap between revenue receipt and revenue expenditure.

Deficits

> In a budget statement, there is a mention of four types of deficits: 1. revenue, 2. budget, 3. fiscal and 4. primary.

Revenue Budget: All 'current' receipts such as taxation, surplus of Public enterprises, and 'expenditure' of the Government.

Capital Budget: All 'Capital' receipts and 'expenditure' such as domestic and foreign loans, loan repayments, foreign aid etc.

Finance Bill is ordinarily introduced every year to give effect to the financial proposals of the Government for the following financial year.

12. Banking in India

The Reserve Bank of India was established on 1st April, 1935 and it was nationalized on 1st January, 1949.

The Finance Ministry issues Currency Notes and Coins of rupee one, all other Currency Notes are issued by the Reserve Bank of India.

The first bank of limited liability managed by Indians was Oudh Commercial Bank founded in 1881. Subsequently, Punjab National Bank was established in 1894.

Swadeshi movement, which began in 1906, encouraged the formation of a number of commercial banks.

The Banking Companies Act was passed in February, 1949, which was subsequently amended to read as Banking Regulation Act, 1949.

Commercial banks mobilise savings in urban areas and make them available to large and small industrial and trading units mainly for working capital requirements.

The Indian banking system consists of commercial banks, both in public and private sector, Regional Rural Banks (RRBs) and cooperative banks.

As on June 30, 2009, Commercial Banking system in India consisted of 171 scheduled commercial banks out of which 113 were in public sector, including 86 RRBs. The remaining 27 banks, other in SBI group and IDBI Bank Limited. Public sector banks (excluding RRBs) accounted for about 76.6% of the deposits of all scheduled commercial banks.

Commercial banks are broadly classified into nationalised or public sector banks and private sector banks, with a few foreign banks. The public sector banks account for more than 92% of the entire banking business in India occupying a dominant position in the commercial banking. The State Bank of India and its 7 associate banks along with another 19 banks are the public sector banks.

Oudh Commercial Bank was the first complete Commercial Bank of India.

The Imperial Bank was established in the year 1921 by merging three main Presidency Banks.

The largest bank - Imperial Bank was nationalised in 1955 on recommendation of Goenka Committee and rechristened as State Bank of India.

In 1959, 7 regional banks were nationalised and given the status of Associate Banks of State Bank of India.

On 19th July, 1969, 14 big commercial banks with deposits worth Rs. 50 crores or more and on 15th April, 1980, six other scheduled banks were nationalised, bringing total number of nationalised banks to 27 (19 + SBI + 7 SBI Associates).

Before the merger of New Bank of India in Punjab National Bank (in 1993) the total number of nationalised banks was 28 (8 SBI and Associates + 14 + 6).

After the merger of 'State Bank of Saurashtra' and 'State Bank of Indore' in the State Bank of India, the number of Associates of SBI has come to 6.

Lead Bank Scheme

After the nationalisation of 14 banks the Lead Bank Scheme of the RBI was adopted in 1969 for branch expansion programme of banks.

Under the scheme, all the nationalised banks and private banks were allotted specific districts where they were asked to take the lead in surveying the scope of banking development particularly expansion of credit facilities.

Banking Reforms

On the recommendation of Narsimham Committee, a number of steps taken to improve functioning of banking sector. SLR and CRR were reduced.

Banks were given freedom to open new branches. Rapid computerisation of banks was undertaken.

Banking ‘Ombudsmen Scheme’ started functioning to expedite inexpensive resolution of customer’s complaints.

Scheduled and Non-scheduled Banks

The scheduled banks are those which are entered in the second schedule of the RBI Act, 1934. These banks have a paid-up capital and reserves of an aggregate value of not less than Rs. 5 lakhs and satisfy the RBI that their affairs are carried out in the interest of their depositors.

All commercial banks (Indian and foreign), regional rural banks and state co-operative banks are scheduled banks. Non-scheduled banks are those which are not included in the second schedule of the RBI Act 1934. At present there is only one such bank in the country.

Regional Rural Banks

The Regional Rural Banks (RRBs), the newest form of banks, have come into existence since middle of 1970s (sponsored by individual nationalised commercial banks) with the objective of developing rural economy by providing credit and deposit facilities for agriculture and other productive activities of all kinds in rural areas.
Co-operative Banks

- Co-operative banks are so called because they are organised under the provisions of the Co-operative Credit Societies law of the states. The major beneficiary of the Co-operative Banking is the agricultural sector in particular and the rural sector in general. The first such bank was established in 1906.
- The Co-operative credit institutions operating in the country are mainly of two kinds: agricultural (dominant) and non-agricultural.
- At the apex is the State Co-operative Bank (SCB) (co-operation being a state subject in India), at the intermediate (district) level are the Central Co-operative Banks (CCBs), and at the village level are Primary Agricultural Credit Societies (PACS); Long-term agricultural credit is provided by the Land Development Banks.
- In the year 1991, Narasimham Committee was constituted to advise on the issue of reconstruction of banking system.

Bharatiya Mahila Bank

With a purpose to promote gender equality and economic empowerment of women, Government of India has set up India’s first Women’s Bank—“Bharatiya Mahila Bank Limited”.

Bharatiya Mahila Bank Ltd is incorporated under the Companies Act 1956 on 5 August, 2013, the Bank received the certificate of commencement of Business on 22 August, 2013 and the Banking License from RBI on 25 September, 2013. The Bank’s Corporate Office is at the IFCI towers, 9th floor, Nehru Place, New Delhi. Launched on 19th November, 2013, the Bank has carved a niche for itself as a pan India Bank with 60 branches across the country.

The Bank has designed many women centric products keeping in mind the core strengths of women so as to enable them to unleash their hidden potentials, engage in economic activities and contribute to the economic growth of the country. Most of the products are offered with a concession in the rate of interest for women customers.

Mrs. Usha Ananthasubramanian is the first Chairman and Managing Director of the Bank and S. M. Swathi is the first Executive Director of the Bank.

The Bank has been allocated with an initial capital of Rs. 1,000 Crores.

Development Banks

- Industrial Development Bank of India (IDBI), established in 1964. Main functions: Providing finance to large and medium scale industrial units.
- Industrial Finance Corporation of India (IFCI), established in 1948. Main functions: (a) Project finance (b) Promotional services.
- Industrial Credit and Investment Corporation of India Limited (ICICI), established in 1991. Main functions: Providing term loans in Indian and foreign currencies; Underwriting of issues of shares and debentures.
- Small Industries Development Bank of India (SIDBI), established in 1989. Finance corporations, state industrial development corporations, commercial

Important Banking Terminology:

1. Bank Rate: Bank Rate is the rate at which central bank of the country (e.g., RBI in India) lends or lends to commercial banks. Bank Rate is a tool, which central bank uses for short-term purposes. Any upward revision in Bank Rate is an indication that banks should increase interest rates. As well as Base Rate/Benchmark Prime Lending Rate. Thus any revision in the Bank rate indicates that it is likely that interest rates on customers' deposits are likely to go up or go down, and it can also indicate an increase or decrease in customer's EMI.
2. Basis points: It is the increase in interest rates in percentage terms. For instance, if the interest rate increases by 50 basis points (bps), then it means that interest rate has been increased by 0.50%. One percentage point is an increase of one percentage basis points. Therefore, an increase from 2 to 3% is an increase of one basis point or 100 basis points.

3. CRR (Cash Reserve Ratio): CRR is the amount of funds that the banks have to keep with RBI. If RBI increases CRR, the available amount with the banks decreases. RBI uses this method (increase of CRR), to drain out the excess money from the banks.

4. SLR (Statutory Liquidity Ratio): SLR is the amount a commercial bank needs to maintain in the form of cash, gold, or government securities (bonds) to provide credit to its customers. SLR rate is determined and maintained by RBI. Need of SLR: With the SLR, the RBI can control the expansion of the bank credit. SLR: With the SLR, the RBI can control the solvency of a commercial bank.

5. Repo Rate: Repo rate is the rate at which commercial banks borrow money from RBI. A reduction in the repo rate will help banks to get money at cheaper rates. When the repo rate increases, commercial banks have to pay more to RBI.

6. Reverse Repo Rate: Reverse Repo rate is the rate at which RBI borrows money from commercial banks. Banks are always happy to lend money to RBI since they can get remunerative interest rates.

7. NEFT (National Electronic Fund Transfer): NEFT enables funds transfer from one bank to another but works a bit differently than RTGS. NEFT is slower but cheaper than RTGS.

8. RTGS (Real Time Gross Settlement): RTGS is a system for funds transfer system where transfer of money or securities takes place from one bank to another on a 'real time' and on a 'gross' basis. Settlement in 'real time' means payment transaction is not subjected to any waiting period. The transactions are settled as soon as they are processed.

9. Liquidity Adjustment Facility (LAF): LAF is a monetary policy tool which allows banks to borrow money through repurchase agreements. LAF is used to aid banks in adjusting the day to day mismatches in liquidity.

10. Marginal Standing Facility (MSF): MSF rate is the rate at which banks borrow funds overnight from the Reserve Bank of India (RBI) against approved government securities. MSF is always 1 percent more than the repo rate.

11. NOSTRO Account: A Nostro account is maintained by an Indian bank in the foreign countries.

12. VOSTRO Account: A Vostro account is maintained by a foreign bank in India with their corresponding bank.

13. CRAR (Capital to Risk Weighted Assets Ratio): Capital to risk weighted assets ratio is arrived at by dividing the capital of the bank with aggregated risk assets. CRAR is a measure of capital adequacy. It is important for banks to maintain a sufficient level of capital to cover potential losses.

14. SDR (Special Drawing Rights): SDR is a reserve asset, created by the International Monetary Fund in 1967. The value of SDR accounting entries is not as hard currency or physical assets like Gold.

15. BOND: BOND is a publicly traded long term debt security issued by corporations and governments, whereby the issuer agrees to pay a fixed amount of interest over a specified period of time and to repay a fixed amount of principal maturity.

16. Non Performing Assets (NPA): An asset (loan), including a leased asset, becomes non-performing when it stops generating income for the bank.

Note: Once the borrower has failed to make interest or principle payments for 90 days the loan is considered to be a non-performing asset.

13. Tax System

- A compulsory contribution given by a citizen or organisation to the Government is called Tax, which is used for meeting expenses on welfare work.
- Tax imposing and Tax collecting is at three levels in India—Central level, State level and Local level.
- The distribution of tax between Centre and State has been clearly mentioned in the provisions of Indian Constitution. For rationalising it from time to time, Finance Commission has been constituted.
- The tax system has been divided into two parts:
  - Tax by Central Government: Custom Duty, Income Tax and Corporate Tax etc.
  - Tax by State Government: The state government has right to collect all the taxes in this category and to spend them.

- There are two types of taxes: 1. Direct Taxes 2. Indirect Taxes:
  - Direct Taxes: The taxes levied by the central government on incomes and wealth are important direct taxes. The important taxes levied on incomes are—corporation tax and income tax. Taxes levied on wealth are wealth tax, gift tax etc.
  - Indirect Taxes: This type of tax is not paid by someone to the authorities and it is actually passed on to the other in the form of increased cost. They are levied on goods and services produced or purchased. Excise Tax, Sales Tax, Vat, Entertainment Tax are indirect taxes. The main forms of indirect taxes are customs and excise duties and sales tax. The central government is empowered to levy customs and excise duties (except on alcoholic liquors and narcotics) whereas sales tax is the exclusive jurisdiction of the state governments.

- However, the union excise duties form the most significant part of central taxes. The major tax revenue sources for states are their shares in union excise duties and income tax, commercial taxes, land revenue, stamp duty, registration fees, state excise duties on alcohol and narcotics etc. Sales tax forms the most important component of commercial taxes.
Progressive Tax: A tax that takes away a higher proportion of one's income as the income rises is known as progressive tax. Indian Income Tax is a progressive tax and direct tax.

R. Chelliah Committee was constituted in August, 1991 for suggesting reforms in Tax Structure.

Chelliah Committee recommended Income Tax for agricultural income of more than Rs. 25,000 p.a. Chelliah Committee also recommended for lowering down the tax rates and reducing the tax slabs.

K.L. Rekhi Committee was constituted in 1992 for suggesting uniform regulations for indirect taxation (Custom Duty and Excise Duty).

Finance Commission
- Finance Commission is constituted by the President under Art 280 of the constitution. Since Independence, 12 Finance Commissions have submitted their reports.
- 1st Finance Commission was constituted under chairmanship of K. C. Neogi while 12th Finance Commission was constituted under chairmanship of Dr. C. Rangarajan. The recommendations of 12th Finance Commission covered period 1st April, 2005 to 31st March, 2010.
- 13th Finance Commission, for the period 2010-2015, had been constituted in November, 2007 with Dr. Vijay L. Kelkar as the Chairman.
- The 14th Finance Commission, for the period 2015-2020, has been constituted on January 2, 2013 with Y. V. Reddy as the Chairman.

Important Taxes Imposed in India
- Tax on Income and Wealth: The central government imposes different types of tax on income and wealth, viz. income tax, corporate tax, wealth tax and gift tax. Out of them income tax and corporate tax are more important from the revenue point of view.
- Personal Income Tax: Personal income tax is generally imposed on an individual combined Hindu families and total income of people of any other communities.
- In addition to tax, separate surcharges are also imposed some times.
- Agricultural income in India is free from income tax.
- Corporate Tax: Corporate Tax is imposed on Registered Companies and Corporations.
- The rate of corporate tax on all companies is equal. However, various types of rebates and exemptions have been provided.
- Custom Duties: As per the Constitutional provisions, the central government imposes import duty and export duty both. Import and Export duties are not only sources of income but with the help of it the central government regulates the foreign trade.
- Import Duties: Generally import duties are ad-velorem in India. It means import duties are imposed on the taxable item on percentage basis.
- Export Duties: Export Duties are more important, compared to Import Duties in terms of revenue and regulation of foreign trade.
- Excise Duties: Excise duties are commodity tax as it is imposed on production of an item and it has no relevance with its sale. This is the largest source of revenue for the Central Government.

Indian Economy

Except liquor, opium and other drugs, production of all the other items is taxable under Central Excise Duties.
- On July 15, 2010 Indian rupee got its symbol, just like other leading currencies of the world viz. Dollar, Euro, Pound Sterling and Yen. The new symbol is an amalgamation of Devanagari ‘R’ and the Roman ‘R’ without the stem. Till now the rupee was written in various abbreviated forms in different languages.
- On March 5, 2009 the government announced a contest to create a symbol for the Rupee. Over 3,000 entries received only 5 entries had been selected by the jury, headed by the Deputy Governor of RBI.
- The new symbol designed by D. Udaya Kumar, a post-graduate of IIT Bombay, was finally selected by the Union Cabinet on July 15, 2010.
- Though the symbol ‘₹’ will not be printed or embossed on currency notes or coins, it would be included in the ‘Unicode Standard’ and major scripts of the world to ensure that it is easily displayed and printed in the electronic and print media.
- One Coin and One Rupee note belong to ‘Legal Tender Money’ category.
- M₃ is known as Narrow Money.
- M₃ is known as Broad Money.

Types of Tax

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Tax</td>
<td>Income Tax, Property Tax, Gift Tax etc.</td>
</tr>
<tr>
<td>Indirect Tax</td>
<td>Sales Tax, Excise Duty, Custom Duty etc.</td>
</tr>
<tr>
<td>Taxes imposed by the Central Government</td>
<td>Income Tax, Corporate Tax, Property Tax, Succession Tax, Wealth Tax, Gift Tax, Custom Duty, Tax on agricultural wealth etc.</td>
</tr>
<tr>
<td>Taxes imposed by the State Government</td>
<td>Land revenue tax, Agricultural income tax, Agricultural Land Revenue, State Excise Duty, Entertainment Tax, Stamp duty, Road Tax, Motor Vehicle Tax etc.</td>
</tr>
</tbody>
</table>

Some Financial institutions and their year of establishment

1. Industrial Credit and Investment Corporation of India: Jan., 1955
2. Industrial Finance Corporation of India: 1948
3. Unit Trust of India (Head Office—Mumbai): 1971
5. Industrial Reconstruction Bank of India: 1985
8. Regional Rural Bank (RRB) (Head Office—Kolkata): 1975
9. Life Insurance Corporation of India (LIC): 1956

14. Industry

India started her quest for industrial development after Independence in 1947.


In the Industrial Policy of 1948, the importance of both public sector and private sector was accepted. However, the responsibility of development of private sector was handed over to Public Sector.
The Industrial Policy Resolution of 1956 gave the public sector strategic role in the economy.

Earmarking the pre-eminent position of the public sector, it envisaged private sector co-existing with the state and thus attempted to give the policy framework flexibility.

The main objective of the Industrial Policy of 1956 was to develop public sector, co-operative sector and control on private monopoly.

There were four categories of industries in the Industrial Policy of 1948 which was reduced to three in the Industrial Policy of 1956.

In 1973, Joint Sector was constituted on the recommendations of Dutta Committee.

The Industrial Policy of 1980 was influenced by the concept of federalism and the policy of giving concession to agriculture based industries was implemented through it.

Various liberalised steps to be taken were declared at comprehensive level, in the Industrial Policy declared on 24th July, 1991.

Privatisation and liberalisation are the main thrust areas in the New Industrial Policy.

**New Industrial Policy, 1991**

This new policy deregulates the industrial economy in a substantial manner.

The Major Features of NIP, 1991 are:

- **Abolition of industrial licensing:** In a major move to liberalise the economy, the new industrial policy abolished all industrial licensing, irrespective of the level of investment, except for certain industries related to security and strategic concerns, social reasons, concerns related to safety and over-riding environmental issues, manufacture of products of hazardous nature and articles of elitist consumption.

- **Entry of foreign investment and technology made easier:** For the promotion of exports of Indian products in world markets, the government would encourage foreign trading companies to assist Indian exporters in export activities. Approval would be given for direct foreign investment up to 51% foreign equity in high priority industries.

- **Public sector’s role diluted:** The new industrial policy has removed all these (the number of industries reserved for the public sector since 1956 was 17) industries from the Reserved List. Industries that continue to be reserved are in areas where security and strategic concerns predominate, defence aircraft and warships, 2. atomic energy, 3. mineral oils and minerals order, 1953, 4. railways.

- **MRTP Act:** Under the MRTP Act, all firms with assets above a certain size (Rs. 100 crore since 1985) were classified as MRTP firms. Such firms were permitted to undertake new projects only on a case-by-case approval basis.

In 2002, a competition Act was passed, which has replaced the MRTP Act functioning.

**Liberalisation of Industrial location policy:** The new Industrial policy provides that in locations other than cities of more than one million population, there will be no requirement of obtaining industrial approvals from the centre, except for industries subject to compulsory licensing. In cities with a population of more than one million, industries other than those of a non-polluting nature will be located outside 25 kms. of the periphery.

**Abolition of Phased Manufacturing Programmes for new projects:** To force the pace of indigenisation in manufacturing, Phased Manufacturing Programmes have been in force in a number of engineering and electronic industries.

**Mandatory convertibility clause removed:** A large part of industrial investment in India is financed by loans from banks and financial institutions. These institutions have followed a mandatory practice of including a convertibility clause in their lending operations for new projects. This has provided them an option of converting part of their loans into equity, if felt necessary by their management. This has often been interpreted as an unwarranted threat to private firms of takeover by financial institutions. This mandatory convertibility clause put forward by the financial institutions has been abolished by the new industrial policy.

In the Union Budget of 1997-98, nine public sector undertakings, which performed very well were given the name of ‘Navratna’ and were made autonomous. These ‘Navratnas’ included:

<table>
<thead>
<tr>
<th>Steel Authority of India Limited (SAIL)</th>
<th>Bharat Electronics Limited (BEL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian Oil Corporation, IOC (Sept. 1964)</td>
<td>Hindustan Aeronautics Limited (HAL)</td>
</tr>
<tr>
<td>Hindustan Petroleum Corporation Limited, HPCL (Estd. July 15, 1974)</td>
<td>National Thermal Power Corporation (NTPC)</td>
</tr>
<tr>
<td>Bharat Heavy Electricals Limited (BHEL)</td>
<td></td>
</tr>
</tbody>
</table>

**Some more PSUs** viz. GAIL (Aug., 1984), MTNL, NMDC, PFC, PGCIL, REC, NALCO, SCI and CIL were included in this list later.

- **Navratna Public sector enterprises** have been given enhanced autonomy and delegation of powers to incur capital expenditure (without any monetory ceiling), to enter into technology joint ventures, to raise capital from domestic and international market, to establish financial joint ventures and to wholly own subsidiary.

- PSUs were further categorised as ‘Maharatna’, ‘Navratna’ and ‘Miniratna’ CPSEs.

**List of Maharatna CPSEs (as on 26 October, 2014):**

1. NTPC Limited
2. Coal India Limited (CIL)
3. GAIL (India) Limited
4. Indian Oil Corporation Limited (IOC)
5. Bharat Heavy Electricals Limited (BHEL)
6. Oil & Natural Gas Corporation Limited (ONGC)
7. Steel Authority of India Limited (SAIL)
Indian Economy

**Small Scale Industries**
Small scale and cottage industries have an important role to play in a labour surplus developing economy like India. Their importance can be explained as

1. **Employment Generation**: Large scale industries are generally capital intensive. Small scale industries, on the other hand, are generally labour intensive and have a substantially higher employment potential.

2. **Equitable Distribution**: The ownership of SSI's is more widespread among both individuals as well as areas. Thus, these ensure equitable distribution of income individually and regionally.

3. **Mobilisation of Small Savings**: SSI's can be run with the help of small capital. Thus, they facilitate mobilisation of small savings.

4. **Export Contribution**: The share of small industries in the total export has increased over the years. It contributes 35% of total exports.

5. **Environment Friendly**: As these are dispersed far away from urban centres, they do not pollute urban environment.

However, Small Scale Industries are suffering from a number of problems like:

(a) Lack of timely, adequate and easy finance,
(b) Lack of availability of raw material,
(c) Lack of sound marketing system,
(d) Competition with large scale sector.

- **Sick Industries**: A sick unit is one which is in existence for at least five years and has found that at the end of accounting year that it had fully eroded its net worth. 50,000 units fall sick every year. A weak unit is one which erode 15% or more of its net worth.

**Textiles Industry**

- Textile industry is the largest industry in the country. The share of Textile and Clothing industry in total industrial production is about 14%. It also contributes 13.4% in total merchandise exports of the country.
- Indian Textiles Industry contributes about 14% to industrial production, 4% to GDP and 11% to the country’s exports earnings.
- The textile sector is the second largest provider of employment after agriculture.
- This industry provides employment to about 350 lakh people in the country.
- There are 112 cotton mills in Gujarat. In Ahmedabad alone, there are 66 mills. It is known as Bostan of East. In Maharashtra there are 104 mills out of which 54 alone are in Bombay. Mumbai is called cottonopolis. In Kanpur there are 10 cotton mills and this city is called Manchester of North India.
- The first cycle making factory of India was established in Calcutta in 1932.
- The first cycle making factory of India was established in Calcutta in 1932.
- About India holds second place in the field of cycles production in the world. About 90 lakh cycles are produced annually in India.
- Small and Cottage industries were given high priority in the Industrial Policy of 1977. District Industry Centres were established in 1977.
- With the aim to provide finance, Small Industries Development Bank of India (SIDBI) was established in 1990.
- **Abid Husain Committee** is related to reforms in small industries.

- The industries in which maximum Rs.1 crore is invested are called Small industries.
Indian Economy

The passenger car was however delicensed in 1993.

At present 100% Foreign Direct Investment (FDI) is permissible under automatic route in this sector including passenger car segment.

The industry also offers substantial scope of employment with 4.5 lakh direct employment and about one crore indirect employment.

Steel

Iron and steel Industry took birth in India in the year 1870 when Bengal Iron Works Company established its plant at Kulti, West Bengal.

Large scale iron and steel production was started in 1907 by TISCO, established at Jamshedpur (Jharkhand).

As per the data from International Iron and Steel Institute (IISI) India is the 7th largest producer of steel in the world.

At present India is the 9th largest Crude Steel producing country in the world.

Today, India is the largest producer of sponge iron in the world.

Small Enterprises Sector

The employment provided by the sector is estimated to be over 280 lakh persons at present.

In recognition of this role, the SE sector had been assigned targets of 12% annual growth in production and creation of 44 lakh additional employment opportunities in the Tenth Five Year Plan.

Micro, Small and Medium Enterprise Development Act, 2006

Small and Medium Enterprises Development Bill, 2005 (which was introduced in the Parliament on May 12, 2005) has been approved by the President and thus became an Act.

This new Act, named as 'Small and Medium Enterprise Development Act, 2006' has become effective from October 2, 2006.

This Act makes a different category for medium level enterprises.

This Act provides the first-ever legal framework for recognition of the concept of ‘enterprise’ (comprising both manufacturing and services) and integrating the three tiers of these enterprises, viz., micro, small and medium.

15. Foreign Trade

Before independence, the foreign trade of India was being operated on the principles of colonialism. But after independence, there have been huge changes in its state and direction.

After independence, inward looking foreign trade policies were accepted and the policy of import replacement was its base.

Efforts were made for trade liberalisation during the decade of 1980 and the comprehensive policy of liberalisation and globalisation was made in the decade of 1990s (after the year 1991).

Volume of India's Foreign Trade

After-independence, Indian foreign trade has made cumulative progress both qualitatively and quantitatively. Though the size of foreign trade and its value both have increased during post-independence era, this increase in foreign trade both have increased during post-independence era, this increase in foreign trade.
trade cannot be said satisfactory because Indian share in total foreign trade of the world has remained remarkable low.

> In 1950, the Indian share in the total world trade was 1.78%, which came down to 0.6% in 1995. According to the Economic Survey 2001-02, this share percentage of 0.6% continued in years 1997 and 1998. Since 1970, this share has remained around 0.6% which clearly indicates that India has failed to increase its share in the total world trade.

> India’s total external trade (exports + imports including re-exports) in the year 2013-14 reached a level of Rs. 18,94,181 crore registering a growth of 15.9%.

### Composition of India’s Foreign Trade

- Imports have been classified into Bulk imports and Non-bulk imports.
- Bulk imports are further sub-divided into Petroleum, Oil and Lubricants (POL) and non-POL items such as consumption goods, fertilizers and iron and steel. Non-bulk items comprise capital goods (which include electrical and non-electrical machinery), pearls, precious and semiprecious stones and other items.
- The structural changes in imports since 1951 show: (a) rapid growth of industrialisation necessitating increasing imports of capital goods and raw materials; (b) growing imports of raw materials on the basis of liberalisation of imports for export promotion; and (c) declining imports of food grains and consumer goods due to the country becoming self-sufficient in food grains and other consumer goods through agricultural and industrial growth.

### Exports of India are broadly classified into four categories:

1. Agriculture and allied products which include coffee, tea, oil cakes, tobacco, cashew kernels, spices, sugar, raw cotton, rice, fish and fish preparations, meat and meat preparations, vegetable oils, fruits, vegetables and pulses; 2. Ores and minerals which include manganese ore, mica and iron ore; 3. Manufactured goods and footwear handicrafts including pearls and precious stones, chemicals, engineering goods and iron steel and 4. Mineral fuels and lubricants.

Exports of India over the years show a clear decline in the importance of manufactured goods. This has been due to changing production structure of agriculture and allied products and a substantial increase in the importance of the economy and the overall growth of the economy.
10. Tax benefits on sales from domestic tariff areas to Special Economic Zones (SEZs).

11. Reduction of processing fees, fewer physical inspections, same day licensing in all offices of DGFT (Director Gen. of Foreign Trade).

12. Common classification for DGFT and customs department to eliminate classification related disputes.

13. No licence requirement for relocation of overseas industrial plants in India.

14. Industrial towns such as Tirupur, Panipat and Ludhiana to get Market Access Initiative (MAI) funds, priority for infrastructure development.

15. Allocation to states from Rs. 350 cr. Assistance to States for Infrastructure Development (ASIDC fund linked to their export performance.

16. Permission for captive power generation and duty free import of fuel for power generation, for exporters.

17. Reduction in the eligibility for getting Export House status from Rs. 15 crores to Rs. 5 crores.

Balance of Payment: A statement of all transactions of a country with the rest of the world during a given period. Transactions may be related to trade, such as imports and exports of goods and services; movement of short-term and long-term investments; gifts, currency and gold. The balance of payments may be classified into current account, capital account, unbalanced transfer account and gold account.

Balance of Trade: Part of the nation’s balance of payments concerning imports and exports. A favourable balance of trade means that exports exceed imports in value.

Invisibles: A term used to describe those items, such as financial services, included in the current Balance of Payments accounts, as distinct from physically visible imports and exports of goods. Invisibles include government grants to overseas countries and subscriptions to international organizations, net payment for shipping services, travel, royalties, commissions for banking and other services, transfers to or from overseas residents, Interest, Profits and Dividends received by or from overseas residents.

Foreign Exchange Reserves in India

- The foreign exchange reserves of the country include three important components: 1. Foreign Exchange Assets of RBI, 2. Gold Stock of RBI, 3. SDR holdings of the Government.

- After 1991, Indian foreign exchange reserves have rapidly increased due to various reasons which are as follows: 1. Devaluation of Rupee, 2. Availability of loans from international institutions, 3. Availability of foreign exchange from NRIs under various schemes, 4. Increased foreign investment (both direct and indirect), 5. Full convertibility of Rupee on current account.


- Under FEMA provisions related to foreign exchange have been modified and liberalised so as to simplify foreign trade and payments. FEMA will make favourable development in foreign Money Market.
The function of IMF is to encourage financial and economic cooperation between member countries and to extend worldwide.

International Bank for Reconstruction and Development (IBRD) was established in 1945.

IBRD along with other institutions is also called World Bank. The other institutions are International Finance Corporation, International Development Agency and Multilateral Investment Guarantee Agency.

Presently, it is helping member countries in capital investment and encouraging long-term balanced development.

General Agreement on Tariffs and Trade (GATT), came into being on 30th October, 1947 and started functioning from 1st January, 1948.

The principle of GATT was equal tariffs policy, to remove quantitative ban and disposal of business disputes in a democratic way.

On 1st January, 1995 the World Trade Organisation took over the place and position of GATT.

The Headquarter of WTO is in Geneva and the number of its member countries in the year 2003 was 146. India is a founder member of it.

The India–ASEAN Trade in Goods Agreement came into effect on January 1, 2010, though it was signed on August 13, 2009.

The signing of the India–ASEAN Trade in Goods Agreement paves the way for the creation of one of the world’s largest free trade areas (FTA)—market of almost 1.8 billion people with a combined GDP of US $ 2.75 trillion.

16. Miscellaneous Facts

The planned Development Model was adopted in India from April 1, 1951.

IRDA (Insurance Regulatory and Development Authority) was set up in India on April 2000.

International Monetary Fund was established on 27th December, 1945 at Hampshire, USA under ‘Bretton Woods Agreement’.

Principle of population was given by Thomas Robert Malthus in 1798. According to this theory population increases in geometrical progression. Malthus said—“Population growth will always tend to outrun the food supply and the betterment of mankind is impossible with limits on reproduction.” This thinking is also known as Malthusianism.

Phillips Curve—This is the relationship between rates of unemployment and corresponding rates of inflation that results in an economy (In simple words—‘Decreased unemployment in an economy will correlate with higher rates of inflation’).

Increase in CRR leads to decrease in bank credit. In simple words increase in Cash Reserve Ratio means the banks have to park more of their cash assets with the Central Bank that leads to decrease in loanable funds.
Central Agmark Laboratory is in Nagpur.

- First Cotton Industry of the country was established in Kolkata in 1818 and the second by Kovas Jee Nana Bhai in Mumbai in 1853.

- Sindi Fertilizer Factory, Chittaranjan Locomotives, Indian Telephone Industry, Integral Coach Factory, Penciline Factory, Indian Telephone Industry were all established during first five year plan.

- The largest number of co-operative institutions is in India.

- Unorganised sectors are creating more employment than organised sector in India.

- The share of groundnut is the highest in the production of oil seeds.

- Three cities of India have more than 1 crore population—Mumbai, Kolkata and Delhi.

- Urbanisation is highest in Goa in India.

- Asian Development Bank was established in 1966. (Head Office—Manila)

- The social accounting method of estimating national income was developed by Richard Stone.

- TRIFED: Tribal Co-operative Marketing Development Federation of India Ltd. established by government in 1987 to benefit small tribal farmers.

- NAIFED: National Agricultural Co-operative Marketing Federation of India Ltd. was established for marketing the agricultural products.

- In 1993 FERA (Foreign Exchange Regulation Act, 1973) was replaced by FEMA (Foreign Exchange Management Act).

- Small Industries have been completely relaxed from licensing.

- Since 2002, price of all petroleum products are market determined. Kerosene and domestic LPG is supplied at subsidised rates to target groups.

- Foreign exchange rates are not fixed. It changes with market conditions. But for example the exchange rate as on June 23, 2015:

| 1 US Dollar | = 63.59 Rupees |
| 1 British Pound | = 100.35 Rupees |
| 1 Euro | = 71.40 Rupees |

- Average size of holding in India is continuously decreasing due to rigid population growth.

- Agriculture Income Insurance Scheme was announced in 2004 to provide insurance safeguards and economic security to farmers.

- Department of Agriculture and Co-operation formulated the Farm Income Insurance Scheme.

- Green Revolution is associated with the use of HYVS (High Yielding Variety Seeds), Chemical fertilizers and new techniques.

- Seed Crop Insurance is operational since 1999-2000.

- Seed Bank is in operation since 1999-2000. Its functions include meeting contingency requirement, development infrastructure for production and distribution of seeds.
Types of loans provided to Indian Farmers:
(a) Short Term Loans: Less than 15 months
(b) Medium Term Loans: 15 months to 5 years
(c) Long Term Loans: More than 5 years

- Loans are acquired from Institutional Sources (Banks) and Non-institutional sources (money-lenders).
- Export-Import (EXIM) Bank was set up in 1982 for financing exports and imports.

* Subject to change.

17. Glossary of Economic and Financial Terms

Accrued interest: The interest due on a bond since the last interest payment was made. The buyer of the bond pays the market price plus accrued interest.

Acquisition: The acquiring of control of one corporation by another. In 'unfriendly' take over attempts, the potential buying company may offer a price well above current market values, new securities and other inducements to stockholders. The management of the subject company might ask for a better price or try to join up with a third company.

Active Market: This is a term used by stock exchange which specifies the particular stock or share that deals in frequent and regular transactions. It helps the buyers to obtain reasonably large amounts any time.

Administered Prices: When the prices of an item or a commodity are decided by the central power, generally the government or any other agency and not on the basis of demand and supply, such types of prices are called Administered Prices.

Ad-valorem Tax: Ad-valorem tax is a kind of indirect tax in which goods are taxed by their values. In the case of ad-valorem tax, the tax amount is calculated as the proportion of the price of the goods. Value Added Tax (VAT) is an ad-valorem tax. In other words when the tax is determined on the basis of value of a commodity, it is known as Ad-valorem tax.

Amalgamation: It means 'merger'. As and when necessity arises two or more companies are merged into a large organisation. The old firms completely lose their identity when the merger takes place.

American Depository Receipt (ADR): A security issued by a U.S. bank in place of the foreign shares held in trust by that bank, thereby facilitating the trading of foreign shares in U.S. markets.

Amortization: Accounting for expenses or charges as applicable rather than as paid. Includes such practices as depreciation, depletion, write-off of intangibles, prepaid expenses and deferred charges.

Annual report: The formal financial statement issued yearly by a firm, composing or corporation. The annual report shows assets, liabilities, revenues, how it fared profit-wise during the year, as well as other information of interest to stockholders, profit and loss, etc.

Appreciation: Appreciation means an increase in the value of something e.g. traded value of currency. It is an increase in the value of assets over a particular time period. Example: land, building, paintings etc. Appreciation is just opposite to depreciation. When the prices rise due to inflation, appreciation may occur.

Arbitrage: A technique employed to take advantage of differences in price. For example, ABC stock can be bought in New York for $10 a share and sold in London at $10.50, an arbiter may simultaneously purchase ABC stock here and sell the same amount in London, making a profit of $.50 a share, less expenses. Arbitrage may also involve the purchase of rights to subscribe to a security, or the purchase of a convertible security and the sale at or about the same time of the security obtainable through exercise of the rights or of the security obtainable through conversion.

Arbitration: Where there is an industrial dispute, the Arbitration comes to the force. The judgement is given by the Arbitrator. Both the parties have to accept and honour the Arbitration. Arbitration is the settlement of labour disputes that takes place between employer and the employees.

Assets: Everything a corporation or an organisation owns or that is due to it: cash, investments, money due it, materials and inventories, which are called current assets; buildings and machinery, which are known as fixed assets; and patents and goodwill, called intangible assets.

Auction: When a commodity is sold by auction, the bids are made by the buyers. Who ever makes the highest bid, gets the commodity which is being sold. The buyers make the bid taking into consideration the quality and quantity of the commodity.

Auction market: The system of trading securities through brokers or agents on an exchange such as the Bombay Stock Exchange. Buyers compete with other buyers while sellers compete with other sellers for the most advantageous price.

Auditor's report: Often called the accountant's opinion, it is the statement of the accounting firm's work and its opinion of the corporation's financial statements, especially if they conform to the normal and generally accepted practices of accountancy.

Autarchy: It means self-sufficiency and self-reliance of an economy. Autarchy is an indicator of self-sufficiency. It means that the country itself can satisfy the needs of its population without making imports from other countries.

Averages: Various ways of measuring the trend of securities prices, one of the most popular of which is the Dow Jones Industrial Average of 30 industrial stocks most popular of which is the Dow Jones Industrial Average of 30 industrial stocks and listed on the New York Stock Exchange. The prices of the 30 stocks are totaled and listed on the New York Stock Exchange. As a result, point changes stock dividends, and that is changed from time to time. As a result, point changes stock dividends, and that is changed from time to time. As a result, point changes stock dividends, and that is changed from time to time. As a result, point changes stock dividends, and that is changed from time to time. As a result, point changes stock dividends, and that is changed from time to time.
Balance of Trade: It refers to the relationship between the values of a country's imports and its export, i.e., the visible balance. Balance of trade refers to the total of a country's export commodities and total value of its import commodities. Thus, balance of trade includes only visible trade i.e., movement of goods (exports and imports of goods). Balance of trade is part of Balance of Payment statement.

Balance Sheet: Balance sheet is a statement showing the assets and liabilities of a business at a certain date. Balance sheet helps in estimating the real financial situation of a firm.

Bank: Bank is a financial institution. It accepts funds on current account and savings account. It also lends money. The bank pays the cheques drawn by customers against current or savings bank account. The bank is a trader that deals in money and credit.

Bank Draft: Banker's draft (Demand Draft) is a negotiable claim drawn upon a bank. Drafts are as good as cash. The drafts cannot be returned unpaid. Bank Draft is safer than a cheque.

Bankruptcy: It is a situation in which a person is unable to discharge his debt obligations.

Basket of Currency: In this system, the exchange value of a country's currency is fixed in terms of some major international currencies. Indian rupee is valued against US Dollar, British Pound, Japanese Yen, French Franc and German Deutsche Mark. India opted for this system in 1975.

Bear and Bull: These terms are used in stock exchange. 'Bear' is an individual who sells shares in the hope that the stock's price would fall. 'Bull' is an individual who buys shares in the hope that the stock's price would rise.

Bearer bond: A bond that does not have the owner's name registered on the books of the issuer. Interest and principal, when due, are payable to the holder.

Bid and Asked: Often referred to as a quotation or quote. The bid is the lowest price anyone wants to pay for a security at a given time, the asked is the lowest price anyone will take at the same time.

Bill of Exchange: It is an unconditional order in writing addressed by one person to another requiring the addressee to pay on demand or at a given future time a certain sum of money to the order of the specified person or to the bearer.

Birth Rate: Birth Rate (or Crude Birth Rate) is the number of births per thousand of the population during a period, usually a year. Only live births are included in the calculation of birth rate.

Black Money: It is unaccounted money which is concealed from tax authorities. All illegal economic activities are dealt with this black money. Howala market has adverse pressure on equitable distribution of wealth and income in the economy. It puts an adverse pressure on equitable distribution of wealth and income in the economy. It puts an adverse pressure on equitable distribution of wealth and income in the economy. It puts an adverse pressure on equitable distribution of wealth and income in the economy.

Block: A large holding or transaction of stock — commonly considered to be 10,000 shares or more.

Blue Chip: It is the most reliable industrial shares on a stock exchange. It is concerned with such equity shares whose purchase is extremely safe. It is a safe investment. It does not involve any risk.

Blue Collar Jobs: These Jobs are concerned with factory. Persons who are unskilled and depend upon manual jobs that require physical strain on human muscle are said to be engaged in Blue Collar Jobs. In the age of machinery, such jobs are on the decline these days.

Blue Sky Laws: A popular name for laws various states have enacted to protect the public against securities frauds. The term (generally used in the context of USA) is believed to have originated when a judge ruled that a particular stock had about the same value as a patch of blue sky.

Book value: An accounting term. Book value of a stock is determined from a company's records, by adding all assets and deducting all debts and other liabilities, plus the liquidation price of any preferred shares. The sum arrived at is divided by the number of common shares outstanding and the result is book value per common share. Book value of the assets of a company or a security may have little relationship to market value.

Boom: The point at which price and employment are the maximum. The trade is also at its highest point and beyond this no upward movement is possible.

Bounty: It is a subsidy paid by the government to exporters. It reduces the price of exportable goods and hence acts as an incentive to enhance exports.

Brain Drain: It means the drift of intellectuals of a country to another country. Scientists, doctors and technology experts generally go to other prominent countries of the world to better their lot and earn huge sums of money. This Brain Drain deprives a country of its wealth and capabilities.

Bridge loan: A loan made by a bank for a short period to make up for a temporary shortage of cash. On the part of borrower, mostly the companies, for example, a business organisation wants to install a new company with new equipment etc. While its present installed company or equipment etc. are not yet disposed off. Bridge loan covers this period between the buying the new and disposing of the old one.

Broad Banding: It means providing more flexibility to manufacturers to produce wider variety of products with same raw material mix so as to ensure optimum capacity.

Broker: An agent who handles the public's orders to buy and sell securities, commodities or other property. A commission is charged for this service.

Brokers' loans: Money borrowed by brokers from banks and other brokers for a variety of uses. It may be used by specialists to help finance inventories of stock they deal in; by brokerage firms to finance the underwriting of new issues of stock they deal in; brokers' loans may be used to help finance the purchase of securities for customers who prefer to use the broker's credit when they buy securities.

Budget: It is a document containing a preliminary approved plan of public revenue and public expenditure. It is a statement of the estimated receipt and expenditure during a fixed period. It is a comparative table giving the accounts of the receipts to be realised and of the expenses to be incurred.
Budget Deficit: Budget deficit is the difference between the estimated public expenditure and public revenue. The government meets the deficit by way of printing new currency or by borrowing. Budget may take a shape of deficit when the public revenue falls short to public expenditure.

Buffer stocks: These are the stocks (generally of primary goods) accumulated by a government agency when supply is plentiful. These stocks are released in case of shortage of supply. In India Food Corporation of India (IFCI) accumulates foodgrains as buffer stocks.

Bullion: It is gold or silver having a specific degree of purity. Generally it is in the form of gold or silver bars.

Bull Market: It is a market where the speculators buy shares or commodities in anticipation of rising prices. This market enables the speculator to resell such shares and make a profit. The opposite is Bear Market.

Buoyancy: In the inflationary period, the increase in tax revenue is known as buoyancy. When the government fails to check inflation, it raises the income tax and the corporate tax. Such a tax is called Buoyancy. It concerns with the revenue from taxation in the period of inflation.

Buyer's market: When the market is favourable to buyer's market. This situation occurs when there is a change from boom to recession i.e. demand is less than supply.

Buy side: The portion of the securities business in which institutional orders originate.

Callable: A bond issue, all or part of which may be redeemed by the issuing firm, institution or organisation under specified conditions before maturity. The term also applies to preferred shares that may be redeemed by the issuing organisation.

Call Money: It is a loan that is made for a very short period of a few days only or for a week. It carries a low rate of interest. In case of stock exchange market, the duration of the call money may be for a fortnight.

Capital: The stock of goods which are used in production and which themselves have been produced. It is one of the major factors of production, the other being land, labour and entrepreneurship.

Capitalism: The economic system based on free enterprise and private profit. Private individuals, self-interest, profit motive is the guiding feature for all the economic activities under capitalism. Under pure capitalist system economic conditions are i.e., no state intervention. Sovereignty of consumer prevails in this system.

Capital Market: It is a market for long-term loans. Capital market is the market which deals only in short-term loans. It is different from money market.

Capital stock: All shares representing ownership of a business, including preferred and common.

Capitalization: Total amount of the various securities issued by organisation or stock, and surplus. Bonds and debentures are usually carried on the books of the issuing company in terms of their par or face value. Preferred and common shares may be carried in terms of par or stated value. Stated value may be an arbitrary figure decided upon by the director or may represent the amount received by the company from the sale of the securities at the time of issuance.

Cash flow: Reported net income of a corporation plus amounts charged off for depreciation, depletion, amortization, and extraordinary charges to reserves, which are book-keeping deductions and not paid out in actual rupees or paise or dollars and cents.

Cash sale: A transaction on the floor of the stock exchange that calls for delivery of the securities the same day. In 'regular way' trade, the seller is to deliver on the third business day, except for bonds, which are the next day.

Ceiling Prices: This is the maximum limit fixed generally by government or its agency. Beyond it the prices can not rise.

Certificate: The actual piece of paper that is evidence of ownership of stock in a company or an organisation. Watermarked paper is finely engraved with delicate etchings to discourage forgery.

Certificate of Deposit (CD): A money market instrument characterized by its set date of maturity and interest rate. There are two basic types of CDs: traditional and negotiable. Traditional bank CDs typically incur an early-withdrawal penalty, while negotiable CDs have secondary market liquidity with investors receiving more or less than the original amount depending on market conditions.

Cheap Money: It indicates a situation when bank rate and other rates of interest are low.

Cheque: Cheque is an order in writing issued by the drawer to a bank. If the customer has sufficient amount in his account, the cheque is paid by the bank. Cheques are used in place of cash money.

Clearing House: Clearing house is an institution which helps to settle the mutual indebtedness that occurs among the members of its organisation.

Closed Economy: Closed economy refers to the economy having no foreign trade (i.e., export and import). Such economies depend exclusively on their own internal domestic resources and have no dependence on outside world.

Collateral: Securities or other property pledged by a borrower to secure repayment of a loan.

Commercial paper: Debt instruments issued by companies to meet short-term financing needs.

Commission: The broker's basic fee for purchasing or selling securities or property as an agent.

Commission broker: An agent who executes the public's orders for the purchase or sale of securities or commodities.

Common stock: Securities that represent an ownership interest in a company. If the company has also issued preferred stock, both common and preferred have ownership rights. Common stockholders assume the greater risk, but generally have greater voting rights. Common stock is the most common type of stock and is often used interchangeably when the company has no preferred stock.
Competitive trader: A member of the exchange who trades in stocks on the floor for an account in which there is an interest. Also known as a registered trader.

Conglomerate: A company or an organization that has diversified its operations usually by acquiring enterprises in widely varied industries.

Consolidated balance sheet: A balance sheet showing the financial condition of a corporation and its subsidiaries.

Convertible: A bond, debenture or preferred share that may be exchanged by the owner for common stock or another security, usually of the same company, in accordance with the terms of the issue.

Core Industries: Core Industries include strategic, basic and critical industries which remain generally under state control, e.g. defence, iron and steel, fertilizers, etc.

Core Sector: Economy needs basic infrastructure for accelerating development. Development of infrastructure industries like cement, iron and steel, petrochemicals, heavy machinery etc can only ensure the development of the economy as a whole. Such industries are core sector industries.

Corporate Tax: It is a direct tax levied on company’s profit. It is calculated on profits after interest and dividend (i.e. capital allowance) have been deducted.

Correspondent: A securities firm, bank or other financial organization that regularly performs services for another in a place or market to which the other does not have direct access. Securities firms may have correspondents in foreign countries or on exchanges of which they are not members. Correspondents are frequently linked by private wires.

Cost Price Index (CPI): It is used for measuring cost of living and it covers a large number of commodities than Wholesale Price Index (WPI) which is used for measuring rate of inflation.

Coupon bond: Bond with interest coupons attached. The coupons are clipped as they come due and presented by the holder for payment of interest.

Credit Control: It implies the measures employed by central bank of a country to control the volume of credit in the banks.

Credit Rating: It is the assessed credit worthiness of prospective customer.

Credit Rationing: Credit rationing takes place when the banks discriminate between the borrowers. Credit rationing empowers the bank to lend to someone and refuse to lend to others. In this way, credit rationing restricts lending on the part of bank.

Credit Squeeze: Monetary authorities restrict credit and as when required. This credit restriction is called credit squeeze. In other words when the credit control is very tight and restrict, this situation is known as credit squeeze.

Cumulative preferred: A stock having a provision that if one or more dividends are omitted, the omitted dividends must be paid before dividends may be paid on the company’s common stock.

Current assets: Those assets of a company that are reasonably expected to be realized in cash, sold or consumed during one year. These include cash, government bonds, receivables and money due usually within one year.

Current liabilities: Money owed and payable by a company, usually within one year.
Devaluation: It is the reduction in the official rate of a currency in terms of a foreign currency. Indian rupee has been devalued thrice in 1949, 1966 and 1967.

Director: Person elected by shareholders to serve on the board of directors. The directors appoint the president, vice presidents, and all other operating officers. Directors decide, among other matters, if and when dividends shall be paid.

Direct Tax: It is a tax whose burden cannot be shifted i.e. the burden of direct tax is borne by the person on whom it is initially fixed, e.g. personal income tax, social security tax paid by employees, death tax etc.

Discount: The amount by which a preferred stock or bond may sell below its par value. Also used as a verb to mean 'takes into account' as the price of the stock has discounted the expected dividend cut.

Discretionary account: An account in which the customer gives the broker or someone else discretion to buy and sell securities or commodities, including selection, timing, amount, and price to be paid or received.

Diversification: Spreading investments among different types of securities and various companies in different fields.

Dividend: It is earnings on stocks paid to shareholders.

Dow theory: A theory of market analysis based upon the performance of the Dow Jones Industrial Average and transportation stock price averages. The theory says that the market is in a basic upward trend if one of these averages advances above a previous important high, accompanied or followed by a similar advance in the other. When both averages dip below previous important lows, this is regarded as confirmation of a downward trend. The Dow Jones is one type of market index.

Dumping: It means selling goods in international market at a price which is lower than that in domestic or home market.

Earnings report: A statement, also called an income statement, issued by a company showing its earnings or losses over a given period. The earnings report lists the income earned, expenses, and the net result.

Elasticity of demand: The responsiveness of demand of a commodity to the change in its price is known as elasticity of demand.

Embargo: It means prohibition of entry of goods from certain countries into a particular country.

Engel's law: Ernest Engel, the 19th century German statistician, analyzed the budget data of working families and established a relationship between the families' income and expenditure. According to the Law 'When a family's income increases the percentage of its income spent on food decreases'.

Equity: The ownership interest of common and preferred stockholders in a company. Also refers to excess of value of securities over the debit balance in a margin account.

Exchange Rate: The rate at which central banks will exchange one country's currency for another.

Excise Tax: Tax imposed on the manufacture, sale or the consumption of various commodities, such as taxes on textiles, cloth, liquor etc.

Ex-dividend: A synonym for 'without dividend'. The buyer of a stock selling ex-dividend does not receive the recently declared dividend. When stocks go ex-dividend, the stock tables include the symbol 'x' following the name.

Ex-rights: Without the rights. Corporations/Companies raising additional money may do so by offering their stockholders the right to subscribe to new or additional stock, usually at a discount from the prevailing market price. The buyer of a stock selling ex-rights is not entitled to the rights.

Extra: The short form of 'extra dividend'. A dividend in the form of stock or cash in addition to the regular or usual dividend the company has been paying.

Face value: The value of a bond that appears on the face of the bond, unless the value is otherwise specified by the issuing company. Face value is ordinarily the amount the issuing company promises to pay at maturity. Face value is not an indication of market value. Sometimes referred to as par value.

Factor cost: It is the sum total of amount paid to four main factors of production i.e. Land (rent), Labour (compensation of employees), Capital (interest), entrepreneurship (profit). It is exclusive of taxes or subsidies.

FINRA: The Financial Industry Regulatory Authority (f/k/a National Association of Securities Dealers), is the largest non-governmental regulator for all securities firms doing business in the United States. FINRA was created in July 2007 through the consolidation of NASD and the member regulation, enforcement and arbitration functions of the New York Stock Exchange.

Fiscal year: A firm's or company's or a corporation's accounting year. Due to the nature of their particular business, some companies do not use the calendar year for their bookkeeping. A typical example is the department store that finds December 31 too early a date to close its books after the Christmas rush. For that reason many stores wind up their accounting year January 31. Their fiscal year, therefore, runs from February 1 of one year through January 31 of the next. The fiscal year of other companies may run from July 1 through the following June 30. Most companies, though, operate on a calendar year basis.

Fixed charges: A company's fixed expenses, such as bond interest, which it has agreed to pay whether or not earned, and which are deducted from income before earnings on equity capital are computed.

Flat income bond: This term means that the price at which a bond is traded includes consideration for all unpaid accruals of interest. Bonds that are in default of interest or principal are traded flat. Income bonds that pay interest only to the extent earned are usually traded flat. All other bonds are usually dealt in 'and interest', which means that the buyer pays to the seller the market price plus interest accrued since the last payment date.

Floating of a Currency: When the exchange value of a currency in terms of other currencies is not fixed officially, that currency is said to be floating.

Floor: The huge trading area - about the size of a football field - where stocks, bonds and options are bought and sold on the Stock Exchange.

Floor broker: A member of the stock exchange who executes orders on the floor of the Exchange to buy or sell any listed securities.

Foreign Exchange Reserves: Foreign Exchange Reserves of a country includes foreign currency assets and interest bearing bonds held by it. In India it also includes SDR and value of gold.
IRA: Individual retirement account. A pension plan with tax advantages. It permits investment through intermediaries like mutual funds, insurance companies, and banks, or directly in stocks and bonds through stockbrokers.

Issue: Any of a company's securities, or the act of distributing such securities. 

Joint Stock Company: It is a form of company in which a number of people contribute funds to finance a firm in return for 'shares' in the company.

Keogh plan: Tax-advantaged personal retirement program that can be established by a self-employed individual.

Laissez-faire: Literally it means 'to let people do as they choose'. It is an economic doctrine which emphasizes the superiority of 'free' trade and the markets over state's interference in economic affairs. It is of French origin of which British variation is 'Laissez-faire'.

Legal Tender: It is the currency (coins and bank notes) which have to be accepted in payment.

Leverage: The effect on a company when the company has bonds, preferred stock, or both outstanding. Example: If the earnings of a company with 10,000 common shares increases from $10,000 to $15,000, earnings per share would go up from $1 to $1.50, or an increase of 50%. But if earnings of a company that had to pay $5,000 in bond interest increased that much, earnings per common share would jump from $.50 to $1 a share, or 100%.

Liabilities: All the claims against a corporation. Liabilities include accounts, wages and salaries payable; dividends declared payable; accrued taxes payable, and fixed or long-term liabilities, such as mortgage bonds, debentures and bank loans.

Limit, limited order, or limited price order: An order to buy or sell a stated amount of a security at a specified price, or at a better price, if obtainable after the order is represented in the trading crowd.

Liquidation: The process of converting securities or other property into cash. The dissolution of a company, with cash remaining after sale of its assets and payment of all indebtedness being distributed to the shareholders.

Liquidity: The ability of the market in a particular security to absorb a reasonable amount of buying or selling at reasonable price changes. Liquidity is one of the most important characteristics of a good market.

Listed stock: The stock of a company that is traded on a securities exchange.

Load: The portion of the offering price of shares of open-end investment companies in excess of the value of the underlying assets. Covers sales commissions and all other costs of distribution. The load is usually incurred only on purchase and, in most cases, no charge when the shares are sold (redeemed).

Locked in: Investors are said to be locked in when they have profit on a security they own but do not sell because their profit would immediately become subject to the capital gains tax.

Manipulation: An illegal operation. Buying or selling a security for the purpose of creating false or misleading appearance of active trading or for the purpose of raising or depressing the price to induce purchase or sale by others.

Margin: The amount paid by the customer when using a broker's credit to buy or sell a security. Under Federal Reserve regulations, the initial margin requirement since 1945 has ranged from the current rate of 50% of the purchase price up to 100%.

Margin call: A demand upon a customer to put up money or securities with the broker. The call is made when a purchase is made; also if a customer's account declines below a minimum standard set by the exchange or by the firm.

Market order: An order to buy or sell a stated amount of a security at the most advantageous price obtainable after the order is represented in the trading crowd.

Market price: The last reported price at which the stock or bond sold, or the current quote.

Market value: The market value of an equity share is the price at which it is traded in the market. This price can be established for a company that is listed on the stock market and actively traded. (For a company that is listed on the stock market but traded very infrequently, it is difficult to obtain a reliable market quotation. For a company that is not listed on the stock market, one can merely conjecture as to what its market price would be if it were traded.)

Maturity: The date on which a loan or bond comes due and is to be paid off.

Merger: Combination of two or more corporations.

MODVAT: The modified system of value added taxation is based on the idea of tax final products and not inputs that go into production.

Money Market: It is a market engaged in short-term lending and borrowing of money linking together the financial institutions, companies and the government.

Money market fund: A mutual fund whose investments are in high-yield money market instruments such as federal securities, CDs and commercial paper. Its intent is to make such instruments, normally purchased in large denominations by institutions, available indirectly to individuals.

Monopoly: It is a type of market structure having one seller and many buyers. There is a lack of substitute products and entry of new firms into market is not possible.

Mortgage bond: A bond secured by a mortgage on a property. The value of the property may or may not equal the value of the bonds issued against it.

MoU: The concept of Memorandum of Understanding (MoU) was introduced in 1988. The main objective of MoU is to reduce the quantity of control and increase the quality of accountability. The emphasis is on achieving the negotiated and agreed objectives rather than interfering in the day-to-day affairs.

Mutual Fund: It is a form of collective investment that is useful in spreading risks and optimising returns.

Nasdaq: An automated information network that provides brokers and dealers with price quotations on securities traded over-the-counter. Nasdaq is an acronym for National Association of Securities Dealers Automated Quotations.

National Income: It is equal to the total money value of goods and services produced over the given time period less capital consumption.

Net asset value: Usually used in connection with investment companies to mean net asset value per share. An investment company computes its assets daily, or periodically, and subtracts from the value of these assets (less any liabilities) an estimated amount of expenses which have not been paid as of the date of the valuation. This figure is called the net asset value.
even twice daily, by totaling the market value of all securities owned. All liabilities are deducted, and the balance is divided by the number of shares outstanding. The resulting figure is the net asset value per share.

**Net change**: The change in the price of a security from the closing price on one day to the closing price the next day on which the stock is traded. The net change is ordinarily the last figure in the newspaper stock price list.

**Net Domestic Product (NDP)**: The money value of a nation's annual output of goods and services, less capital consumption (depreciation) experienced in producing that output.

**Net National Product (NNP)**: Net National Product is equal to Net Domestic Product plus Net factor income from abroad.

**New York Futures Exchange (NYFE)**: A subsidiary of the New York Stock Exchange devoted to the trading of futures products.

**New York Stock Exchange (NYSE)**: The largest organized securities market in the United States, founded in 1792. The Exchange itself does not buy, sell, or set the prices of securities traded there. The prices are determined by public supply and demand. The Exchange is a non-profit corporation of 1,366 individual members, governed by a board of directors consisting of 10 public representatives, 10 Exchange members or allied members and a full-time chairman, executive vice-chairman and president.

**Noncumulative**: A type of preferred stock on which unpaid dividends do not accrue. Omitted dividends are, as a rule, gone forever.

**NYSE Composite Index**: The composite index covering price movements of all common stocks listed on the New York Stock Exchange. It is based on the close of the market December 31, 1965, as 100 and is weighted according to the number of shares listed for each issue. The index is computed continuously and printed on the ticker tape. Point changes in the index are converted to dollars and cents so as to provide a meaningful measure of changes in the average price of listed stocks.

**Octroi**: It is an internal tariff system among different regions of a country.

**Odd Lot**: An amount of stock less than the established 100-share unit.

**Off-board**: This term may refer to transactions over-the-counter in unlisted securities or to transactions of listed shares that are not executed on a national securities exchange.

**Offer**: The price at which a person is ready to sell. Opposed to bid, the price at which one is ready to buy.

**Overbought**: An opinion as to price levels. May refer to a security that has had a sharp rise or to the market as a whole after a period of vigorous buying which, it may be argued, has left prices 'too high'.

**Over Sold**: The reverse of overbought. A single security or a market which, it is believed, has declined to an unreasonable level.

**Over-the-counter**: A market for securities made up of securities dealers who may or may not be members of a securities exchange. The over-the-counter market is conducted over the telephone and deals mainly with stocks of companies without sufficient shares, stockholders or earnings to warrant listing on an exchange. Over-the-counter dealers may act either as principals or as brokers for customers. The over-the-counter market is the principal market for bonds of all types.

**Paper profit (loss)**: An unrealized profit or loss on a security still held. Paper profits and losses become realized only when the security is sold.

**Par**: In the case of a common share, par means a dollar amount assigned to the share by the company's charter. Par value may also be used to compute the dollar amount of common shares on the balance sheet. In the case of preferred stocks it signifies the dollar value upon which dividends are figured. With bonds, par value is the face amount, usually $1,000.

**Participating preferred**: A preferred stock that is entitled to its stated dividend and to additional dividends on a specified basis upon payment of dividends on the common stock.

**Passed dividend**: Omission of a regular or scheduled dividend.

**Penny stocks**: Low-priced issues, often highly speculative, selling at less than $1 a share. Frequently used as a term of disparagement, although some penny stocks have developed into investment-caliber issues.

**Per Capita Income**: It implies income per person. It is obtained by dividing national income of a country by its population.

**Plastic Money**: It refers to use of instruments like 'credit cards' instead of cash in business transactions. It is called so because credit cards are made of plastic.

**Portfolio**: Holdings of securities by an individual or institution. A portfolio may contain bonds, preferred stocks, common stocks and other securities.

**Poverty Line**: The poverty line has been fixed by the planning commission on the basis of an average daily intake of 2400 calories per person in rural areas and 2100 calories per capita in urban areas. In monetary terms the poverty line is commented to be Rs. 32 per month in rural and Rs. 47 in urban areas in terms of 2011-12 prices.

**Preferred stock**: A class of stock with a claim on the company's earnings before payment may be made on the common stock and usually entitled to priority over payment. Usually entitled to dividends at a specified common stock if the company liquidates. Usually entitled to dividends at a specified common stock if the company liquidates.

**Premium**: The amount by which a bond or preferred stock may sell above its par value. May refer also, to redemption price of a bond or preferred stock if it is higher than face value.

**Price-to-earnings ratio**: A popular way to compare stocks selling at various price levels. The P/E ratio is the price of a share of stock divided by earnings per share for a 12 month period. For example, a stock selling for $50 a share and earning $5 a share is said to be selling at a price-to-earnings ratio of 10.
Primary distribution: Also called primary or initial public offering. The original sale of a company’s securities.

Prime rate: The lowest interest rate charged by commercial banks to their most credit-worthy customers; other interest rates, such as personal, automobile, commercial and financing loans are often pegged to the prime.

Principal: The person for whom a broker executes an order, or dealers buying or selling for their own accounts. The term ‘principal’ may also refer to a person’s capital or to the face amount of a bond.

Profit-taking: Selling stock that has appreciated in value since purchase, in order to realize the profit. The term is often used to explain a downturn in the market.

Prospectus: The official selling circular that must be given to purchasers of new securities registered with the Securities and Exchange Commission. It highlights the much longer Registration Statement file with the Commission.

Proxy: Written authorization given by a shareholder to someone else to represent him or her and vote his or her shares at a shareholders meeting.

Proxy statement: Information given to stockholders in conjunction with the solicitation of proxies.

Recession: Recession cycle characterised by a modest downturn in the level of economic activity means fall up of demand.

Refation: It is an increase in the level of National Income and Output. Refation is often deliberately brought about by the authorities in order to secure full employment and to increase the rate of economic growth.

Quote: The highest bid to buy and the lowest offer to sell a security in a given market at a given time. If you ask your financial advisor for a ‘quote’ on a stock, $45.25 is the highest price any buyer wanted to pay at the time the quote was given on the floor of the exchange and that $45.50 was the lowest price that any seller would take at the same time.

Rally: A brisk rise following a decline in the general price level of the market, or in an individual stock.

Record date: The date on which you must be registered as a shareholder of a company in order to receive a declared dividend or, among other things, to vote at the option of the issuing company. Redemption also applies to the price of a bond that may be redeemed before maturity. The company must pay the interest or the principal.

Refinancing: Same as refunding. Refinancing is the process of taking out a new loan to pay off an existing loan. New securities are sold by a company and used to retire existing securities. The object may be to save interest.

Registered bond: A bond that is registered on the books of the issuing company. It can be transferred only when endorsed by the registered owner.

Registrar: Usually a trust company or bank charged with the responsibility of keeping record of the owners of a corporation’s securities and preventing the issue of more than the authorized amount.

Regulation T: The federal regulation governing the amount of credit that may be advanced by brokers and dealers to customers for the purchase of securities.

Regulation U: The federal regulation governing the amount of credit that may be advanced by banks to customers for the purchase of listed stocks.

Rights: When a company wants to raise more funds by issuing additional securities, it may give its stockholders the opportunity, ahead of others, to buy the new securities in proportion to the number of shares each owns. The piece of paper evidencing this privilege is called a right.

Scheduled bank: It is a bank included in the second schedule of RBI. It has a minimum cash reserve of ‘Rs. 5 lakhs’.

Scale order: An order to buy (or sell) a security, that specifies the total amount to be bought (or sold) at specified price variations.

Scrupulously: A term coined in the mid 1970s to describe the hobby of collecting antique bonds, stocks, and other financial instruments. Values are affected by beauty of the certificate and the issuer’s role in world finance and economic development.

SEBI: It was set up in 1988 by the Government of India to regulate the operations in the stock market of India. The SEBI stands for Securities and Exchange Board of India.

Self Reliance: Self Reliance, in short, can mean attainment of economic independence which, in turn, implies capability to sustain a faster rate of growth of economy essentially with the help of the domestic resources.

Seller’s Market: It is market situation which exists for a short time period. During this period there is an excess demand for goods and services at current prices which forces price up to the advantage of the seller.

Sell side: The portion of the securities business in which orders are transacted. The sell side includes retail brokers, institutional brokers and traders, and research departments. If an institutional portfolio manager changes jobs and becomes a registered representative, he or she has moved from the buy side to the sell side.

Sensex: The Stock Exchange Sensitive Index (popularly referred to as the SENSEX) reflects the weighted arithmetic average of the price relative of a group of thirty shares included in the index of sensitive shares. For example, Bombay Stock Exchange Sensitive Index is a group of 30 sensitive shares.

Serial bond: An issue that matures in part at periodic stated intervals.

Settlement: Conclusion of a securities transaction when a customer pays a broker/dealer for securities purchased or delivers securities sold and receives from the broker the proceeds of a sale.

Shares: These are the equal portions of the capital of a limited company. Shares in a company do not carry fixed rate of interest. The holders of the ordinary shares carry the residual risk of the business; they rank after debenture holders and preference shareholders for the payment of dividends and are liable for losses, although this liability is limited to the value of the shares and to the limit losses, although this liability is limited to the value of the shares and the limit losses which are paid before any others, and owners have prior right to repayment of capital if company is wound up.

Share Capital: Money raised by issuing of shares is called Share Capital.

Share Index: It is the statistical indicator of overall share values, based on selected group.
Short covering: Buying stock to return stock previously borrowed to make delivery on a short sale.

Short sale: A transaction by a person who believes a security will decline and sells it, though the person does not own any. Sometimes people will sell short a stock they already own in order to protect a paper profit. This is known as selling short against the box.

Sinking fund: Money regularly set aside by a company to redeem its bonds, debentures or preferred stock from time to time as specified in the indenture or charter.

Speculation: The employment of funds by a speculator. Safety of principal is a secondary factor.

Speculator: One who is willing to assume a relatively large risk in the hope of gain.

Spin off: The separation of a subsidiary or division of a corporation from its parent company by issuing shares in a new corporate entity. Shareowners in the parent company receive shares in the new company in proportion to their original holding and the total value remains approximately the same.

Split: The division of the outstanding shares of a corporation into a larger number of shares. A 3-for-1 split by a company with 1 million shares outstanding results in 3 million shares outstanding. Each holder of 100 shares before the 3-for-1 split would have 300 shares, although the proportionate equity in the company would remain the same; 100 parts of 1 million are the equivalent of 300 parts of 3 million. ordinarily, splits must be voted by directors and approved by shareholders.

Stock exchange: An organized marketplace for securities featured by the centralization of supply and demand for the transaction of orders by member brokers for institutional and individual investors.

Stock dividend: A dividend paid in securities rather than in cash. The dividend may be additional shares of the issuing company, or in shares of another company (usually a subsidiary) held by the company.

Stockholder of record: A stockholder whose name is registered on the books of the issuing corporation.

Stop limit order: A stop order that becomes a limit order after the specified stop price has been reached.

Stop order: An order to buy at a price above or sell at a price below the current market. Stop buy orders are generally used to limit loss or protect unrealized profits or limit loss on a holding. A stop order becomes a market order when the stock sells at or beyond the specified price and, thus, may not necessarily be executed at that price.

Street name: Securities held in the name of a broker instead of a customer's name are said to be carried in 'street name.' This occurs when the securities have been bought on margin or when the customer wishes the security to be held by the broker.

Swapping: Selling one security and buying a similar one almost at the same time to take a loss, usually for tax purposes.
Variable annuity: A life insurance policy where the annuity premium (a set amount of dollars) is immediately turned into units of a portfolio of stocks. Upon retirement, the policyholder is paid according to accumulated units, the dollar value of which varies according to the performance of the stock portfolio. Its objective is to preserve, through stock investment, the purchasing value of the annuity which otherwise is subject to erosion through inflation.

VAT: It seeks to tax the value added at every stage of manufacturing and sale with a provision of refunding the amount of VAT already paid at earlier stages to avoid double taxation.

Volume: The number of shares or contracts traded in a security or an entire market during a given period. Volume is usually considered on a daily basis and a daily average is computed for longer periods.

Voting right: Common stockholders' right to vote their stock in affairs of a company. Preferred stock usually has the right to vote when preferred dividends are in default for a specified period. The right to vote may be delegated by the stockholder to another person.

Warrants: Certificates giving the holder the right to purchase securities at a stipulated price within a specified time limit or perpetually. Sometimes a warrant is offered with securities as an inducement to buy.

Working control: Theoretically, ownership of 51% of a company's voting stock is necessary to exercise control. In practice—and this is particularly true in the case of a large corporation—effective control sometimes can be exercised through ownership, individually or by a group acting in concert, of less than 50%.

Yield: Also known as return. The dividends or interest paid by a company expressed as a percentage of the current price.

Yield to maturity: The yield of a bond to maturity takes into account the price discount from or premium over the face amount. It is greater than the current yield when the bond is selling at a discount and less than the current yield when the bond is selling at a premium.

Zero coupon bond: A bond that pays no interest but is priced, at issue, at a discount from its redemption price.

18. Some Noteworthy Facts

- Inflation, in theory, occurs when money supply grows at a higher rate than GDP in real terms.
- The existence of a large parallel economy, fluctuations in agricultural and industrial output, and indirect taxation are the reasons for: cost-push inflation.
- Among the supply side measures to contain inflation is: to increase the supply of products or commodities to India around 2016 A.D. They are referring to the phenomenon of: a surge in the population in the productive age group.
- The significant change in the new FEMA which has replaced FERA is that the emphasis from imprisonment will be shifted to: Voluntary compliance.
- 'Level playing field' argument industries requires: Domestic industry to be treated at par with MNCs
- One of the disadvantages of the Wholesale Price Index in India is that: It does not cover the services sector
- Check off system refers to the verification of membership through: deduction of subscription from pay
- Direct taxation is a better form of taxation because: it allows for taxation according to means
- Lender of last resort, periodic inspection of commercial banks, issue of bank notes of all denominations are the functions of: Reserve Bank of India
- Multi Fibre Agreement deals with: Textiles
- Under the Medium Term Fiscal Restructuring Programme, state governments have been permitted to borrow from international financial institutions like the World Bank and Asian Development Bank (ADB) to: replace their high cost debt with low cost funds
- Open market operation of RBI refers to trading in securities.
- The new definition of fiscal deficit was suggested by: Chakravarty Committee
- According to the Chakravarty Committee, one of the principal causes affecting price stability in India is: Violent fluctuation in agricultural production
- The concept of Total Fertility Rate (TFR) in population means the average number of children born to a woman during her lifetime.
- Tarapore Committee recommended that before capital account was made convertible the rate of inflation should be brought down for three years within 3-4%.
- Tarapore Committee recommended that foreign exchange reserves should not be below the requirements of import for 6 months.
- The first bank managed by Indians was: Oudh Bank
- The statement, "India has achieved national food security but has not ensured household food security" means: there is sufficient food stock but all households donot have access to it
- The permit for duty free trade issued by the East India Company at a price to private traders was called: Diwani
- The demand for establishment of a department of agriculture in India was made by: Manchester Cotton Supply Association
- The birth rate measures the number of births during a year per: 1000 of population
- Structural unemployment arises due to: inadequate productive capacity
- 'Disguised unemployment' refers to: more persons employed for a job which a few can accomplish
- The Securities and Exchange Board of India (SEBI) has imposed a restriction on money flow in equity through 'P-Notes'. The full form of 'P-Notes' is: Participatory Notes.
The money which government of India spends on the development of infrastructure in the country comes from the following sources—Loan from World Bank/ADB etc., Taxes collected from the people, Loan from the RBI etc.

Investor Protection Fund has been established by:

Stock Exchange

The full form of FII is:

Foreign Institutional Investor

The Finance Ministry (on Feb. 15, 2008) has allowed companies to issue Foreign Currency Exchangeable Bonds (FCEBs) with a maturity of five years to raise funds from the overseas market by unlocking part of the holding in Indian companies. The investment under the scheme shall comply with Foreign Direct Investment (FDI) policy as well as the External Commercial Borrowing (ECB) policy requirements.

The Union Government, on March 3, 2008, launched a conditional cash transfer scheme for the girl child. The conditions of this scheme include registration of birth of the girl, following a total immunisation schedule, school enrolment and delaying of marriage until the age of 18 years. The name of the scheme is Dhan Laxmi.

The Securities and Exchange Board of India (SEBI), on May 29, 2008, has allowed overseas sovereign wealth funds to register as foreign institutional investors (FIIs) and invest in shares and government securities.

The Centre approved the amendment to the Prevention of Money Laundering Act (PMLA), a move aimed at bringing casinos, international credit card payment gateways such as Visa and MasterCard, full-fledged money changers (FFMCs) and money transfer service providers (MTSPs) such as the Western Union under the purview of Indian laws.

The Central Government has decided on April 6, 2008, to form a strategic reserve of 5 million tonnes of foodgrains, to be consisted of 3 million tonnes of wheat and 2 million tonnes of rice.

The National Association of Software and Service Companies (NASSCOM), the premier trade body represents: the IT and BPO industry.

The largest consumer of natural gas in the world is: the USA

The country which leads in oil production in the world is: the USA

The country which leads in Internet users in the world is: the USA

World’s leading gold producer country is: South Africa

Entry for Normal Loss is recorded in:

Trading Account

Accounting acronym GAAP stands for:

Generally Accepted Accounting Principles

Limited Liability is available in the kind of business organisation called:

Company

The form of accounting states that transactions are to be recorded in the period:

Accrual basis of accounting

The most important ratio for the Sales Tax Department from the control point of view is:

Gross Profit Ratio

The most important ratio for the Income Tax Department from the control point of view is:

Net Profit Ratio

The abbreviations for debit and credit (Dr. and Cr.) come from the language:

Latin, 'debitum et credere'

A Public Limited Company tries to maximise:

Wealth of Shareholders

Anticipated losses are recorded in the books of accounts as per:

Matching of Cost and Revenue

Goodwill is recorded in the books of accounts only when:

Nominal Account

Depreciation Account is called:

Seller

Monopoly is when there is a single:

We can get the current ratio by:

dividing current assets by current liabilities

The major rubber producing state in India is:

Kerala

Some Important Books on Economics

| The Wealth of Nations | Adam Smith |
| Money Illusion | Irwin Fisher |
| Capital and Growth | Hicks |
| General Theory of Employment, Interest and Money | J. M. Keynes |
| Planned Economy for India | M. Vishveshwaraiya |
| The Value and Capital | Hicks |
| The Canon (theory) of Consumer's Surplus | Marshall |
| Big Push Theory | A. R. Roden |
| Datt & Sundaram Indian Economy | Gaurav Datt and Ashwani Mahajan |

Appendix-1: Highlights of the Economic Survey 2014-15

GDP growth is expected to accelerate between 8.1 and 8.5% in 2015-16.

Inflation is likely to remain in the 5.5% range in 2015-16.

The current account deficit is estimated to be 1.0% in the fiscal year 2015-16.

Food grains production for 2014-15 is estimated at 227.07 million tonnes.

It calls for complementing Make in India initiative with Skill India initiative to enable a larger section of the population to benefit from the transformation that such sectors will facilitate.

The Model APMC Act, 2003 should be amended along the lines of the Karnataka Model that has successfully introduced an integrated single licensing system.

In the short run, the need for accelerated fiscal consolidation will be conditioned by the recommendations of the Fourteenth Finance Commission (FFC).

Food Subsidy Bill stands at 1,07,823.75 crore rupees during 2014-15 (up to January 2015) which means an increase of 20% over previous year.

The direct fiscal cost of select subsidies is roughly 3,78,000 crore rupees or 4.2% of GDP in 2011-12.
Appendix-2: Highlights of Socio Economic and Caste Census-2011

Provisional Data of Socio Economic and Caste Census (SECC) 2011 for rural India was released on 3 July, 2015 by the Finance Minister of India.

SECC 2011 is a unique paperless census. The enumeration of the data was done using over 6.4 lakh electronic handheld device.

The survey has been completed in all the 640-districts.

Conducted between 2011 and 2013, the census covered 24.39 crore households across the country- 17.91 crore are rural households.

The highest number of rural households are in Bihar (90%).

The census also showed that 21.53% of rural households belong to the SC/ST.

According SECC 2011, 10.08 crore or 56% of the country's total 17.92 crore rural households do not own any agricultural land.

Andhra Pradesh (73%) and Tamil Nadu (73%) are on top in the list of landless rural households, followed by Kerala (72%), West Bengal (70%), Punjab and Bihar (both 65%) are the states above national average (56%).

According to SECC data 31.26% of the total rural households can be broadly identified as "poor".

As many as 74.49% rural households survive on a monthly income of less than ₹5,000 of its highest earner. The highest number of such households is in Chhattisgarh (over 90%).

5% rural households derive salaries from government jobs, 1.11% from public and 3.57% from private sources.

Overall, 94% of households own houses, but only 17.70% of SC and 10.50% of ST households have their own houses.

Only 4.58% rural households pay income tax.

70% of total SC households and 38.27% rural households (SC) are "landless households deriving major part of their income from manual casual labour". The highest are in Tamil Nadu (55.80%) and Bihar (54.33%).

The largest proportion of households with "destitute living on alms" is in Odisha.

Source: IE, July 4, 2015

---

Physics

Unit: The chosen standard used for measuring a physical quantity is called unit.

Unit should be:
1. well defined
2. easy to reproduce
3. easy to compare
4. internationally accepted
5. independent of changes in physical conditions

Units are of two types: 1. Fundamental Unit and 2. Derived Unit

System of Units: Units depend on choice. Each choice of units leads to a new system (set) of units. The internationally accepted systems are 1. CGS system, 2. MKS System 3. FPS System 4. SI Units.

In SI Units, there are seven fundamental units given in the following table:

<table>
<thead>
<tr>
<th>Physical Quantity</th>
<th>SI Unit</th>
<th>Symbol</th>
<th>Physical Quantity</th>
<th>SI Unit</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>metre</td>
<td>m</td>
<td>Temperature</td>
<td>kelvin</td>
<td>K</td>
</tr>
<tr>
<td>Mass</td>
<td>kilogram</td>
<td>kg</td>
<td>Luminous intensity</td>
<td>candela</td>
<td>Cd</td>
</tr>
<tr>
<td>Time</td>
<td>second</td>
<td>s</td>
<td>Amount of substance</td>
<td>mole</td>
<td>mol</td>
</tr>
<tr>
<td>Electric Current</td>
<td>ampere</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Besides these seven fundamental units, two supplementary units are also defined, viz., radian [rad] for plane angle and steradian (sr) for solid angle.

> All the units which are defined/expressed in terms of fundamental units are called derived units.

Some important derived units.

<table>
<thead>
<tr>
<th>No.</th>
<th>Physical Quantity</th>
<th>cgs units</th>
<th>SI unit</th>
<th>Relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Force</td>
<td>dyne</td>
<td>newton</td>
<td>1 newton = 10^8 dyne</td>
</tr>
<tr>
<td>2.</td>
<td>work</td>
<td>erg</td>
<td>joule</td>
<td>1 joule = 10^7 erg</td>
</tr>
</tbody>
</table>

Some practical units of length, mass and time

<table>
<thead>
<tr>
<th>Length</th>
<th>Mass</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light year = distance travelled by light in one year in vacuum.</td>
<td>1 Quintal = 10^2 kg</td>
<td>1 Solar day = 86400 sec.</td>
</tr>
<tr>
<td>1 LY = 9.46 × 10^13m</td>
<td>1 Metric ton = 10^6 kg</td>
<td>1 Year = 365 1/4 solar days</td>
</tr>
<tr>
<td>1 Astronomical Unit (A.U.) = 1.5 × 10^11 m</td>
<td>1 Atomic Mass Unit (amu) or Dalton = 1.66 × 10^-27 kg</td>
<td>1 Lunar month = 27.3 solar days.</td>
</tr>
<tr>
<td>1 Parsec = 3.26 ly</td>
<td>1 Slug = 14.59 kg</td>
<td>Tropical year = It is the year in which total solar eclipse occurs.</td>
</tr>
<tr>
<td>= 3.08 × 10^16 m</td>
<td>1 Pound = 0.4537 kg</td>
<td>Leap year = It is the year in which the month of February is of 29 days.</td>
</tr>
<tr>
<td>1 Nautical mile or Seamiile = 6020 ft.</td>
<td>1 Chandrashekhar limit = 1.4 times the mass of sun</td>
<td></td>
</tr>
<tr>
<td>= 2.8 × 10^3 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Micron = 1 μm = 10^-6 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Angstrom (Å) = 10^-10 m</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Motion

Scalar Quantities: Physical quantities which have magnitude only and no direction are called scalar quantities.

Example: Mass, speed, volume, work, time, power, energy etc.

Vector Quantities: Physical quantities which have magnitude and direction both and obey triangle law are called vector quantities.

Example: Displacement, velocity, acceleration, force, momentum, torque etc.

Electric current, though has a direction, is a scalar quantity because it does not obey triangle law.

Note: Moment of inertia, refractive index, stress are tensor quantities.

Distance: Distance is the length of actual path covered by a moving object in a given time interval.

Displacement: Shortest distance covered by a body in a definite direction is called displacement.

> Distance is a scalar quantity whereas displacement is a vector quantity but both having the same unit (metre)

> Displacement may be positive, negative or zero whereas distance is always positive. In general, magnitude of displacement < distance

Speed: Distance travelled by the moving object in unit time interval is called speed i.e. speed = \( \frac{\text{Distance}}{\text{Time}} \)

It is a scalar quantity and its SI unit is metre/second \((\text{m/s})\).

Velocity: Velocity of a moving object is defined as the displacement of the object in unit time interval i.e. velocity = \( \frac{\text{Displacement}}{\text{Time}} \)

It is a vector quantity and its SI unit is metre/second.

Acceleration: Acceleration of an object is defined as the rate of change of velocity of the object i.e. acceleration = \( \frac{\text{Change in Velocity}}{\text{Time}} \)

It is a vector quantity and its SI units is metre/second\(^2\) \((\text{m/s}^2)\)

If velocity decreases with time then acceleration is negative and is called retardation.

Circular Motion: If an object describes a circular path (circle) its motion is called circular motion. If the object moves with uniform speed, its motion is uniform circular motion.

Uniform circular motion is an accelerated motion because the direction of velocity changes continuously whereas the magnitude of velocity i.e. speed of the body remains unchanged.

Angular Velocity: The angle subtended by the line joining the object from the origin of circle in unit time interval is called angular velocity.

It is generally denoted by \( \omega \) and \( \omega = \frac{\theta}{T} \)

If \( T \) = time period = time taken by the object to complete one revolution, \( n \) = frequency = no. of revolutions in one second.

\[
\text{then } \left( nT = 1 \right) \quad \text{and} \quad \omega = \frac{2\pi}{T} = 2\pi n. \\
\]

> In one revolution, the object travels \( 2\pi r \) distance.

\[ = \text{Linear speed} = \frac{2\pi r}{T} = \omega r \text{ where } \omega \text{ is angular speed} \times \text{radius} \]

Newton's laws of motion: Newton, the father of physics established the laws of motion in his book "principia" in 1687.

Newton's first law of motion: Every body maintains its initial state of rest or motion with uniform speed on a straight line unless an external force acts on it.

> First law is also called law of Galileo or law of inertia.

> Inertia: Inertia is the property of a body by virtue of which the body opposes change in its initial state of rest or motion with uniform speed on a straight line.

Inertia is of two types 1. Inertia of rest 2. Inertia of motion

Some examples of Inertia:

1. When a car or train starts suddenly, the passengers bends backward.
2. When a running horse stops suddenly, the rider bends forward.
3. When a coat/blanket is beaten by a stick, the dust particles are removed.
4. When a look is thrown in the road, the sand particles are thrown in the air.

First law gives the definition of force.

Force: Force is that external cause which when acts on a body changes or tries to change the initial state of rest or motion with uniform velocity of the body.

Momentum: Momentum is the property of a moving body and is defined as the product of mass and velocity of the body, i.e.

\[ \text{momentum} = \text{mass} \times \text{velocity} \]

It is a vector quantity. Its SI unit is kgm/s.

Newton's second law of motion: The rate of change in momentum of a body is directly proportional to the applied force on the body and takes place in the direction of force.

\[ F = ma \]
Newton's second law gives the magnitude of force.

Newton's first law is contained in the second law.

**Newton's Third Law of Motion**: To every action, there is an equal and opposite reaction.


**Principle of conservation of linear momentum**: If no external force acts on a system of bodies, the total linear momentum of the system of bodies remains constant.

As a consequence, the total momentum of bodies before and after collision remains the same.

Rocket works on the principle of conservation of linear momentum.

**Impulse**: When a large force acts on a body for very small time, then force is called impulsive force. Impulse is defined as the product of force and time.

\[ \text{Impulse} = \text{force} \times \text{time} = \text{change in momentum}. \]

It is a vector quantity and its direction is the direction of force. Its SI unit is newton second (Ns).

**Centripetal Force**: When a body travels along a circular path, its velocity changes continuously. Naturally an external force always acts on the body towards the centre of the path.

The external force required to maintain the circular motion of the body is called centripetal force.

If a body of mass \( m \) is moving on a circular path of radius \( R \) with uniform speed \( v \), then the required centripetal force, \( F = \frac{mv^2}{R} \).

**Centrifugal Force**: In applying the Newton's laws of motion, we have to consider some forces which cannot be assigned to any object in the surrounding.

These forces are called pseudo force or inertial force.

Centrifugal force is such a pseudo force. It is equal and opposite to centripetal force.

- Cream separator, centrifugal drier work on the principle of centrifugal force because forces of action and reaction act on different bodies.

**Moment of Force**: The rotational effect of a force on a body about an axis of rotation is described in terms of moment of force.

Moment of a force about an axis of rotation is measured as the product of magnitude of force and the perpendicular distance of direction of force from the axis of rotation.

- It is a vector quantity. Its SI unit is newton metre (Nm).

**Centre of Gravity**: The centre of gravity of a body is that point through which the entire weight of body acts. The centre of gravity of a body does not change with the change in orientation of body in space.

The weight of a body acts through centre of gravity in the downward direction. Hence a body can be brought to equilibrium by applying a force equal to its weight in the vertically upward direction through centre of gravity.

**Equilibrium**: If the resultant of all the forces acting on a body is zero then the body is said to be in equilibrium.

If a body is in equilibrium, it will be either at rest or in uniform motion. If it is at rest, the equilibrium is called static, otherwise dynamic.

- Static equilibrium is of the following three types:

  1. **Stable Equilibrium**: If on slight displacement from equilibrium position, a body has tendency to regain its original position, it is said to be in stable equilibrium.

  2. **Unstable equilibrium**: If on slight displacement from equilibrium position, a body moves in the direction of displacement and does not regain its original position, the equilibrium is said to be unstable equilibrium. In this equilibrium, the centre of gravity of the body is at the highest position.

  3. **Neutral Equilibrium**: If on slight displacement from equilibrium position a body has no tendency to come back to its original position or to move in the direction of displacement, it is said to be in neutral equilibrium. In neutral equilibrium, the centre of gravity always remains at the same height.

**Conditions for Stable Equilibrium**: For stable equilibrium of a body, the following two conditions should be fulfilled.

1. The centre of gravity of the body should be at the minimum height.
2. The vertical line passing through the centre of gravity of the body should pass through the base of the body.

### 3. Work, Energy and Power

**Work**: If a body gets displaced when a force acts on it, work is said to be done. Work is measured by the product of force and displacement of the body along the direction of force.

If a body gets displaced by \( S \) when a force \( F \) acts on it, then the work \( W = FS \cos \theta \)

where \( \theta = \text{angle between force and displacement} \)

If both force and displacement are in the same direction, then \( W = FS \)

- If force and displacement are perpendicular to each other, \( W = 0 \) as \( \cos \theta = 0 \).

For example, in case of uniform circular motion work done by the centripetal force is zero.

Work is a scalar quantity and its SI unit is joule.

**Energy**: Capacity of doing work by a body is called its energy.

- Energy is a scalar quantity and its SI unit is joule.
- Energy developed in a body due to work done on it is called mechanical energy.

**Mechanical energy** is of two types: 1. **Potential Energy** 2. **Kinetic Energy**

**Potential Energy**: The capacity of doing work developed in a body due to its position or configuration is called its potential energy.

**Example**: 1. energy of stretched or compressed spring 2. energy of water collected at a height 3. energy of spring in a watch.
PE of a body in the gravitational field of earth is \( mgh \).
where \( m \) = mass, \( g \) = acceleration due to gravity, \( h \) = height of the body from surface of the earth.

**Kinetic Energy**: Energy possessed by a body due to its motion is called Kinetic Energy of the body.

If a body of mass \( m \) is moving with speed \( v \), then kinetic energy of the body is \( \frac{1}{2} m v^2 \).

**Principle of Conservation of Energy**
Energy can neither be created nor be destroyed. Only energy can be transformed from one form to another form. Whenever energy is utilized in one form, equal amount of energy is produced in other form. Hence total energy of the universe always remains the same. This is called the principle of conservation of energy.

<table>
<thead>
<tr>
<th>Some Equipments used to Transform Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dynamo</td>
</tr>
<tr>
<td>2. Candle</td>
</tr>
<tr>
<td>3. Microphone</td>
</tr>
<tr>
<td>4. Loud Speaker</td>
</tr>
<tr>
<td>5. Solar Cell</td>
</tr>
<tr>
<td>6. Tube light</td>
</tr>
<tr>
<td>7. Electric Bulb</td>
</tr>
<tr>
<td>8. Battery</td>
</tr>
<tr>
<td>9. Electric motor</td>
</tr>
<tr>
<td>10. Sitar</td>
</tr>
</tbody>
</table>

**Relation between Momentum and Kinetic Energy**
\[
\text{K.E} = \frac{p^2}{2m} \text{ where } p = \text{momentum} = mv
\]
Clearly when momentum is doubled, kinetic energy becomes four times.

**Power**: Rate of doing work is called power.

If an agent does \( W \) work in time \( t \), then power of agent = \( \frac{W}{t} \).

SI unit of power is watt named as a respect to the scientist James Watt.

\( 1 \text{ watt} = 1 \text{ joule/sec} \)
\( 1 \text{ kW} = 10^3 \text{ watt} \)
\( 1 \text{ MW} = 10^6 \text{ watt} \)

Horse power is a practical unit of power. \( 1 \text{ H.P.} = 746 \text{ watt} \).

\( 1 \text{ watt second} = 1 \text{ watt} \times 1 \text{ second} = 1 \text{ joule} \).

\( 1 \text{ watt hour (Wh)} = 3600 \text{ joule} \)
\( 1 \text{ kilowatt hour (kWh)} = 3.6 \times 10^6 \text{ joule} \).

\( W, \text{kW, MW \& H.P. are units of power.} \)
\( Ws, \text{Wh, kWh are units of work and energy.} \)

4. **Gravitation**

**Gravitation**: Everybody attracts other body by a force called force of gravitation.

**Newton's law of Gravitation**: The force of gravitational attraction between two point bodies is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

\[
F = \frac{G m_1 m_2}{r^2} \text{ where } m_1 \text{ and } m_2 \text{ are masses, } G \text{ is constant}\]

Here \( G \) is constant called universal gravitational constant. The value of \( G \) is \( 6.67 \times 10^{-11} \text{Nm}^2/\text{kg}^2 \).

**Gravity**: The gravitational force of earth is called gravity i.e. gravity is the force by which earth pulls a body towards its centre.

The acceleration produced in a body due to force of gravity is called acceleration due to gravity (denoted as \( g \)) and its value is \( 9.8 \text{ m/s}^2 \).

- Acceleration due to gravity is independent of shape, size and mass of the body.

**Variation in \( g \)**
1. \( g \) decreases with height or depth from earth's surface.
2. \( g \) is maximum at poles.
3. \( g \) is minimum at equator.
4. \( g \) increases due to rotation of earth.
5. \( g \) decreases if angular speed of earth increases and increases if angular speed of earth decreases.

- If angular speed of earth becomes 17 times its present value, a body on the equator becomes weightless.

**Weight of a body in a lift**
1. If lift is stationary or moving with uniform speed (either upward or downward), the apparent weight of a body is equal to its true weight.
2. If lift is going up with acceleration, the apparent weight of a body is more than the true weight.
3. If lift is going down with acceleration, the apparent weight of a body is less than the true weight.
4. If the cord of the lift is broken, it falls freely. In this situation the weight of a body in the lift becomes zero. This is the situation of weightlessness.
5. While going down, if the acceleration of lift is more than acceleration due to gravity, a body in the lift goes in contact of the ceiling of lift.

**Kepler's Laws of Planetary Motion**
1. All planets move around the sun in elliptical orbits, with the sun being at rest at one focus of the orbit.
2. The position vector of the planet with sun at the origin sweeps out equal area in equal time i.e. The areal velocity of planet around the sun always remains constant.

A consequence of this law is that the speed of planet increases when the planet is closer to the sun and decreases when the planet is far away from sun.

Speed of a planet is maximum when it is at perigee and minimum when it is at apogee.

3. The square of the period of revolution of a planet around the sun is directly proportional to the cube of mean distance of planet from the sun.

If \( T \) is period of revolution and \( r \) is the mean distance of planet from sun then \( T^2 \propto r^3 \).
5. Pressure

**Pressure** : Pressure is defined as force acting normally on unit area of the surface.

\[
P = \frac{F}{A} = \frac{\text{Force}}{\text{Area}}
\]

SI unit of pressure is \( N/m^2 \) also called pascal (Pa). Pressure is a scalar quantity.

**Atmospheric Pressure** : Atmospheric pressure is that pressure which is exerted by a mercury column of 76 cm length at 0°C at 45° latitude at the sea-level. It is equal to weight of 76 cm column of mercury of cross-sectional area 1 cm². Generally it is measured in bar. 1 bar = \( 10^5 N/m^2 \)

Atmospheric pressure 1 atm = 1.01 bar = \( 1.01 \times 10^5 N/m^2 \) = 760 torr

One torr is the pressure exerted by a mercury column of 1 mm length.

- Atmospheric pressure decreases with altitude (height from earth's surface).
- This is why 1. It is difficult to cook on the mountain 2. The fountain pen of a passenger leaks in aeroplane at height.

- Atmospheric pressure is measured by barometer. With the help of barometer, weather forecast can be made.
- Sudden fall in barometric reading is the indication of storm.
- Slow fall in barometric reading is the indication of rain.
- Slow rise in the barometric reading is the indication of clear weather.

**Pressure in liquid** : Force exerted on unit area of wall or base of the container by the molecules of liquid is the pressure of liquid.

The pressure exerted by liquid at depth \( h \) below the surface of liquid is given as \( p = \rho gh \) where \( d \) is the density of liquid.

- Regarding pressure, the following points are worth noting:
  1. In a static liquid at same horizontal level, pressure is same at all points.
  2. Pressure at a point in a static liquid has same value in all directions.
  3. Pressure at a point in a liquid is proportional to the depth of the point from the free surface.
  4. Pressure at a point in a liquid is proportional to the density of the liquid.

**Pascal law for pressure of liquid**

1. If gravitational attraction is negligible, in equilibrium condition, pressure is same at all points in a liquid.
2. If an external pressure is applied to an enclosed fluid, it is transmitted undiminished to every direction.

- Hydrolic lift, hydraulic press, Hydrolic brake work on Pascal law.

**Effect of pressure on Melting Point and Boiling Point**

1. The M.P. of substances which expands on fusion increases with the increase in pressure; for example - wax.
2. The M.P. of substances which contracts on fusion decreases with the increase in temperature; for example - ice.
3. Boiling point of all the substances increases with the increase in pressure.
6. Floatation

Buoyant Force: When a body is immersed partly or wholly in a liquid, a force acts on the body by the liquid in the upward direction. This force is called Buoyant force or force of buoyancy or upthrust. It is equal to the weight of liquid displaced by the body and acts at the centre of gravity of displaced liquid. Its study was first made by Archimedes.

Archimedes Principle: When a body is immersed partly or wholly in a liquid, there is an apparent loss in the weight of the body which is equal to the weight of liquid displaced by the body.

Law of Floatation

A body floats in a liquid if
1. Density of material of body is less than or equal to the density of liquid.
2. If density of material of body is equal to density of liquid, the body floats fully submerged in liquid in neutral equilibrium.
3. When body floats in neutral equilibrium, the weight of the body is equal to the weight of displaced liquid.
4. The centre of gravity of the body and centre of gravity of the displaced liquid should be in one vertical line.

Centre of Buoyancy: The centre of gravity of the liquid displaced by a body is called centre of buoyancy.

Meta Centre: When a floating body is slightly tilted from equilibrium position, the centre of buoyancy shifts. The point at which the vertical line passing through the new position of centre of buoyancy meets with the initial line is called meta centre.

Conditions for stable equilibrium of a floating body
1. The meta centre must always be higher than the centre gravity of the body.
2. The line joining the centre of gravity of the body and centre of flotation should be vertical.

Density: Density is defined as mass per unit volume.

\[ \text{Density} = \frac{\text{mass}}{\text{volume}} \]

SI unit is kg/m³.

Relative density = \( \frac{\text{density of material}}{\text{density of water at } 4\degree C} \)

Since relative density is a ratio, it is unitless.

> Relative density is measured by Hydrometer.

> The density of sea water is more than that of normal water. This explains why it is easier to swim in sea water.

> When ice floats in water, its \( \frac{1}{10} \) the part remain outside the water.

> If ice floating in water in a vessel melts, the level of water in the vessel does not change.

> Purity of milk is measured by lactometer.

7. Surface Tension

Cohesive Force: The force of attraction between the molecules of same substance is called cohesive force. Cohesive force is maximum in solids. This is why solids have a fixed shape. Cohesive force is negligible in case of gases.

Adhesive Force: Force of attraction between the molecules of different substances is called adhesive force. Due to adhesive force, one body sticks to other.

Surface Tension: Surface tension is the property of a liquid by virtue of which it has the tendency to have the area of its free surface minimum as if it were under tension like a stretched elastic membrane.

A liquid drop attains spherical shape due to surface tension as for given volume, sphere has minimum surface area.

Surface tension of a liquid is measured by the normal force acting per unit length on either side of an imaginary line drawn on the free surface of liquid and tangential to the free surface.

So, if a force \( F \) acts on an imaginary line of length \( l \), then surface tension, \( T = \frac{F}{l} \).

Work done in increasing the surface area of a liquid by unity under isothermal condition is equal to surface tension of liquid. According to this definition, unit of surface tension is joule/meter².

Surface tension of a liquid decreases with the increase of temperature and becomes zero at critical temperature.

Capillary tube: A tube having very narrow (fine) and uniform bore is called a capillary tube.

Capillarity: If a capillary tube is dipped in a liquid, liquid ascends or descends in the capillary tube. This phenomenon is called capillarity.

> The height by which liquid ascends or descends in a capillary tube depends upon the radius of the tube.

The capillarity depends on the nature of liquid and solid both. The liquid which wets the wall of tube rises in the tube and the liquid which does not wet the wall of tube descends in the tube. For example, when a glass capillary tube is dipped in water, water rises in the tube and shape of water meniscus is concave, similarly when a glass capillary tube is dipped in mercury, mercury descends in the tube and shape of mercury meniscus is convex.

Illustrations of capillarity
1. A piece of blotting paper soaks ink because the pores of the blotting paper serve as capillary tubes.
2. The oil in the wick of a lamp rises due to capillary action of threads in the wick.
3. The root hairs of plants draws water from the soil through capillary action.
4. To prevent loss of water due to capillary action, the soil is loosened and split into pieces by the farmers.
5. If a capillary tube is dipped in water in an artificial satellite, water rises up to other end of tube because of its zero apparent weight, how long the tube may be.
6. Action of towel in soaking up water from the body is due to capillary action of cotton in the towel.
7. Melted wax, in a candle rises up to wick by capillary action.
8. Viscosity

Viscosity: Viscosity is the property of a liquid by which it opposes the relative motion between its different layers.

Viscosity of gases is much less than that of liquids. There is no viscosity in solids.

Viscosity of an ideal fluid is zero.

With rise in temperature, viscosity of liquids decreases and that for gases increases.

Viscosity of a fluid is measured by its coefficient of viscosity. Its SI unit is decapoise (kg/ms) or pascal second. It is generally denoted by $\eta$.

Terminal Velocity: When a body falls in a viscous medium, its velocity first increases and finally becomes constant. This constant velocity is called Terminal velocity.

In this situation, the weight of the body is equal to the sum of viscous force and force of buoyancy i.e. the net force on the body is zero.

Terminal velocity of a spherical body falling in a viscous medium is proportional to the square of radius of the body.

Streamline Flow: If a fluid is flowing in such a way that velocity of all the fluid particles reaching a particular point is same at all time, then the flow of fluid is said to be streamline flow. Thus in streamline flow, each particle follows the same path as followed by a previous particle passing through that point.

Critical Velocity: The maximum velocity up to which fluid motion is streamline and of the velocity above the critical velocity, flow is turbulent.

If the velocity of flow is less than critical velocity, the rate of flow of fluid depends basically on viscosity of fluid. If the velocity of flow is more than critical this reason, on eruption of the volcano, the lava coming out of it flows very swiftly

9. Elasticity

Elasticity: Elasticity is the property of material of a body by virtue of which the body acquires its original shape and size after the removal of deforming force.

Elastic Limit: Elastic limit is the maximum value of deforming force upto which a material shows elastic property and above which the material looses its elastic property.

Stress: The restoring force per unit area set up inside the body subjected to deforming force is called stress.

Strain: The relative change in dimension or shape of a body which is subjected to stress is called strain.

It is measured by ratio of change in length to the original length (longitudinal strain), change in volume to original volume (volume strain).

Hooke's law: Under elastic limit, stress is proportional to strain

i.e. stress $\propto$ strain or $\frac{stress}{strain} = E$ (constant)

$E$ is called elastic constant or modulus of elasticity. Its value is different for different material. Its SI unit is N/m² also called pascal.

Elastic constant is of three types:

1. Young's modulus of elasticity $Y = \frac{\text{Longitudinal stress}}{\text{Longitudinal strain}}$

2. Bulk modulus of elasticity $K = \frac{\text{Volume stress}}{\text{Volume Strain}}$

3. Rigidity modulus $\eta = \frac{\text{Tangential (or shear) stress}}{\text{Shear strain}}$

10. Simple Harmonic Motion

Periodic Motion: Any motion which repeats itself after regular interval of time is called periodic or harmonic motion. Motion of hands of a clock, motion of earth around the sun, motion of the needle of a sewing machine are the examples of periodic motion.

Oscillatory Motion: If a particle repeats its motion after a regular time interval about a fixed point, motion is said to be oscillatory or vibratory. i.e. oscillatory about a fixed point, motion is to be oscillatory or vibratory. i.e. oscillatory about a fixed point, motion is to be oscillatory or vibratory. i.e. motion of a constrained periodic motion between precisely fixed limits. Motion of a particle or a system of particles is called oscillatory.

Motion in a constrained periodic motion between precisely fixed limits. Motion of a system of particles is called oscillatory.

Time period: Time taken in one complete oscillation is called time period.

Or, Time after which motion is repeated is called time period.

Frequency = Frequency is the no. of oscillations completed by oscillating body in unit time interval. Its SI unit is Hertz.

If $n =$ frequency, $T =$ time period, then $nT = 1$
Simple Harmonic Motion: If a particle repeats its motion about a fixed point after a regular time interval in such a way that at any moment the acceleration of the particle is directly proportional to its displacement from the fixed point at that moment and is always directed towards the fixed point then the motion of the particle is called simple harmonic motion.

The fixed point is called mean point or equilibrium point.

Characteristics of SHM
When a particle executing SHM passes through the mean position:
1. No force acts on the particle.
2. Acceleration of the particle is zero.
3. Velocity is maximum.
4. Kinetic energy is maximum.
5. Potential energy is zero.

When a particle executing SHM is at the extreme end, then:
1. Acceleration of the particle is maximum.
2. Restoring force acting on particle is maximum.
3. Velocity of particle is zero.
4. Kinetic energy of particle is zero.
5. Potential energy is maximum.

Simple Pendulum: If a point mass is suspended from a fixed support with the help of a massless and inextensible string, the arrangement is called simple pendulum. The above is an ideal definition. Practically a simple pendulum is made by suspending a small ball (called bob) from a fixed support with the help of a light string.

If the bob of a simple pendulum is slightly displaced from its mean position and then released, it starts oscillating in simple harmonic motion. Time period of oscillation of a simple pendulum is given as

\[ T = 2\pi \sqrt{\frac{l}{g}} \]

where \( l \) is the effective length of the pendulum and \( g \) is the acceleration due to gravity.

11. Wave

A wave is a disturbance which propagates energy from one place to the other without the transport of matter.

Waves are broadly of two types:

1. Mechanical Wave  
2. Non-mechanical wave

Mechanical Wave: The waves which require material medium (solid, liquid or gas) for their propagation are called mechanical wave or elastic wave.

Mechanical waves are of two types

1. Longitudinal wave: If the particles of the medium vibrate in the direction of propagation of wave, the wave is called longitudinal wave.

Waves on springs or sound waves in air are examples of longitudinal waves.

2. Transverse Wave: If the particles of the medium vibrate perpendicular to the direction of propagation of wave, the wave is called transverse wave.

Waves on strings under tension, waves on the surface of water are examples of transverse waves.

- Non-mechanical waves or electromagnetic waves: The waves which do not require medium for their propagation i.e. which can propagate even through the vacuum are called non-mechanical wave.
- Light, heat are the examples of non-mechanical wave. In fact all the electromagnetic waves are non-mechanical.
- All the electromagnetic wave consists of photon.
- The wavelength range of electromagnetic wave is \( 10^{-14} \text{m} \) to \( 10^{4} \text{m} \).

Properties of electromagnetic waves
1. They are neutral (uncharged).
2. They propagate as transverse wave.
3. They propagate with the velocity of light.
4. They contains energy and momentum.
5. Their concept was introduced by Maxwell.

Following waves are not electromagnetic

1. Cathode rays  
2. Canal rays  
3. α rays  
4. β rays  
5. Sound wave
6. Ultrasonic wave

Some Important Electromagnetic Waves

<table>
<thead>
<tr>
<th>Electro-magnetic Waves</th>
<th>Discoverer</th>
<th>Wavelength range (in meter)</th>
<th>Frequency range</th>
</tr>
</thead>
<tbody>
<tr>
<td>γ-Rays</td>
<td>Henri Bequerel</td>
<td>(10^{-14} \text{ to } 10^{-10} )</td>
<td>(10^{12} \text{ to } 10^{16} )</td>
</tr>
<tr>
<td>X-Rays</td>
<td>W. Roentgen</td>
<td>(10^{-10} \text{ to } 10^{-8} )</td>
<td>(10^{8} \text{ to } 10^{10} )</td>
</tr>
<tr>
<td>Ultra-violet rays</td>
<td>Ritter</td>
<td>(10^{-8} \text{ to } 10^{-7} )</td>
<td>(10^{14} \text{ to } 10^{16} )</td>
</tr>
<tr>
<td>Visible radiation</td>
<td>Newton</td>
<td>(3.9 \times 10^{-7} \text{ to } 7.8 \times 10^{-7} )</td>
<td>(10^{14} \text{ to } 10^{16} )</td>
</tr>
<tr>
<td>Infra-red rays</td>
<td>Herschel</td>
<td>(7.8 \times 10^{-8} \text{ to } 7.8 \times 10^{-3} )</td>
<td>(10^{10} \text{ to } 10^{14} )</td>
</tr>
<tr>
<td>Short radio waves or Heinrich</td>
<td>Hertz</td>
<td>(10^{-3} \text{ to } 1 )</td>
<td>(10^{6} \text{ to } 10^{9} )</td>
</tr>
<tr>
<td>Hertzian Waves</td>
<td>Hertz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Radio Waves</td>
<td>Marconi</td>
<td>(1 \text{ to } 10^{4} )</td>
<td>(10^{6} \text{ to } 10^{8} )</td>
</tr>
</tbody>
</table>

Note: Electromagnetic waves of wavelength range \( 10^{-3} \text{ m} \) to \( 10^{-2} \text{ m} \) are called microwaves.

Phase of vibration: Phase of vibration of a vibrating particle at any instant is the physical quantity which express the position as well as direction of motion of the particle at that instant with respect to its equilibrium (mean) position.

Amplitude: Amplitude is defined as the maximum displacement of the vibrating particle on either side from the equilibrium position.

Wavelength: Wavelength is the distance between any two nearest particle of the medium, vibrating in the same phase. It is denoted by the Greek letter \( \lambda \).

In transverse wave distance between two consecutive crests or troughs and in longitudinal wave, distance between two consecutive compressions or rarefactions is equal to wavelength.

Relation between wavelength, frequency and velocity of wave

Velocity \( v \) of wave = frequency \( v \) × wavelength \( \lambda \) or, \( v = n\lambda \).
A path difference of $\Delta x$ corresponds to a phase difference $\Delta \phi$ where
$$\Delta \phi = \frac{2\pi}{\lambda} \cdot \Delta x.$$

### 12. Sound Wave

- **Sound waves are longitudinal mechanical waves.**
  - According to their frequency range, longitudinal mechanical waves are divided into the following categories:

  1. **Audible or Sound Waves:** The longitudinal mechanical waves which lie in the frequency range 20 Hz to 20000 Hz are called audible or sound waves. These waves are sensitive to human ear. These are generated by the vibrating bodies such as tuning fork, vocal cords etc.

  2. **Infrasonic Waves:** The longitudinal mechanical waves having frequencies less than 20 Hz are called infrasonic. These waves are produced by sources of bigger size such as earth quakes, volcanic eruptions, ocean waves and by elephants and whales.

  3. **Ultrasonic Waves:** The longitudinal mechanical waves having frequencies greater than 20000 Hz are called ultrasonic waves. Human ear can not detect these waves. But certain creatures like dog, cat, bat, mosquito can detect these waves. Bat not only detect but also produce ultrasonic.

  Ultrasonic waves can be produced by Galton’s whistle or Hartman’s generator or by the high frequency vibrations of a quartz crystal under an alternating electric field (Piezo - electric effect) or by the vibrations of a ferromagnetic rod under an alternating magnetic field (Magnetostriction).

- **Applications of Ultrasonic Waves**
  1. For sending signals.
  2. For measuring the depth of sea.
  3. For cleaning clothes, aeroplanes and machinery parts of clocks.
  4. For removing lamp-shoot from the chimney of factories.
  5. In sterilizing of a liquid.
  6. In Ultrasonography.

### Speed of Sound:

- **Speed of sound is different in different mediums.** In a medium, the speed of sound basically depends upon elasticity and density of medium.

- **Speed of sound is maximum in solids and minimum in gases.**

- **When sound enters from one medium to another medium, its speed and wavelength changes but frequency remains unchanged.**

- **In a medium, the speed of sound is independent of frequency.**

### Effect of pressure on speed of sound:
The speed of sound is independent of pressure i.e. speed remains unchanged by the increase or decrease of pressure.

### Speed of sound in different mediums

<table>
<thead>
<tr>
<th>Medium</th>
<th>Speed of sound (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
<td>260</td>
</tr>
<tr>
<td>Air (0°C)</td>
<td>332</td>
</tr>
<tr>
<td>Air (20°C)</td>
<td>343</td>
</tr>
<tr>
<td>Steam (100°C)</td>
<td>405</td>
</tr>
<tr>
<td>Helium</td>
<td>965</td>
</tr>
<tr>
<td>Alcohol</td>
<td>1213</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>1269</td>
</tr>
<tr>
<td>Mercury</td>
<td>1450</td>
</tr>
<tr>
<td>Water (20°C)</td>
<td>1482</td>
</tr>
<tr>
<td>Sea water</td>
<td>1533</td>
</tr>
<tr>
<td>Copper</td>
<td>3560</td>
</tr>
<tr>
<td>Iron</td>
<td>5130</td>
</tr>
<tr>
<td>Glass</td>
<td>5640</td>
</tr>
<tr>
<td>Granite</td>
<td>6000</td>
</tr>
<tr>
<td>Aluminium</td>
<td>6420</td>
</tr>
</tbody>
</table>

### Effect of Temperature on speed of sound:
The speed of sound increases with the increase of temperature of the medium. The speed of sound in air increases by 0.61 m/s when the temperature is increased by 1°C.

### Effect of humidity on speed of sound:
The speed of sound is more in humid air than in dry air because the density of humid air is less than the density of dry air.

### Characteristics of Sound waves:
Sound waves have the following three characteristics:

1. **Intensity:** Intensity of sound at any point in space is defined as amount of energy passing normally per unit area held around that point per unit time. SI Unit of Intensity is watt/m². Intensity of sound at a point is:
   - inversely proportional to the square of the distance of point from the source.
   - directly proportional to square of amplitude of vibration, square of frequency and density of the medium.

   Due to intensity, a sound appears loud or faint to the ear. Actually, the sensation of a sound perceived in ear is measured by another term called **loudness** which depends on intensity of sound and sensitiveness of the ear. Unit of loudness is **bel**. A practical unit of loudness is **decibel (dB)** which is equal to 1/10th of bel. Another unit of loudness is **phon**.

2. **Pitch:** Pitch is that characteristic of sound which distinguishes a sharp (or shrill) sound from a grave (dull or flat) sound. Pitch depends upon frequency. Higher the frequency, higher will be the pitch and shriller will be the sound. Lower the frequency, lower will be the pitch and grave will be the sound.

3. **Quality:** Quality is that characteristic of sound which enables us to distinguish between sounds produced by two sources having the same intensity and pitch. The quality depends upon number, frequency and relative intensities of overtones.

### Echo:
The sound waves received after being reflected from a high tower or mountains is called echo.

- To hear echo, the minimum distance between the observer and reflector should be 17 m (16.6 m).
- Persistence of ear (effect of sound on ear) is 1/10 sec.
- Due to refraction, sound is heard at longer distances in nights than in day.

### Resonance:
If the frequency of imposed periodic force is equal to the natural frequency of a body, the body oscillates with a very large amplitude. This phenomenon is called resonance.

### Interference of sound:
The modification or redistribution of energy at a point due to superposition of two (or, more) sound waves of same frequency is called interference of sound.

If two waves meet at a point in same phase, intensity of sound is maximum at that point. Such type of interference is called **constructive interference**. Similarly, if the two waves meet at a point in opposite phase, intensity of sound at that point is minimum. Such type of interference is called **destructive interference**.

### Stationary wave:
When two progressive waves of same type (i.e both longitudinal or both transverse) having the same amplitude and same time period/
frequency/wavelength travelling with same speed along the same straight line in opposite directions, superimpose, a new set of waves are formed which are called stationary of standing waves.

**Diffraction of sound**: Wavelength of sound is of the order of 1 m. If an obstacle of that range appears in the path of sound, sound deviates at the edge of obstacles and propagates forward. This phenomenon is called diffraction of sound.

**Doppler's Effect**: If there is a relative motion between source of sound and observer, the apparent frequency of sound heard by the observer is different from the actual frequency of sound emitted by the source. This phenomenon is called Doppler's effect.

When the distance between the source and observer decreases, the apparent frequency increases and vice-versa.

**Mach Number**: It is defined as the ratio of speed of source of sound to the speed of sound in the same medium under the same condition of temperature and pressure.

- If Mach number > 1, body is called supersonic.
- If Mach number > 5, body is called hypersonic.
- If Mach number < 1, the body (source) is said to be moving with subsonic speed.

**Shock Waves**: A body moving with supersonic speed in air leaves behind it a conical region of disturbance which spreads continuously. Such a disturbance is called shock wave. This wave carries huge energy and may even make cracks in window panes or even damage a building.

**Bow Waves**: When a motor boat in a sea travels faster than sound, then waves just like shock-waves are produced on the surface of water. These waves are called bow waves.

13. **Heat**

Heat is that form of energy which flows from one body to other body due to difference in temperature between the bodies. The amount of heat contained in a body depends upon the mass of the body.

- If W work is performed and heat produced is H then \( \frac{W}{H} = J \) or \( W = JH \) where \( J \) is a constant called Mechanical Equivalent of Heat. Its value is 4.186 joule/calorie. It means if 4.186 joule of work is performed, 1 calorie of heat is consumed.

**Units of Heat**

- C.G.S unit: calorie = It is the amount of heat required to raise the temperature of 1 g of pure water through 1°C.
- International calorie: It is the amount of heat required to raise the temperature of 1 g of pure water from 14.5°C to 15.5°C.
- F.P.S. unit: B.Th.U (British Thermal Unit) = It is the amount of heat required to raise the temp. of 1 pound of pure water through 1°F.

**Relations between different units**:

- 1 B.Th.U = 252 calorie
- 1 Therm = 10⁵ B.Th.U
- 1 calorie = 4.186 joule
- 1 pound calorie = 453.6 calorie

**Temperature**: Temperature is that physical cause which decides the direction of flow of heat from one body to other body. Heat energy always flows from body at higher temperature to body at lower temperature.

**Measurement of Temperature**

**Thermometer**: The device which measures the temperature of a body is called a thermometer.

**Scales of temperature measurement**

To measure temperature two fixed points are taken on each thermometer. One of the fixed points is the freezing point of water or ice point as lower fixed point (LFP). The other fixed point is the boiling point of water or steam point as upper fixed point (UPP).

The temperatures of these fixed points, the no. of fundamental interval between the two fixed points on different temperature scales is shown by the table given below:

<table>
<thead>
<tr>
<th></th>
<th>Celsius</th>
<th>Fahrenheit</th>
<th>Reamur</th>
<th>Kelvin</th>
<th>Rankine</th>
</tr>
</thead>
<tbody>
<tr>
<td>UFP</td>
<td>100°C</td>
<td>212°F</td>
<td>80°F</td>
<td>373.15K</td>
<td>672°Ra</td>
</tr>
<tr>
<td>LFP</td>
<td>0°C</td>
<td>32°F</td>
<td>0°F</td>
<td>273.15K</td>
<td>492°Ra</td>
</tr>
</tbody>
</table>

**Absolute zero**: -273.15°C = -459.67°F = -218.4°C

**Relation between Temperature on different scales**

\[
\frac{\Delta C}{5} = \frac{\Delta F}{9} = \frac{\Delta R}{4} = \frac{\Delta K}{5} = \frac{\Delta Ra}{9}
\]

- Celsius was initially known as centigrade.
- While expressing temperature on kelvin scale ° (degree) is not used.
- Freezing point (F.P.) of mercury is −39°C. Hence to measure temperature below this temperature, alcohol thermometer is used. F.P. of alcohol is −115°C.

**Range of different thermometers**

- **Mercury Thermometer**: from −30°C to 350°C
- **Constant volume gas thermometer**: from −200°C to 500°C (with H₂), below −200°C up to −268°C (with He) above 1000°C up to 1600°C (with N₂ gas and bulb of glazed porcelain)
- **Platinum resistance thermometer**: from −200°C to 1200°C
- **Thermocouple thermometer**: from −200°C to 1600°C

**Total Radiation Pyrometer**

When a body is at high temperature, it glows brightly and the radiation emitted by the body is directly proportional to the fourth power of absolute temperature of the body. Radiation pyrometer measures the temperature of a body by measuring the radiation emitted by the body.

This thermometer is not put in contact with the body. But it can not measure...
temperature below 800°C because at low temperature emission of radiation is very small and cannot be detected.

Specific Heat Capacity: Specific heat capacity of a material is the amount of heat required to raise the temperature of unit mass of substance through 1°C. Its SI unit is Joule/kg Kelvin (J/kg K).

- One calorie of heat is required to raise the temperature of 1 gram of water through 1°C. Hence specific heat capacity of water is 1 cal/gm °C.
- 1 calorie/gram° C = 4.186 Joule/kg Kelvin.

Thermal Expansion
When a body is heated its length, surface area and volume increase. The increase in length, area and volume with the increase in temperature are measured in Kelvin. Clearly, density of water is maximum at 4°C.

Transmission of Heat: The transfer of heat from one place to another place is called transmission of heat. There are three modes of heat transfer—1. Conduction, 2. Convection and 3. Radiation.

Conduction: In this process, heat is transferred from one place to another place by the successive vibrations of the particles of the medium without bodily movement of the particles of the medium. In solids, heat transfer takes place by conduction.

Convection: In this process, heat is transferred by the actual movement of particles of the medium from one place to another place. Due to movement of particles, a current of particles set up which is called convection current.

In liquids and gases, heat transfer takes place by convection.

Radiation: In this method transfer of heat takes place with the speed of light without affecting the intervening medium.

Newton's law of cooling: The rate of loss of heat by a body is directly proportional to the difference in temperature between the body and the surrounding.

Kirchhoff's law: According to Kirchhoff's law, the ratio of emissive power to absorptive power is same for all surfaces at the same temperature and is equal to emissive power of black body at that temperature.

Kirchhoff's law signifies that good absorbers are good emitters.

If a shining metal ball with some black spot on its surface is heated to a high temperature and seen in dark, the shining ball becomes dull but the black spots shines brilliantly, because black spot absorbs radiation during heating and emit in dark.

Stefan's law: The radiant energy emitted by a black body per unit area per absolute temperature is given by:

\[ E = \sigma T^4 \]

where \( \sigma \) is a constant called Stefan's constant.

Change of State
Any material can remain in any of its three states (solid, liquid and gas). To change the substance from one state to another state is called change of state. For this change to take place at a fixed temp.

**Fusion:** The process by which a substance is changed from solid state to liquid state is called fusion. Fusion takes place at a fixed temperature called melting point (M.P.)

**Freezing:** The process by which a substance is changed from liquid state to solid state is called freezing. Freezing takes place at a fixed temperature called freezing point (F.P.) For a substance M.P. = F.P.

- M.P. of a substance changes with the change in pressure. Melting point of substances which contract in the process of fusion (as ice) decreases with the increase in pressure. Melting point of substances which expands in the process of fusion (as wax) increases with the increase in pressure.
- With the addition of impurity (as salt in ice), melting point of a substance decreases.

**Vapourisation:** The process by which a substance is changed from liquid state to vapour state is called vapourisation.

Vapourisation takes place by two methods: 1. Evaporation & 2. Boiling or Ebulition

**Evaporation:** The process of vapourisation which takes place only from the exposed surface of liquid and that at all temperatures is called evaporation.

Evaporation causes cooling. This is why water in a earthed pot gets cooled in summer.

**Boiling:** The process of vapourisation which takes place at a fixed temperature and from whole part of liquid is called boiling.

The temperature at which boiling takes place is called boiling point.

**Condensation:** The process by which a substance is changed from vapour state to liquid state is called condensation.

- Boiling point of a liquid increases with the increase in pressure.
- Boiling point of a liquid increases with the addition of impurity.
Latent heat or heat of transformation

The amount of heat required to change the state of unit mass of substances at constant temperature is called latent heat.

If \( Q \) heat is required to change the state of a substance of mass \( m \) at constant temperature and \( L \) is the latent heat, then \( Q = mL \).

S.I. unit of latent heat is Joule/kilogram.

Any material has two types of latent heat.

1. **Latent heat of fusion**: It is the amount of heat energy required to convert unit mass of a substance from solid state to liquid state at its melting point. It is also the amount of heat released by unit mass of liquid when changed into solid at its freezing point.

2. **Latent heat of vapourisation**: It is the amount of heat required to change unit mass of a substance from liquid state to vapour state at its boiling point. It is also the amount of heat released when unit mass of a vapour is changed into liquid.

**Sublimation**: Sublimation is the process of conversion of a solid directly into vapour.

- Sublimation takes place when boiling point is less than melting point.
- Sublimation is shown by camphor or ice in vacuum. **Hoar Frost**: Hoar frost is just the reverse process of sublimation i.e., it is the process of direct conversion of vapour into solid.

- Steam produces more severe burn than water at same temperature because internal energy of steam is more than that of water at same temperature.

**Relative Humidity**: Relative humidity is defined as the ratio of amount of water vapour present in a given volume of atmosphere to the amount of water vapour required to saturate the same volume at same temperature.

The ratio is multiplied by 100 to express the relative humidity in percentage.

- Relative humidity is measured by Hygrometer.
- Relative humidity increases with the increase of temperature.

**Air conditioning**: For healthy and favourable atmosphere of human being, the conditions are as follows:

1. **Temperature**: from 23°C to 25°C.
2. **Relative humidity**: from 60% to 65%.
3. **Speed of air**: from 0.75 meter/minute to 2.5 meter/minute.

**Thermodynamics**

First law of thermodynamics: Heat energy given to a system is used in the following two ways:

1. In increasing the temperature and hence internal energy of the system.
2. In doing work by the system.

If \( \Delta Q \) = heat energy given to the system

\( \Delta U \) = Increase in the internal energy of the system.

\( \Delta W \) = work done by the system

Then, \( \Delta Q = \Delta U + \Delta W \) is the mathematical statement of first law of thermodynamics.
Laws of reflection
1. The incident ray, reflected ray and normal to the reflecting surface at the incident point all lie in the same plane.
2. The angle of reflection is equal to the angle of incidence.

Reflection from plane mirror
1. The image is virtual, laterally inverted.
2. The size of image is equal to that of object.
3. The distance of image from the mirror is equal to the distance of object from the mirror.
4. If an object moves towards (or away from) a plane mirror with speed \( v \), the image moves towards (or away) with a speed \( 2v \) relative to the object.
5. If a plane mirror is rotated by an angle \( \theta \), keeping the incident ray fixed, the reflected ray is rotated by an angle \( 2\theta \).
6. To see his full image in a plane mirror, a person requires a mirror of at least half of his height.
7. If two plane mirrors are inclined to each other at an angle \( \theta \) the number of images \( n \) of a point object formed is determined as follows:
   - If \( \frac{360}{\theta} \) is even integer, then \( n = \frac{360}{\theta} - 1 \)
   - If \( \frac{360}{\theta} \) is odd integer,
     then \( n = \frac{360}{\theta} - 1 \) if the object is symmetrically placed, and
     \( n = \frac{360}{\theta} \) if the object is not symmetrically placed.
   - If \( \frac{360}{\theta} \) is a fraction then \( n \) is equal to integral part.

Reflection from spherical mirror
Spherical mirrors are of two types: 1. Concave mirror and 2. Convex mirror

Position & nature of image formed by a spherical mirror

<table>
<thead>
<tr>
<th>Position of object</th>
<th>Position of image</th>
<th>Size of image in comparison to object</th>
<th>Nature of image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concave mirror</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At infinity</td>
<td>At Focus</td>
<td>Highly diminished</td>
<td>Real, inverted</td>
</tr>
<tr>
<td>Between infinity</td>
<td>Between focus and centre of curvature</td>
<td>Diminished</td>
<td>Real, inverted</td>
</tr>
<tr>
<td>and centre of</td>
<td></td>
<td>Of same size</td>
<td>Real, inverted</td>
</tr>
<tr>
<td>curvature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At centre of</td>
<td>At centre of</td>
<td>Enlarged</td>
<td>Real, inverted</td>
</tr>
<tr>
<td>curvature</td>
<td>curvature and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>infinity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between focus and</td>
<td>Behind the mirror</td>
<td>Enlarged</td>
<td>Virtual, erect</td>
</tr>
<tr>
<td>pole</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convex mirror</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At infinity</td>
<td>At Focus</td>
<td>Highly diminished</td>
<td>Virtual, erect</td>
</tr>
<tr>
<td>In front of mirror</td>
<td>Between pole and focus</td>
<td>Diminished</td>
<td>Virtual, erect</td>
</tr>
</tbody>
</table>

Note: Image formed by a convex mirror is always virtual, erect and diminished.
Uses of Concave mirror:
1. As a shaving glass.
2. As a reflector for the head lights of a vehicle, search light.
3. In ophthalmoscope to examine eye, ear, nose by doctors.
4. In solar cookers.

Uses of Convex mirror:
1. As a rear view mirror in vehicle because it provides the maximum rear field of view and image formed is always erect.
2. In sodium reflector lamp.

Refraction of light: When a ray of light propagating in a medium enters the other medium, it deviates from its path. This phenomenon of change in the direction of propagation of light at the boundary when it passes from one medium to another medium is called refraction of light.

When a ray of light enters from rarer medium to denser medium (as from water to glass) it deviates towards the normal drawn on the boundary of two media at the incident point. Similarly in passing from denser to rarer medium, a ray deviates away from the normal. If light is incident normally on the boundary i.e. parallel to normal, it enters the second medium undeviated.

Laws of refraction
1. Incident ray, refracted ray and normal drawn at incident point always lie in the same plane.
2. Snell's law: For a given colour of light, the ratio of sine of angle of incidence to the sine of angle of refraction is a constant, 
   \[ \frac{\sin i}{\sin r} = \mu_2 \text{ (constant)} \]
   This constant \(\mu_2\) is called refractive index of second medium with respect to the first medium.

> Absolute refractive index of a medium is defined as the ratio of speed of light in free space (vacuum) to that in the given medium.
   
i.e. absolute refractive index \(\mu\) = \(\frac{\text{Speed of light in vacuum}}{\text{Speed of light in the medium}}\)

> The refractive index of a medium is different for different colours. The refractive index of a medium decreases with the increase in wavelength of light. Hence the refractive index of a medium is maximum for violet colour of light and minimum for red colour of light.
> The refractive index of a medium decreases with the increase in temperature. But this variation is very small.
> When a ray of light enters from one medium to other medium, its frequency and phase don’t change but wavelength and velocity change.

Some illustrations of Refraction
1. Bending of a linear object when it is partially dipped in a liquid inclined to the surface of the liquid.
2. Twinkling of stars.

3. Oval shape of sun in the morning and evening.
4. An object in a denser medium when seen from a rarer medium appears to be at a smaller distance.
   This is way (a) A fish in a pond when viewed from air appears to be at a smaller depth than the actual depth (b) A coin at the base of a vessel filled with water appears raised.

Critical angle: In case of propagation of light from denser to rarer medium through a plane boundary, critical angle is the angle of incidence for which angle of refraction is 90°.

Total Internal Reflection: If light is propagating from denser medium towards the rarer medium and angle of incidence is more than critical angle, then the light incident on the boundary is reflected back in the denser medium, obeying the laws of reflection. This phenomenon is called total internal reflection as total light energy is reflected, no part is absorbed or transmitted.
   > For total internal reflection,
     1. Light must be propagating from denser to rarer medium.
     2. Angle of incidence must exceed the critical angle.

Illustrations of total internal reflection
1. Sparkling of diamond
2. Mirage and looming.
3. Shining of air bubble in water.
4. Increase in duration of sun's visibility: The sun becomes visible even before sun rise and remains visible even after sunset due to total internal reflection of light.
5. Shining of a smoked ball or a metal ball on which lamp soot is deposited when dipped in water.
6. Optical Fibre: Optical fibre consists of thousands of strands of a very fine quality glass or quartz (of refractive index 1.7), each strand coated with a layer of material of lower refractive index (1.5). In it, light is propagated along the axis of fibre through multiple total internal reflection, even though the fibre is curved, without loss of energy.

Applications:
1. For transmitting optical signals and the two dimensional pictures.
2. For transmitting electrical signals by first converting them to light.
3. For visualising the internal sites of the body by doctors in endoscopy.

Refraction of Light Through Lens
> Lens is a section of transparent refractive material of two surfaces of definite geometrical shape of which one surface must be spherical. Lens is generally of two types:
   1. Convex lens
   2. Concave lens.
   > When a lens is thicker at the middle than at the edges, it is called a convex lens or a converging lens. When the lens is thicker at the edges than in the middle, it is called as concave lens or diverging lens.
Some terms regarding a lens.

Convex Lens

Concave Lens

O – optical Centre
C₁C₂ – Principal axis
F₁ – First Focus
F₂ – Second Focus

Power of a lens

Power of a lens is its capacity to deviate a ray. It is measured as the reciprocal of the focal length in meters, i.e. \( P = \frac{1}{f} \).

SI Unit of power is dioptre (D).

Power of a convex lens is positive and that of a concave lens is negative.

If two lenses are placed in contact, then the power of combination is equal to the sum of powers of individual lenses.

Change in the power of a lens: If a lens is dipped in a liquid, its focal length and power both change. This change depends upon the refractive indices of lens and the liquid. If a lens of refractive index \( \mu \) is dipped in a liquid of refractive index \( \mu' \), then the following three situations are possible:

1. \( \mu > \mu' \): i.e. lens is dipped in a liquid of smaller refractive index like a lens of glass (\( \mu = 1.5 \)) is dipped in water (\( \mu' = 1.33 \)), then the focal length of the lens increases and the power of the lens decreases.

2. \( \mu = \mu' \): i.e. lens is dipped in a liquid of equal refractive index then the focal length of the lens becomes infinite i.e. its power becomes zero. The lens and the liquid behave as a single medium.

3. \( \mu < \mu' \): i.e. lens is dipped in a liquid of higher refractive index the focal length decreases as well as the nature of the lens also changes i.e. convex lens behaves as concave lens and vice-versa. For example, an air bubble trapped in water or glass appears as convex but behaves as concave lens. Similarly a convex lens of glass (\( \mu = 1.5 \)) when dipped in carbon disulphide (\( \mu' = 1.68 \)), it behaves as a concave lens.

Formation of images by lenses

<table>
<thead>
<tr>
<th>Position of object</th>
<th>Position of image</th>
<th>Size of image</th>
<th>Nature of image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convex Lens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At infinity</td>
<td>At focus</td>
<td>Highly diminished</td>
<td>Real, inverted</td>
</tr>
<tr>
<td>Beyond 2F</td>
<td>Between F and 2F</td>
<td>Of same size</td>
<td>Real, inverted</td>
</tr>
<tr>
<td>At 2F</td>
<td>2F</td>
<td>Highly enlarged</td>
<td>Real, inverted</td>
</tr>
<tr>
<td>At F</td>
<td>Beyond 2F</td>
<td>Enlarged</td>
<td>Real, inverted</td>
</tr>
<tr>
<td>Between F and 2F</td>
<td>Beyond 2F</td>
<td>Highly enlarged</td>
<td>Real, inverted</td>
</tr>
<tr>
<td>At optical centre</td>
<td>The same side as in the object</td>
<td>Virtual and erect</td>
<td></td>
</tr>
</tbody>
</table>

Concave Lens

At infinity

Between lens and focus

Highly diminished

Virtual and erect

Dispersion of Light: When a ray of white light (or a composite light) is passed through a prism, it gets split into its constituent colours. This phenomenon is called dispersion of light. The coloured pattern obtained on a screen after dispersion of light is called spectrum.

- The dispersion of light is due to different deviation suffered by different colours of light. The deviation is maximum for violet colour and minimum for red colour of light. The different colours appeared in the spectrum are on the following order; violet, indigo, blue, green, yellow, orange and red. (VIBGYOR)

- The dispersion of light is due to different velocities of light of different colours in a medium. As a result, the refractive index of a medium is different for different colours of light.

- The velocity of light in a medium is maximum for that colour for which refractive index is minimum. Clearly, the velocity of violet colour of light is minimum in a medium and retroactive index of that medium is maximum for violet colour. Similarly, the velocity of light in a medium is maximum for red colour and refractive index of that medium is minimum for red colour.

Rainbow: Rainbow is the coloured display in the form of an arc of a circle hanging in the sky observed during or after a little drizzle appearing on the opposite side of sun. Rainbow is formed due to dispersion and refraction of sunlight by the suspended water droplets.

Rainbow is of two types:

1. Primary rainbow
2. Secondary rainbow

Primary rainbow is formed due to two refractions and one total internal reflection of light falling on the raindrops. In the primary rainbow, the red colour is on the convex side and violet on the concave side. Primary rainbow has an angular width of 2° at an average angle of elevation of 41°.

Secondary rainbow is formed due to two refractions and two internal reflections of light falling on rain drops. The order of colour on the secondary rainbow is of light falling on rain drops. The order of colour is red, orange, yellow, green, blue, indigo, and violet. Secondary rainbow has an angular width of 3.5° at an average elevation of 52.75°. Secondary rainbow is less intense than primary rainbow.

Theory of Colours: Colour is the sensation perceived by the cones in the eye due to light.

Primary Colours: The spectral colours blue, green and red are called primary colours because all the colours can be produced by mixing these in proper proportion.

Blue + Red + Green = White

Secondary Colours: The colour produced by mixing any two primary colours is called a secondary colour. There are three secondary colours yellow, magenta and cyan as
Complementary Colours: Any two colours when added produce white light, are said to be complementary colours. Clearly a secondary colour and the remaining primary colour are complementary colours. Red and cyan, blue and yellow and green and magenta are complementary of each other.

- The different colours and their mixtures are shown by the colour triangle.
- In coloured television, the three primary colours are used.

Colour of bodies: The colour of a body is the colour of light which it reflects or transmits. An object is white, if it reflects all the components of white light and it is black if it absorbs all the light incident over it. This is why a red rose appears red when viewed in white or red light but appears black when viewed in blue or green light.

- How a body will appear in light of different colour can be understood by the following table

<table>
<thead>
<tr>
<th>Name of object</th>
<th>In white light</th>
<th>In red light</th>
<th>In green light</th>
<th>In yellow light</th>
<th>In blue light</th>
</tr>
</thead>
<tbody>
<tr>
<td>White paper</td>
<td>White</td>
<td>Red</td>
<td>Green</td>
<td>Yellow</td>
<td>Blue</td>
</tr>
<tr>
<td>Red paper</td>
<td>Red</td>
<td>Red</td>
<td>Black</td>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td>Green paper</td>
<td>Green</td>
<td>Black</td>
<td>Black</td>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td>Yellow paper</td>
<td>Yellow</td>
<td>Black</td>
<td>Black</td>
<td>Yellow</td>
<td>Black</td>
</tr>
<tr>
<td>Blue paper</td>
<td>Blue</td>
<td>Black</td>
<td>Black</td>
<td>Black</td>
<td>Blue</td>
</tr>
</tbody>
</table>

Scattering of light: When light waves fall on small objects such as dust particles, water particles in suspension, suspended particles in colloidal solution, they are thrown out in all directions. This phenomenon is called scattering of light.

- Scattering of light is maximum in case of violet colour and minimum in case of red colour of light.
- The brilliant red colour of rising and setting sun is due to scattering of light.

Interference of light: When two light waves of exactly the same frequency and a constant phase difference travel in the same direction and superimpose then the resultant intensity in the region of superposition is different from the sum of the intensity of the two waves. This modification in the intensity of light in the region of superposition is called interference of light. Interference is of two types:

1. Constructive interference
2. Destructive interference

Constructive interference: At some points, where the two waves meet, there is interference such that the phase difference is zero.

Destructive interference: At other points, where the two waves meet in opposite phase, the intensity is maximum. Such interference is called destructive interference.

Diffraction of light: When light waves fall on a small sized obstacle or a small aperture whose dimension is comparable to the wavelength of light, then there is a departure from the rectilinear propagation and light energy flares out into a divergent beam. The spreading of light energy beyond the limit prescribed by rectilinear propagation of light is called diffraction of light. In other words, diffraction is the process by which a beam of light or other systems of wave spread out as a result of passing through a narrow opening or across an edge.

Polarisation of light: Polarisation is the only phenomenon which proves that light is a transverse wave. Light is an electromagnetic wave in which electric and magnetic field vectors vibrate perpendicular to each other and also perpendicular to the direction of propagation. In ordinary light, the vibrations of electric field vector are in every plane perpendicular to the direction of propagation of wave. Polarisation is the phenomenon of restricting the vibrations of a light in a particular direction in a plane perpendicular to the direction of propagation of wave.

- The visible effect of light is only due to electric field vector.

Human Eye

- Least distance of distinct vision is 25 cm.

Defects of human eye and the remedies:

1. Myopia or short sightedness: A person suffering from myopia can see the near objects clearly while far objects are not clear.
   - Causes: 1. Elongation of eye ball along the axis.
             2. Shortening of focal length of eye lens.
             3. Over stretching of ciliary muscles beyond the elastic limit.
   - Remedy: Diverging lens is used.

2. Hyperopia or hypermetropia or longsightedness: A person suffering from hypermetropia can see the distant objects clearly but not the near objects.
   - Causes: 1. Shortening of eye ball along the axis.
             2. Increase in the focal length of eye lens.
             3. Stiffening of ciliary muscles.
   - Remedy: A converging lens is used.

3. Presbyopia: This defect is generally found in elderly persons. Due to stiffening of ciliary muscles, eye loses much of its accommodating power. As a result, distant as well as nearby objects can not be seen.
   - For its remedy two separate lenses or a bifocal lens is used.

4. Astigmatism: This defect arises due to difference in the radius of curvature of the cornea in different planes. As a result rays from an object in one plane are corneal in the different planes. As a result rays from an object in one plane are corneal in the different planes. For its remedy cylindrical lens is used. It is brought to focus by eye in another plane. For its remedy cylindrical lens is the one that is used, brought to focus by eye in another plane. For its remedy cylindrical lens is used.
   - There are two kinds of vision cells in the retina. They are called rods and cones. Rods distinguish colour of light.
   - Cones distinguish colour of light.

Simple microscope: This is simply a convex lens of small focal length. The object to be enlarged is placed within the focus of lens.

Magnifying power of a simple microscope is given as

\[ M = 1 + \frac{D}{f} \]

where \( D = 25 \text{ cm} \), \( f \) = focal length of lens.
15. Static Electricity

When two bodies are rubbed together, they acquire the property of attracting light objects like small bits of paper, dust particles etc. The bodies which acquire this property are said to be electrified or charged with electricity.

Charge: Charge is the basic property associated with matter due to which it produces and experiences electrical and magnetic effects.

- Benjamin Franklin named the two types of charges as positive and negative.
- Similar charges repel each other and opposite charges attract each other.
- Charging of bodies takes place due to transfer of electrons from one body to another.

A list of materials has been given below. The list is such that any of the material in the list will be positively charged when rubbed with any other material coming later in the list. The other material will naturally be negatively charged.

|--------|------------|------------|---------------|

Surface density of charge: Surface density of charge is defined as the amount of charge per unit area on the surface of conductor.

- The surface density of charge at a point on the surface of conductor depends upon the shape of conductor and presence of other conductors or insulators near the given conductor.

- The surface density of charge at any part of the conductor is inversely proportional to the radius of curvature of the surface of that part.
- This is why surface density of charge in maximum at the pointed parts of the conductor.

Conductor: Conductors are those materials which allow electricity (charge) to pass through themselves. Good conductors have loosely bound electrons.

Examples: (a) Metals like silver, iron, copper (b) Earth (especially the moist part) acts like a huge conductor.

- Silver is the best conductor.

Insulator or Dielectric: Insulators are those materials which do not allow electricity to flow through themselves.

Examples: Wood, paper, mica, glass, ebonite.

Coulomb's law: According to Coulomb's law, the force of attraction or repulsion between two point charges at rest is directly proportional to the product of the magnitudes of the charges and inversely proportional to the square of the distance between them. This force acts on the line joining the two charges.

Electric Field: Region in space around a charge or charged body where the charge has its electrical effect is called electric field of the charge.

Electric Field Intensity: Electric field intensity at a point in an electric field is the force experienced by a unit positive charge placed at that point.

Electric Field of hollow conductor

Electric field intensity inside a charged hollow conductor is zero. Charge given to such a conductor (or conductor of any shape) remains on its surface only.

This explains why a hollow conductor acts as an electrostatic shield. It is for this reason that it is safer to sit in a car or bus during lightning.

Electric Potential: Electric potential at a point in an electric field is the work done in bringing a unit positive charge from infinity to that point.

- SI unit of electric potential is volt. It is a scalar quantity.
- Potential Difference: Work done in bringing a unit positive charge from one point to another point is the potential difference between the two points. Its SI unit is volt and is a scalar quantity.

Electric Capacity: Electric capacity of a conductor is defined as the charge required to increase the potential of the conductor by unity. If potential of a conductor is increased by V when a charge Q is given to it, capacity of the conductor is \( \frac{Q}{V} \). Its SI unit is farad (F).

Electrochemical Cell: Electrochemical cell is a device which converts chemical energy into electrical energy.

Cells are basically of two types: 1. Primary cell 2. Secondary cell.

Primary Cell: In primary cell electrical energy is obtained from the irreversible chemical reaction taking inside the cell. After complete discharge, primary cell becomes unserviceable.

Examples: Voltaic Cell, Leclanché Cell, Daniel Cell, Dry Cell etc.
Secondary Cell: A secondary cell is that which has to be charged at first from an external electric source and then can be used to draw current. Such cells are rechargeable.

- Production of electricity by chemical reaction was first discovered by Allessandro de volta (voltaic cell is named after him) in 1794. In voltaic cell zinc rod is used as cathode and copper rod is used as anode. These rods are placed in sulphuric acid kept in a glass vessel.
- In a Leclanche cell, carbon rod acts as anode and zinc rod acts as cathode. These rods are placed in ammonium chloride kept in a glass vessel.
- The emf of Leclanche cell is 1.5 volt.
- Leclanche cell is used for intermittent works, i.e., works in which continuous electrical energy is not required like electric bell.
- In a dry cell, mixture of MnO₂, NH₄Cl and carbon is kept in a zinc vessel. A carbon rod is placed in the mixture which acts as anode. The zinc vessel itself acts as cathode. The emf of dry cell is 1.5 volt.

16. Current Electricity

Electric Current: Electric current is defined as the rate of flow of charge or charge flowing per unit time interval. Its direction is the direction of flow of positive charge. Its SI unit is ampere (A). It is a scalar quantity.

- A current of one ampere flowing through a conductor means $6.25 \times 10^{18}$ electrons are entering at one end or leaving the other end of the conductor in one second.

Resistance: The opposition offered by a conductor to the flow of current through it is called resistance. It arises due to collisions of drifting electrons with the core ions. Its SI unit is ohm.

Ohm's law: If physical conditions like temperature, intensity of light etc. remain unchanged then electric current flowing through a conductor is directly proportional to the potential difference across its ends. If $V$ is the potential difference across the ends of a conductor and $I$ is the current through it, then according to Ohm's law $V = IR$

where $R$ is a constant called resistance of conductor.

Ohmic Resistance: The resistances of such conductors which obey ohm's law are called ohmic resistance. For example resistance of manganese wire.

Non ohmic resistance: The resistances of such materials which do not obey Ohm's law are called non-ohmic resistance.

Example: Resistance of diode valve, resistance of triode valve.

Conductance: Reciprocal of resistance of a conductor is called its conductance. i.e., conductance $= \frac{1}{\text{Resistance}}$

It is denoted by $G$ and $(G = \frac{1}{R})$

Its SI unit is ohm⁻¹ (also called mho or siemen.)

- The resistance of a conductor is directly proportional to its length and inversely proportional to its cross sectional area. i.e., if $l$ and $A$ are respectively length and cross sectional area of a conductor and $R$ is its resistance then $R = \frac{l}{A}$ or $R = \rho \frac{l}{A}$, where $\rho$ is a constant of material of conductor called specific resistance or resistivity. Its SI unit is ohm meter.

Specific conductance or conductivity: The reciprocal of resistivity of a conductor is called its conductivity (s). Its SI unit is mhos/m or siemen/meter (sm⁻¹).

Combination of Resistance: Various resistances can be combined to form a network mainly in two ways: 1. Series combination 2. Parallel combination.

- In series combination, the equivalent resistance is equal to the sum of the resistances of individual conductors. $(R = R_1 + R_2 + \ldots + \frac{1}{R_n})$
- In parallel combination, the reciprocal of equivalent resistance is equal to the sum of the reciprocals of individual resistances.

Electric Power: The rate at which electrical energy is consumed in a circuit is called electric power. Its SI unit is watt.

Kilowatt hour: It is the unit of energy and is equal to the energy consumed in the circuit at the rate of 1 kilowatt (1000 J/s) for 1 hour.

1 kilowatt hour = $3.6 \times 10^6$ joule

1 kWh is also called the unit of energy consumption.

Ammeter: Ammeter is a device used to measure electric current in a circuit. It is connected in series in the circuit.

- The resistance of an ideal ammeter is zero.

Voltmeter: Voltmeter is a device used to measure the potential difference between two points in a circuit. It is connected in parallel to the circuit.

- The resistance of an ideal voltmeter is infinite.

Electric Fuse: Electric fuse is a protective device used in series with an electric appliance to save it from being damaged due to high current. In general, it is a small conducting wire of alloy of copper, tin and lead having low melting point.

- Pure fuse is made up of tin.

Galvanometer: Galvanometer is a device used to detect and measure small electric current in a circuit. It can measure current up to $10^{-6}$ A.

Shunt: Shunt is a wire of very small resistance.

- A galvanometer can be converted into an ammeter by connecting a shunt in parallel to it.
- A galvanometer can be converted into a voltmeter by connecting a very high resistance in its series.

Electromagnetic induction: Whenever there is change of magnetic flux linked with a circuit, an emf is induced in the circuit. This phenomenon is called electromagnetic induction. The emf so developed is called induced emf and the current generated (if circuit is closed) is called induced current.

Direction of induced current is determined with the help of Fleming's right hand rule or Lenz law.
Transformer: Transformer is a device which converts low voltage A.C. into high voltage A.C. and high voltage A.C. into low voltage A.C. It is based on electromagnetic induction and can be used only in case of alternating current.

A.C. Dynamo (or generator): It is device used to convert mechanical energy into electrical energy. It works on the principle of electro-magnetic induction.

Electric motor: It is a device which converts electrical energy into mechanical energy.

Microphone: It converts sound energy into electrical energy and works on the principle of electromagnetic induction. In other words, microphone is an instrument for changing sound waves into electrical energy which may then be amplified, transmitted or recorded.

The current generated in the power stations are alternating current having voltage 22000 volt or more. In grid substations, with the help of transformer, their voltage is increased up to 132000 volt to minimise loss of energy in long distance transmission.

17. Magnetism

Magnetism is the property displayed by magnets and produced by the movement of electric charges, which results in objects being attracted or pushed away.

Magnet is a piece of iron or other materials that can attract iron containing objects and that points north and south when suspended.

A magnet is characterized by following two properties:

1. Attractive property: A magnet attracts magnetic substances like iron, cobalt, nickel and some of their alloys like magnetite (Fe3O4).
2. Directive property: When a magnet is freely suspended, it aligns itself in the geographical north south direction.

A magnet may be 1. Natural 2. Artificial.

Natural magnet is oxide of iron. But due to irregular shape, weak magnetism and high brittleness, natural magnets find no use in the laboratory.

The magnets made by artificial methods are called artificial magnets or manmade magnets. They may be of different types like bar magnet, horse shoe magnet, Robinson's ball ended magnet, magnetic needle, electromagnet etc.

The two points near the two ends of a magnet where the attracting capacity is maximum are called magnetic poles. When a magnet is freely suspended, its one pole always directs towards the north. This pole is called north pole. The other pole is called south pole.

The imaginary line joining the two poles of a magnet is called magnetic axis of the magnet.

Similar poles repel each other and dissimilar poles attract each other.

When a magnetic substance is placed near a magnet, it gets magnetised due to induction.

Magnetic Field: Region in space around a magnet where the magnet has its magnetic effect is called magnetic field of the magnet.

Intensity of magnetic field or magnetic flux density: Magnetic flux density of a point in a magnetic field is the force experienced by a north pole of unit strength placed at that point. Its SI unit is newton/ampere-meter or weber/meter² or tesla (T).

Magnetic lines of force: The magnetic lines of force are imaginary curves which represent a magnetic field graphically. The tangent drawn at any point on the magnetic lines of force gives the direction of magnetic field at that point.

Properties of magnetic lines of force:
1. Magnetic lines of force are closed curves. Outside the magnet they are from north to south pole and inside the magnet they are from south to north pole.
2. Two lines of force near intersect each other.
3. If the lines of force are crowded, the field is strong.
4. If the lines of force are parallel and equidistant, the field is uniform.

Magnetic Substance: On the basis of magnetic behavior, substances can be divided into three categories.

1. Diamagnetic substance: Diamagnetic substances are such substances which when placed in a magnetic field, acquire feeble magnetism opposite to the direction of magnetic field.

Examples: Bismuth, Zinc, Copper, Silver, Gold, Diamond, Water, Mercury, Water etc.

2. Paramagnetic Substance: Paramagnetic substances are such substances which when placed in a magnetic field acquire a feeble magnetism in the direction of the field.

Examples: Aluminum, Platinum, Manganese, Sodium, Oxygen etc.

3. Ferromagnetic substance: Ferromagnetic substances are those substances, which when placed in a magnetic field, are strongly magnetised in the direction of field.

Examples: Iron, Cobalt, Nickel etc.

Domain: Atoms of ferromagnetic substance have a permanent dipole moment i.e. they behave like a very small magnet. The atoms form a large no. of effective regions called domain in which 10¹⁰ to 10¹¹ atoms have their dipole moment aligned in the same direction. The magnetism in ferromagnetic substance, when placed in a magnetic field, is developed due to these domain by 1. the displacements of boundaries of the domains 2. the rotation of the domains.

Curie Temperature: As temperature increases, the magnetic property of ferromagnetic substance decreases and above a certain temperature the substance changes into paramagnetic substance. This temperature is called Curie temperature.

Permanent magnets are made of steel, cobalt steel, ticonal, alcomoax and alnico.

Electromagnets, cores of transformers, telephone diaphragms, armatures of dynamos and motors are made of soft iron, mu-metal and stally.

Terrestrial Magnetism: Our earth behaves as a powerful magnet whose magnetic field of earth at a place is described in the geographical south pole. The magnetic field of earth at a place is described in terms of following three elements.

1. Declination: The acute angle between magnetic meridian and geographical
18. Atomic & Nuclear Physics

Atomic Physics

> Atom is the smallest part of matter which takes part in chemical reactions. Atoms of the same element are similar in mass, size, and characteristics. Atom consists of three fundamental particles: electron, proton, and neutron. All the protons and neutrons are present in the central core of atom called nucleus. Electrons revolve around the nucleus.

> In an atom, electrons and protons are equal in number and have equal and opposite charge. Hence atom is neutral.

<table>
<thead>
<tr>
<th>Particle</th>
<th>Mass (Kg)</th>
<th>Charge (Coulomb)</th>
<th>Discoverer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proton</td>
<td>1.672 x 10^-27</td>
<td>+1.6 x 10^-19</td>
<td>Rutherford</td>
</tr>
<tr>
<td>Neutron</td>
<td>1.675 x 10^-27</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Electron</td>
<td>9.108 x 10^-31</td>
<td>-1.6 x 10^-19</td>
<td>J.J. Thomson</td>
</tr>
</tbody>
</table>

Note: Proton was discovered by Golsin and named by Rutherford.

Properties of Canal rays:

1. The positive rays consist of positively charged particles.
2. These rays travel in straight line.
3. These rays can exert pressure and thus possess kinetic energy.
4. These rays are deflected by electric and magnetic fields.
5. These rays are capable of producing physical and chemical changes.
6. These rays can produce ionisation in gases.

Radioactivity

> Radioactivity is the sending out of harmful radiation or particles, caused when atomic nuclei break up spontaneously.

> Radioactivity was discovered by Henry Becquerel, Madame Curie, and Pierre Curie for which they jointly win Nobel prize.

> The nucleus having protons 83 or more are unstable. They emit α, β, and γ particles and become stable. The elements of such nucleus are called radioactive elements and the phenomenon of emission of α, β, and γ particles is called radioactivity.

> γ rays are emitted after the emission of α and β rays.

> Robert Pierre and his wife Madame Curie discovered a new radioactive element radium.

> The rays emitted by radioactivity were first recognised by Rutherford.

> The end product of all natural radioactive element after emission of radioactive rays is lead.
Nuclear Fission: The nuclear reaction in which a heavy nucleus splits into two nuclei of nearly equal mass is nuclear fission. The energy released in the nuclear fission is called nuclear energy.

> Nuclear fission was first demonstrated by Strassmann and O. Hahn. They found that when $^{235}_92$U nucleus is excited by the capture of a neutron, it splits into two nuclei $^{142}_58$Ba and $^{92}_38$Kr.

Chain Reaction: When uranium atom is bombarded with slow neutrons, fission takes place. With the fission of each uranium nucleus, the average 3 neutrons and large energy is released. These neutrons cause further fission. Clearly a chain of fission of uranium nucleus starts which continues till whole of uranium is exhausted. This is called chain reaction.

Chain reaction is of the following two types 1. Uncontrolled chain reaction 2. Controlled chain reaction.

Uncontrolled Chain Reaction: In each fission reaction, three more neutrons are produced. These three neutrons may cause the fission of three other $^{235}_92$U nuclei producing 9 neutrons and so on. As a result the number of neutron goes on increasing till the whole of fissionable material is consumed. This chain reaction is called uncontrolled or explosive chain reaction. This reaction proceeds very quickly and a huge amount of energy is liberated in a short time.

Atom bomb: Atom bomb is based on nuclear fission. $^{235}_92$U and $^{239}_92$Pu are used as fissionable material. This bomb was first used by USA against Japan in second world war (6th August, 1945 at Hiroshima & 9th August, 1945 at Nagasaki).

Controlled Chain Reaction: A fission chain reaction which proceeds slowly without any explosion and in which the energy released can be controlled is known as controlled reaction. Actually in this situation only one of the neutrons produced in each fission is able to cause further fission. In controlled chain reaction, the rate of reaction remains constant.

Nuclear Reactor or Atomic Pile: Nuclear reactor is an arrangement in which controlled nuclear fission reaction takes place.

> First nuclear reactor was established in Chicago University under the supervision of Prof. Fermi.

> There are several components of nuclear reactor which are as follows:

1. Fissionable Fuel: $^{235}_92$U or $^{239}_92$Pu is used.
2. Moderator: Moderator decreases the energy of neutrons so that they can be further used for fission reaction. Heavy water and graphite are used as moderator.
3. Control rod: Rods of cadmium or boron are used to absorb the excess neutrons produced in fission of uranium nucleus so that the chain reaction continues to be controlled.
4. Coolant: A large amount of heat is produced during fission. Coolant absorbs that heat and prevents excessive rise in the temperature. The coolant may be water, heavy water ($D_2O$ – deuterium ($^2H^1$) is an isotope of hydrogen), or a gas like He or $CO_2$.
Uses of nuclear reactor
1. To produce electrical energy from the energy released during fission.
2. To produce different isotopes which can be used in medical, physical and agriculture science.

Fast Breeder Reactor: A nuclear reactor which can produce more fissionable fuel than it consumes is called a fast breeder reactor.

Nuclear Fusion: When two or more light nuclei combined together to form a heavier nucleus, tremendous energy is released. This phenomenon is called nuclear fusion. A typical example of nuclear fission is $\text{H}_2^+ + \text{H}_3^+ \rightarrow \text{He}^+ + \alpha + \text{He}^+$ where $\alpha$ is the nucleus of helium.

> The energy released by sun and other stars is by nuclear fusion.
> For the nuclear fusion, a temperature of the order of $10^8$ K is required.

Hydrogen bomb: Hydrogen bomb was made by American scientists in 1952. This is based on nuclear fusion. It is 1000 times more powerful than atom bomb.

Mass Energy Relation: In 1905 Einstein established a relation between mass and energy on the basis of special theory of relativity. According to this relation, mass can be converted into energy and vice versa, according to the relation $E = mc^2$ where $c$ is the velocity of light and $E$ is the energy equivalent of mass $m$.

> Albert Einstein was an American scientist. He was born in Germany. He was given Nobel Prize of Physics in 1921.

> Sun is continuously emitting energy. Earth is continuously receiving $4 \times 10^{16}$ joule of energy per second from sun. As a result mass of sun is decreasing at the rate of approximately $4 \times 10^{16}$ kg per second. But mass of sun is so large that it is estimated that the sun will continuously supply energy for next $10^{9}$ years.

19. Electronics

Electronics: Electronics is the branch of physics and technology concerned with the behaviour and movement of electrons.

Electron Emission:

In metals, the electrons from the outermost orbit of atom become free at room temp. However these free electrons cannot easily leave the surface of metals. For the free electrons to leave the metal surface, external energy is required. Electron emission can be achieved by the following methods.

1. Thermionic Emission: by heating the metal.
2. Photo-electric emission: By illuminating the metal surface with light (electromagnetic waves like ultraviolet rays) of suitable frequency. The electrons so emitted are called photo electrons.
3. Secondary emission: It is the electron emission when highly energetic electron beam is incident on a metal surface. The electron so emitted are called secondary electrons.
4. Field or cold emission: This is the process of electron emission by applying a strong electric field across the metal surface.

Diode Valve: Designed by J. A. Fleming in 1904, diode valve consists of two electrodes placed inside an evacuated glass envelope. One electrode is called anode which is made up of tungsten on which there is a thin layer of barium oxide. When heated, cathode emits electrons. These electron flow towards the other electrode called anode or plate, which is at positive potential. As a result an electric current is established in the circuit.

> The electrons emitted from the cathode are collected in the evaluated space around it. This collection of electrons is called space charge which is obviously negative.
> Diode valve acts as a rectifier. Rectifier is a device which converts alternating voltage (current) into direct voltage (current).

Triode Valve: Designed by Lee de Forest in 1907, triode valve is a modified form of usual diode. It consists of a usual anode-cathode pair and one more electrode called control grid.

> Triode valve can be used as amplifier, oscillator, transmitter and detector.

Semi-conductor: Semi conductor are those materials whose electrical conductivity, at room temperature, lies in between that of insulator and conductor. Germanium and Silicon are two important semiconductors. In a crystal lattice of semi-conductor, some of the electrons become free from bond formation. At the sites of these electrons a deficiency of electron exists which acts as a virtual positive charge. These virtual positive charges are called holes. Semi-conductors are used in electronics industry.

Semi-conductors are of two types:

1. Intrinsic Semi-Conductor: A semi conductor in an extremely pure form is known as intrinsic semi-conductor. At absolute zero, an intrinsic semi-conductor is a perfect insulator (conductivity = zero).
2. Extrinsic Semi-Conductor: If a measured and small amount of chemical impurity is added to intrinsic semi-conductor, it is called extrinsic semi-conductor or doped semi-conductor. As a result of doping, there is a large increase in its conductivity.

> Extrinsic semi-conductor are of two types:

(a) N type semi conductor: An extrinsic semi-conductor in which electrons are majority charge carrier is called N type semi conductor. Such a semi conductor with pentavalent impurity like Arsenic, Antimony & Phosphorus.

(b) P type semi conductor: An extrinsic semi-conductor in which holes are the majority charge carrier is called P type semi conductor. Such a semi conductor with trivalent impurity like Gallium, Indium, Boron and Aluminium.

Doping: Adding of chemical impurity to a pure semi conductor is called doping. The amount and type of impurity is closely controlled.

Donor: Pentavalent impurities are called donor.
Acceptor: Trivalent impurities are called acceptor.

> The electrical conductivity of a semi conductor increases with the increase in temperature.

Rectifier: Rectifier is a device which converts alternating current into direct current.

Nanotechnology: Study of science of small is called nanotechnology.
# 20. Scientific Instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altimeter</td>
<td>Measures altitudes (used in aircraft)</td>
</tr>
<tr>
<td>Ammeter</td>
<td>Measures strength of electric current</td>
</tr>
<tr>
<td>Anemometer</td>
<td>Measures force and velocity of wind and directions</td>
</tr>
<tr>
<td>Audiometer</td>
<td>Measures intensity of sound</td>
</tr>
<tr>
<td>Barograph</td>
<td>Continuous recording of atmospheric pressure</td>
</tr>
<tr>
<td>Barometer</td>
<td>Measures atmospheric pressure</td>
</tr>
<tr>
<td>Binoculars</td>
<td>To view distant objects</td>
</tr>
<tr>
<td>Bolometer</td>
<td>To measure heat radiation</td>
</tr>
<tr>
<td>Callipers</td>
<td>Measure inner and outer diameters of bodies</td>
</tr>
<tr>
<td>Calorimeter</td>
<td>Measures quantities of heat</td>
</tr>
<tr>
<td>Cardiogram (ECG)</td>
<td>Traces movements of the heart; recorded on a Cardiograph</td>
</tr>
<tr>
<td>Cathetometer</td>
<td>Determines heights, measurement of levels, etc., in scientific experiments</td>
</tr>
<tr>
<td>Chronometer</td>
<td>Determines longitude of a vessel at sea</td>
</tr>
<tr>
<td>Colorimeter</td>
<td>Compares intensity of colours</td>
</tr>
<tr>
<td>Commutator</td>
<td>To change/reverse the direction of electric current; Also used to convert AC into DC</td>
</tr>
<tr>
<td>Cryometer</td>
<td>A type of thermometer used to measure very low temperatures, usually close to 0°C</td>
</tr>
<tr>
<td>Cyclotron</td>
<td>A charged particle accelerator which can accelerate charged particles to high energies</td>
</tr>
<tr>
<td>Dilatometer</td>
<td>Measures changes in volume of substances</td>
</tr>
<tr>
<td>Dynamo</td>
<td>Converts mechanical energy into electrical energy</td>
</tr>
<tr>
<td>Electroencephalogram (EEG)</td>
<td>Measures and records electrical activity of brain</td>
</tr>
<tr>
<td>Electrometer</td>
<td>Measures very small but potential difference in electric currents</td>
</tr>
<tr>
<td>Electroscope</td>
<td>Detects presence of an electric charge</td>
</tr>
<tr>
<td>Electromicroscope</td>
<td>To obtain a magnifying view of very small objects; Capable of magnifying up to 20000 times</td>
</tr>
<tr>
<td>Endoscope</td>
<td>To examine internal parts of the body</td>
</tr>
<tr>
<td>Fathometer</td>
<td>Measures depth of the ocean</td>
</tr>
<tr>
<td>Fluxmeter</td>
<td>Measures magnetic ocean</td>
</tr>
<tr>
<td>Galvanometer</td>
<td>Measures electric current</td>
</tr>
<tr>
<td>Hydrometer</td>
<td>Measures the relative density of liquids</td>
</tr>
<tr>
<td>Hygrometer</td>
<td>Measures level of humidity</td>
</tr>
<tr>
<td>Hydrophone</td>
<td>Measures sound under water</td>
</tr>
<tr>
<td>Hygroscope</td>
<td>Shows the changes in atmospheric humidity</td>
</tr>
<tr>
<td>Hypsometer</td>
<td>To determine boiling point of liquids</td>
</tr>
<tr>
<td>Kymograph</td>
<td>Graphically records physiological movement. (e.g., blood pressure/heartbeat)</td>
</tr>
<tr>
<td>Lactometer</td>
<td>Measures the relative density of milk to determine purity</td>
</tr>
<tr>
<td>Machmeter</td>
<td>Determines the speed of an aircraft in terms of the speed of sound</td>
</tr>
<tr>
<td>Magnetometer</td>
<td>Measures magnetic moments of magnets and fields</td>
</tr>
<tr>
<td>Manometer</td>
<td>Measures pressure of gases</td>
</tr>
<tr>
<td>Micrometer</td>
<td>Measures distances/angles</td>
</tr>
<tr>
<td>Microscope</td>
<td>Converts sound waves into electrical vibrations</td>
</tr>
<tr>
<td>Microphone</td>
<td>To obtain a magnified view of small objects</td>
</tr>
<tr>
<td>Reflexometer</td>
<td>Measures the scattering of light by particles suspended in a liquid</td>
</tr>
<tr>
<td>Ohmmeter</td>
<td>To measure electrical resistance in ohms</td>
</tr>
<tr>
<td>Ondimeter</td>
<td>Measures the frequency of electromagnetic waves, especially in the radio-frequency band</td>
</tr>
<tr>
<td>Periscope</td>
<td>To view objects above sea level (used in submarines)</td>
</tr>
<tr>
<td>Photometer</td>
<td>Compares the luminous intensity of the source of light</td>
</tr>
<tr>
<td>Polygraph</td>
<td>Instrument that simultaneously records changes in physiological processes such as heartbeat, blood-pressure and respiration; used as a lie detector</td>
</tr>
<tr>
<td>Pyknometer</td>
<td>Determines the density and coefficient of expansion of liquids</td>
</tr>
<tr>
<td>Pyrheliometer</td>
<td>Measures components of solar radiation</td>
</tr>
<tr>
<td>Pyrometer</td>
<td>Measures very high temperature</td>
</tr>
<tr>
<td>Quadrant</td>
<td>Measures altitudes and angles in navigation and astronomy</td>
</tr>
<tr>
<td>Radar</td>
<td>To detect the direction and range of an approaching aeroplane by means of radio waves (Radio, Angle, Detection and Range)</td>
</tr>
<tr>
<td>Radio micrometer</td>
<td>Measures heat radiation</td>
</tr>
<tr>
<td>Refractometer</td>
<td>Measures refractive indices</td>
</tr>
<tr>
<td>Salinometer</td>
<td>Determines salinity of solutions</td>
</tr>
<tr>
<td>Sextant</td>
<td>Used by navigators to find the latitude of a place by measuring the elevation above the horizon of the sun or another star; also used to measure the height of very distant objects</td>
</tr>
<tr>
<td>Spectroscope</td>
<td>To observe or record spectra</td>
</tr>
<tr>
<td>Spectrometer</td>
<td>Spectroscope equipped with calibrated scale to measure the position of spectral lines (Measurement of refractive indices)</td>
</tr>
<tr>
<td>Spherometer</td>
<td>Measures curvature of spherical objects</td>
</tr>
<tr>
<td>Sphygmomanometer</td>
<td>Measures blood pressure</td>
</tr>
<tr>
<td>Stereoscope</td>
<td>To view two-dimensional pictures</td>
</tr>
<tr>
<td>Stethoscope</td>
<td>Used by doctors to hear and analyze heart and lung sounds</td>
</tr>
<tr>
<td>Stroboscope</td>
<td>To view rapidly moving objects</td>
</tr>
<tr>
<td>Tachometer</td>
<td>To determine speed, especially the rotational speed of a shaft (used in aeroplanes and motor-boats)</td>
</tr>
<tr>
<td>Instrument</td>
<td>Use</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tachometer</td>
<td>A theodolite adapted to measure distances, elevations and bearings during survey</td>
</tr>
<tr>
<td>Tangent</td>
<td>Measures the strength of direct current</td>
</tr>
<tr>
<td>Galvanometer</td>
<td>Records physical happenings at a distant place.</td>
</tr>
<tr>
<td>Telemeter</td>
<td>Receives and sends typed messages from one place to another</td>
</tr>
<tr>
<td>Telescope</td>
<td>To view distant objects in space</td>
</tr>
<tr>
<td>Thermometer</td>
<td>Measures Temperature</td>
</tr>
<tr>
<td>Thermostat</td>
<td>Regulates temperature at a particular point</td>
</tr>
<tr>
<td>Tonometer</td>
<td>To measure the pitch of a sound</td>
</tr>
<tr>
<td>Transponder</td>
<td>To receive a signal and transmit a reply immediately</td>
</tr>
<tr>
<td>Udometer</td>
<td>Rain gauge</td>
</tr>
<tr>
<td>Ultrasonoscope</td>
<td>To measure and use ultrasonic sound (beyond hearing); use to make an EOG to detect brain tumours, heart defects and abnormal growth</td>
</tr>
<tr>
<td>Venturimeter</td>
<td>To measure the rate of flow of liquids</td>
</tr>
<tr>
<td>Vernier</td>
<td>Measures small sub-division of scale</td>
</tr>
<tr>
<td>Viscometer</td>
<td>Measures the viscosity of liquid</td>
</tr>
<tr>
<td>Voltmeter</td>
<td>To measure electric potential difference between two points</td>
</tr>
<tr>
<td>Wattmeter</td>
<td>To measure the power of an electric circuit</td>
</tr>
<tr>
<td>Wavemeter</td>
<td>To measure the wavelength of a radiowave</td>
</tr>
</tbody>
</table>

### 21. Inventions

<table>
<thead>
<tr>
<th>Invention</th>
<th>Inventor</th>
<th>Country</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adding machine</td>
<td>Pascal</td>
<td>France</td>
<td>1642</td>
</tr>
<tr>
<td>Aeroplane</td>
<td>Wright brothers</td>
<td>USA</td>
<td>1903</td>
</tr>
<tr>
<td>Balloon</td>
<td>Jacques and Joseph Montgolfier</td>
<td>France</td>
<td>1783</td>
</tr>
<tr>
<td>Ball-point pen</td>
<td>C. Biro</td>
<td>Hungary</td>
<td>1858</td>
</tr>
<tr>
<td>Barometer</td>
<td>E. Torricelli</td>
<td>Italy</td>
<td>1844</td>
</tr>
<tr>
<td>Bicycle</td>
<td>K. Macmillan</td>
<td>Scotland</td>
<td>1839</td>
</tr>
<tr>
<td>Bicycle Tyre</td>
<td>J.B. Dunlop</td>
<td>Scotland</td>
<td>1888</td>
</tr>
<tr>
<td>Calculating machine</td>
<td>Pascal</td>
<td>France</td>
<td>1642</td>
</tr>
<tr>
<td>Centigrade scale</td>
<td>A. Celsius</td>
<td>France</td>
<td>1742</td>
</tr>
<tr>
<td>Cinematograph</td>
<td>Thomas Alva Edison</td>
<td>USA</td>
<td>1891</td>
</tr>
<tr>
<td>Computer</td>
<td>Charles Babbage</td>
<td>Britain</td>
<td>1834</td>
</tr>
<tr>
<td>Cine camera</td>
<td>Friese-Greene</td>
<td>Britain</td>
<td>1889</td>
</tr>
<tr>
<td>Cinema</td>
<td>A.L. and J.L. Lumiere</td>
<td>France</td>
<td>1895</td>
</tr>
<tr>
<td>Clock (mechanical)</td>
<td>Hsing and Ling-Tsian</td>
<td>China</td>
<td>1725</td>
</tr>
<tr>
<td>Clock (pendulum)</td>
<td>C. Huygens</td>
<td>Netherlands</td>
<td>1657</td>
</tr>
<tr>
<td>Diesel engine</td>
<td>Rudolf Diesel</td>
<td>Germany</td>
<td>1892</td>
</tr>
<tr>
<td>Dynamite</td>
<td>Alfred Nobel</td>
<td>Sweden</td>
<td>1867</td>
</tr>
</tbody>
</table>
22. Important Discoveries in Physics

<table>
<thead>
<tr>
<th>Discovery</th>
<th>Inventor</th>
<th>Country</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laws of motion</td>
<td>Newton</td>
<td>England</td>
<td>1687</td>
</tr>
<tr>
<td>Law of electrostatic attraction</td>
<td>Coulomb</td>
<td>England</td>
<td>1779</td>
</tr>
<tr>
<td>Atom</td>
<td>John Dalton</td>
<td>England</td>
<td>1808</td>
</tr>
<tr>
<td>Photography (On metal)</td>
<td>J. Neepse</td>
<td>England</td>
<td>1826</td>
</tr>
<tr>
<td>Law of Electric resistance</td>
<td>G.S. Ohm</td>
<td>England</td>
<td>1827</td>
</tr>
<tr>
<td>Law of floatation</td>
<td>Archimedes</td>
<td>England</td>
<td>1827</td>
</tr>
<tr>
<td>Electromagnetic Induction</td>
<td>Michael Faraday</td>
<td>England</td>
<td>1831</td>
</tr>
<tr>
<td>Photography (On paper)</td>
<td>W. Fox Talbot</td>
<td>England</td>
<td>1835</td>
</tr>
<tr>
<td>Dynamite</td>
<td>Alfred Nobel</td>
<td>England</td>
<td>1867</td>
</tr>
<tr>
<td>Periodic table</td>
<td>Mendelev</td>
<td>England</td>
<td>1888</td>
</tr>
<tr>
<td>X-Rays</td>
<td>Roentgen</td>
<td>England</td>
<td>1895</td>
</tr>
<tr>
<td>Radioactivity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electron</td>
<td>Henry Becquerel</td>
<td>England</td>
<td>1896</td>
</tr>
<tr>
<td>Radium</td>
<td>J.J. Thomson</td>
<td>England</td>
<td>1897</td>
</tr>
<tr>
<td>Quantum theory</td>
<td>Madam Curie</td>
<td>England</td>
<td>1898</td>
</tr>
<tr>
<td>Wireless Telegram</td>
<td>Max Planck</td>
<td>England</td>
<td>1900</td>
</tr>
<tr>
<td>Diode Bulb</td>
<td>Marconi</td>
<td>England</td>
<td>1901</td>
</tr>
<tr>
<td>Photo electric effect</td>
<td>Sir J. S. Fleming</td>
<td>England</td>
<td>1904</td>
</tr>
<tr>
<td>Principle of Relativity</td>
<td>Albert Einstein</td>
<td>England</td>
<td>1905</td>
</tr>
<tr>
<td>Triode Bulb</td>
<td>Albert Einstein</td>
<td>England</td>
<td>1905</td>
</tr>
<tr>
<td>Atomic Structure</td>
<td>Lee de Forest</td>
<td>England</td>
<td>1906</td>
</tr>
<tr>
<td></td>
<td>Neil Bohr &amp; Rutherford</td>
<td>England</td>
<td>1913</td>
</tr>
</tbody>
</table>

23. S.I. Units of Physical Quantity

<table>
<thead>
<tr>
<th>Quantity</th>
<th>SI</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>meter</td>
<td>m</td>
</tr>
<tr>
<td>Mass</td>
<td>kilogram</td>
<td>kg</td>
</tr>
<tr>
<td>Time</td>
<td>second</td>
<td>s</td>
</tr>
<tr>
<td>Work and Energy</td>
<td>joule</td>
<td>J</td>
</tr>
<tr>
<td>Electric current</td>
<td>ampere</td>
<td>A</td>
</tr>
<tr>
<td>Temperature</td>
<td>kelvin</td>
<td>K</td>
</tr>
<tr>
<td>Intensity of flame</td>
<td>candela</td>
<td>cd</td>
</tr>
<tr>
<td>Angle</td>
<td>radian</td>
<td>rad</td>
</tr>
<tr>
<td>Solid angle</td>
<td>steradian</td>
<td>sr</td>
</tr>
<tr>
<td>Force</td>
<td>newton</td>
<td>N</td>
</tr>
<tr>
<td>Area</td>
<td>square meter</td>
<td>m²</td>
</tr>
<tr>
<td>Volume</td>
<td>cubic meter</td>
<td>m³</td>
</tr>
<tr>
<td>Speed</td>
<td>meter per second</td>
<td>m/s</td>
</tr>
<tr>
<td>Angle Velocity</td>
<td>radian per second</td>
<td>rad s⁻¹</td>
</tr>
<tr>
<td>Frequency</td>
<td>Hertz</td>
<td>Hz</td>
</tr>
<tr>
<td>Moment of inertia</td>
<td>kilogram Square meter</td>
<td>kg m² s⁻¹</td>
</tr>
<tr>
<td>Momentum</td>
<td>kilogram meter per second</td>
<td>Kg m s⁻¹</td>
</tr>
<tr>
<td>Impulse</td>
<td>newton second</td>
<td>Ns</td>
</tr>
<tr>
<td>Angular Momentum</td>
<td>kilogram square meter per second</td>
<td>Kg m² s⁻¹</td>
</tr>
<tr>
<td>Pressure</td>
<td>pascal</td>
<td>Pa</td>
</tr>
<tr>
<td>Power</td>
<td>watt</td>
<td>W</td>
</tr>
<tr>
<td>Surface tension</td>
<td>newton second per square m.</td>
<td>N.s.m⁻²</td>
</tr>
<tr>
<td>Viscosity</td>
<td>watt per meter per degree celsius</td>
<td>Wm⁻¹°C⁻¹</td>
</tr>
<tr>
<td>Thermal Conductivity</td>
<td>joule per kilogram per Kelvin</td>
<td>J kg⁻¹ K⁻¹</td>
</tr>
<tr>
<td>Specific Heat capacity</td>
<td>joule</td>
<td>J</td>
</tr>
<tr>
<td>Electric charge</td>
<td>volt</td>
<td>V</td>
</tr>
<tr>
<td>Potential Difference</td>
<td>omm</td>
<td>Ω</td>
</tr>
<tr>
<td>Electric Resistance</td>
<td>farad</td>
<td>F</td>
</tr>
<tr>
<td>Electrical Capacity</td>
<td>henry</td>
<td>H</td>
</tr>
<tr>
<td>Magnetic Induction</td>
<td>weber</td>
<td>Wb</td>
</tr>
<tr>
<td>Magnetic Flux</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
24. Conversion of Units from One System to Another System

<table>
<thead>
<tr>
<th>Quantity</th>
<th>SI</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luminous Flux or photometric power</td>
<td>lumen</td>
<td>lumen</td>
</tr>
<tr>
<td>Intensity of illumination</td>
<td>lux</td>
<td>lux</td>
</tr>
<tr>
<td>Wave length</td>
<td>Angstrom</td>
<td>Ǻ</td>
</tr>
<tr>
<td>Astronomical distance</td>
<td>light year</td>
<td>ly</td>
</tr>
</tbody>
</table>

1. Introduction

Chemistry is the branch of science which deals with the composition of matter and also the physical and chemical characteristics associated with the different material objects.

A French chemist, Lavoisier (1743-1793) is regarded as the father of modern chemistry.

1. Substance and its nature: Anything that occupies space, possesses mass and can be felt by any one or more of our senses is called matter.

Early Indian Philosophers classified matter in the form of five basic elements the "Panch Tatava"—air, earth, fire, sky and water. According to them everything, living or non-living was made up of these five basic elements. Ancient Greek Philosophers had arrived at a similar classification of matter.

Indian sage Maharishi Kanada was perhaps the first to suggest that all forms of matter are composed of very small i.e., tiny particles known as anu and each anu may be made up of still smaller particles called parmanu. Greek thinker Democritus named these tiny particles parmanus as atoms (from the Greek word atomos meaning uncut) Thus matter is composed of tiny particles known as atoms.

Solid State: A solid possesses definite shape and definite volume which means that it cannot be compressed on applying pressure. Solids are generally hard and rigid. Example—metals, wood, bricks, copper etc.

Liquid State: A liquid possesses definite volume but no definite shape. This means that the liquid can take up the shape of container in which it is placed. Example—water, milk, oil, alcohol etc.

Gaseous State: A gas does not have either a definite volume or definite shape. It can be compressed to large extent on applying pressure and also takes the shape of the container where it is enclosed. Examples—Air, Oxygen, Nitrogen, Ammonia, Carbon dioxide etc.
Metalloids: Metalloids are the elements which have common properties of both metals and non-metals. Examples — Arsenic, Antimony, Bismuth etc.

Compounds: Compounds are pure substances that are composed of two or more different elements in fixed proportion by mass. The properties of a compound are entirely different from those of the elements from which it is made. Example — Water, Sugar, Salt, chloroform, Alcohol, Ether etc.

Compounds are classified into two types —

1. Organic Compounds: The Compounds obtained from living sources are called organic compounds. The term organic is now applied to hydrocarbons and their derivatives. Examples — Carbohydrates, Proteins, Oils, Fats etc.

2. Inorganic Compounds: The Compounds obtained from non-living sources such as rocks and minerals are called inorganic compounds. Examples — Common Salt, Marble, Washing Soda etc.

Mixtures: A material obtained by mixing two or more substances in any indefinite proportion is called a mixture. The properties of the components in a mixture remain unchanged. Example — Milk, Sea water, Petrol, Paint, Glass, Cement, Wood etc.

There are two types of mixture —

1. Homogeneous mixture and 2. Heterogeneous mixture.

1. Homogeneous mixture: A mixture is said to be homogeneous if it has a uniform composition throughout and there are no visible boundaries of separation between constituents. More over, the constituents can not be seen even by a microscope. Examples — Common salt dissolved in water, sugar dissolved in water, iodine dissolved in CCl₄, benzene in toluene and methyl alcohol in water.

2. Heterogeneous mixture: A mixture is said to be heterogeneous if it does not have a uniform composition throughout and has visible boundaries of the separation between the various constituents. The different constituents of the heterogeneous mixture can be seen even with naked eye. Example — A mixture of Sulphur & Sand, A mixture of Iron filings & Sand etc.

Separation of mixtures: Some methods of separation of mixtures are given below —

1. Sublimation: Sublimation is a process of conversion of a solid into vapour without passing through the liquid state and This method can be used for the removal of solid particles from the engine oil in car engine. Examples — 1. removal of solid particles from the engine oil in car engine.

2. Filtration: This is a process for quick and complete removal of suspended solid particles from a liquid, by passing the suspension through a filter paper. Examples — 1. removal of solid particles from the engine oil in car engine.
3. Evaporation : The process of conversion of a liquid into its vapours at room temperature is called evaporation. Evaporation causes cooling. Example — Evaporation of water in summer from ponds, wells & lakes.

4. Crystallization : This method is mostly used for separation and purification of solid substances. In this process, the impure solid or mixture is heated with a suitable solvent (e.g. alcohol, water, acetone, chloroform) to its boiling point and the hot solution is filtered. The clear filtrate is cooled slowly to room temperature. This is separated by filtration and dried.

5. Distillation : It is a process of converting a liquid into its vapour by heating and then condensing the vapour again into the same liquid by cooling. Thus, distillation involves vapourisation and condensation both.

6. Fractional distillation : This process is similar to the distillation process except that a fractionating column is used to separate two or more volatile liquids which have different boiling points. Example — A mixture of copper sulphate and water or a mixture of water (B.P 100°C) and methyl alcohol (B.P 45°C) can be separated by this method.

7. Chromatography : The name chromatography is derived from Latin word 'chroma' meaning colour. The technique of chromatography is based on the difference in the rates at which the components of a mixture are absorbed in the suitable absorbent.

There are many types of chromatography.

(a) Column (absorption) chromatography
(b) Thin layer chromatography
(c) Paper chromatography
(d) High pressure liquid chromatography
(e) Ion-exchange chromatography
(f) Gas chromatography

8. Sedimentation and Decantation : This method is useful when one component is a liquid and other is an insoluble. Insoluble solid, heavier than liquid, i.e. mud and water.

If muddy water is allowed to stand undisturbed for sometime in a beaker, the particles of earth (clay and sand) settle at the bottom. This process is called sedimentation. The clear liquid at the top can be gently transferred into another beaker. This process is known as decantation.

Concept of change in state : (a) Melting Point : The constant temperature at which a solid becomes liquid upon absorbing heat under normal pressure is called an 800°C.

(b) Boiling point : The constant temperature at which a liquid changes to vapour state under normal atmospheric pressure is called boiling point.

<table>
<thead>
<tr>
<th>Liquid</th>
<th>Water</th>
<th>Ethanol</th>
<th>Chloroform</th>
<th>Acetone</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.P.</td>
<td>100°C</td>
<td>78.3°C</td>
<td>62°C</td>
<td>46°C</td>
</tr>
</tbody>
</table>

The boiling point decreases with decrease in atmospheric pressure. Soluble impurities increases the boiling point of liquid.

(c) Freezing Point : The constant temperature at which a liquid changes into a solid by giving off heat energy is called freezing point of that liquid. F.P. of water = 0°C.

(d) Evaporation : The process of conversion of a liquid into its vapours at room temperature is called evaporation. Evaporation causes cooling. Actually, during evaporation, the molecules having higher kinetic energy escape from the surface of the liquid. Therefore, average kinetic energy of the rest of the molecules decreases. Moreover, cooling takes place during evaporation because of temperature of liquid is directly proportional to average kinetic energy. Evaporation is affected by following factors.

1. Nature of liquid
2. Temperature
3. Surface area.

(e) Vapour pressure : The pressure exerted by the vapours of liquid in equilibrium with liquid at a given temperature is called vapour pressure. Vapour pressure depends upon — 1. its nature and 2. temperature.

Higher the vapour pressure of a particular liquid less will be the magnitude of intermolecular forces present in molecules. Vapour pressure of a liquid increases with increase in temperature.

2. Atomic Structure

Atom : The smallest particle of an element is called an atom. An atom can take part in chemical combination and does not occur free in nature. The atom of the hydrogen is the smallest and lightest. Example — Na, K, Ca, H etc.

Molecule : A molecule is the smallest particle of an element or compound that can have a stable and independent existence. Example — O₂, N₂, Cl₂, P₄, S₈ etc.

Mole : A mole is a collection of 6.023 x 10²³ particles. It means that

1 mole = 6.023 x 10²³ (just like 1 pair = 2)
1 mole atom = 6.023 x 10²³ atoms
1 mole molecule = 6.023 x 10²³ molecules

Avogadro’s Number : The number 6.023 x 10²³ is called Avogadro’s Number.

Atomic Mass : The atomic mass of an element is a number which states that how many times the mass of one atom of an element is heavier than 1/12 mass of one atom of carbon-12.

Atomic mass of an element = \[ \frac{\text{Mass of one atom of the element}}{12} \]
Actual mass of 1 atom of an element = atomic mass in amu $\times 1.66 \times 10^{-24}$ g.

Molecular mass: The molecular mass of a substance is a number which states how many times mass one molecule of a substance is heavier in comparison to $\frac{1}{12}$th mass of one atom of Carbon-12.


Electron:
1. Electron had been discovered by J.J. Thomson.
2. The name of electron was given by Stoney.
3. The relative charge on electron is $-1$ unit and its absolute charge is $-1.6 \times 10^{-19}$ coulomb or $-4.8 \times 10^{-10}$ e.s.u. (electrostatic unit)
4. The relative mass of an electron is 0.0000543 amu and its absolute mass is $9.1 \times 10^{-28}$ g or $9.1 \times 10^{-31}$ kg.
5. The charge/mass (e/m) ratio of an electron is $-1.76 \times 10^{8}$ Coulomb gram
6. An electron was obtained from Cathode rays experiments.

Proton:
1. A proton had been discovered by Goldstein
2. A proton was named by Rutherford
3. The relative charge on proton is $+1$ unit and its absolute charge is $+1.6 \times 10^{-19}$ coulomb or $+4.8 \times 10^{-10}$ e.s.u.
4. The relative mass of proton is 1.00763 amu and its absolute mass is $1.673 \times 10^{-24}$ gram or $1.673 \times 10^{-27}$ kg.
5. The charge/mass (e/m) ratio for a proton is $9.58 \times 10^{4}$ Coulomb gram
6. An proton was obtained from anode rays experiments.

Neutron:
1. A neutron had been discovered by James Chadwick.
2. Charge on neutron is zero
3. The relative mass of neutron is 1.00863 amu and its absolute mass is $1.675 \times 10^{-24}$ gram or $1.675 \times 10^{-27}$ kg.
4. The charge/mass for a neutron is zero.
5. A neutron was obtained from radioactivity phenomenon.

Atomic number ($Z$): The number of proton or electron in an atom of the element is called atomic number. It is denoted by $Z$.

Mass number ($A$): The sum of number of protons and neutrons in an atom of the element is called mass number. It is denoted by $A$.

Let $^{23}_{11}$ Na,

In Na, $Z = 11$, $A = 23$ and,

$e = 11$, $p = 11$

$\therefore n = A - p = 23 - 11 = 12$

Isotopes: These are atoms of the elements having the same atomic number but different mass number.

Isotopes of Carbon $^{12}$C, $^{13}$C, $^{14}$C

Isobars: These are atoms of the elements having the same mass number but different atomic numbers. e.g. $^{40}$Ar, $^{40}$K, $^{40}$Ca

Isotones: These are atoms of different elements having the same mass number of neutrons.

$^{14}$C, $^{15}$N, $^{16}$O

Isoelectronic: These are atoms/molecules/ions containing the same number of electrons.

1. O$^{2-}$, F$^-$, Ne, Na$^+$, Mg$^{2+}$
2. CN$^{-}$, N$_2$O$^{2+}$ etc.

Thomson's model of an atom: According to Thomson, an atom is treated as a sphere of radius $10^{-8}$ cm in which positively charged particles are uniformly distributed and negatively charged electrons are embedded through them. This is also called Plum-Fudding model of an atom.

Rutherford's model of an atom: On the basis of scattering experiment, Rutherford proposed a model of the atom which is known as nuclear atomic model.

According to this model,
1. An atom consists of a heavy positively charged nucleus where all protons and neutrons are present. Protons & neutrons are collectively called nucleons. Almost whole mass of the atom is contributed by these nucleons.
2. Radius of a nucleus = $10^{-13}$ cm
3. Radius of an atom = $10^{-8}$ cm
4. Volume of an atom is $10^{13}$ times heavier than volume of a nucleus.
5. Electrons revolve around the nucleus in closed orbits with high speed. This model is similar to the solar system, the nucleus representing the sun and revolving electrons as planets. The electrons are therefore, generally referred as planetary electrons.

Nature of light & Electromagnetic Spectrum: In 1856 James Clark Maxwell stated that light, x-ray, γ-rays and heat etc emit energy continuously in the form of radiations or waves and the energy is called radiant energy. These waves are of radiations or waves and the energy is called radiant energy. These waves are associated with electric as well as magnetic fields and are therefore known as electromagnetic waves (or radiations).

1. Wave length ($\lambda$): The distance between two consecutive crests or troughs is called wavelength. It is denoted by $\lambda$ (Lamda).

SI unit of $\lambda$ is metre (m) and CGS unit is centimetre (cm).

1 Å = $10^{-10}$ m, 1 μ (micron) = $10^{-6}$ m,
1 nm = $10^{-9}$ m, 1 pm = $10^{-12}$ m.
2. **Frequency (ν)**: The number of waves passing through a point in one second is called frequency. It is denoted by $\nu$ ($\text{nu}$). The unit of frequency is cycle/second or $\text{sec}^{-1}$ or Hertz (Hz).

$$1 \text{Hz} = 1 \text{ cycle per second}$$

3. **Wave number ($\bar{\nu}$)**: The number of wavelengths which can be accommodated in one centimetre length along the direction of propagation is called wave number. It is denoted by $\bar{\nu}$. The SI unit of $\bar{\nu}$ is $\text{m}^{-1}$ and CGS unit is $\text{cm}^{-1}$.

$$\text{Wave number } (\bar{\nu}) = \frac{1}{\text{wave length } (\lambda)}$$

4. The relation between velocity of light ($C$), frequency ($\nu$) and wavelength ($\lambda$) is:

$$C = \nu \lambda$$

Where $C = 3 \times 10^8 \text{ m/sec}$

or, $3 \times 10^8 \text{ cm/sec}$

Different types of electromagnetic waves (or radiation) differ with respect to wavelength or frequency. The wavelength of electromagnetic spectrum increases in the following order:

Cosmic rays < Y-rays < X-rays < Ultraviolet rays < Visible < Infrared < Microwaves < Radiowaves.

**Planck's quantum theory of Radiations**: In 1900 Max Planck put forward a theory which is known as Planck's quantum theory. According to this theory radiant energy is emitted or absorbed in the form of small energy packets called quanta. In case of light these energy packets are known as photons. The energy of each quantum is directly proportional to the frequency of radiation.

$$i.e., E = \nu$$

or, $$E = h\nu = \frac{hC}{\lambda}$$

Where $h$ is called Planck's constant. Its value is $6.626 \times 10^{-34}$ Js and $C$ is the velocity of light and $C = 3 \times 10^8 \text{ m/s}$.

These electromagnetic radiations are expressed in terms of certain characteristics which are given below—

**Spectrum**: When white light is allowed to pass through a prism, it splits into several colours. These seven coloured band is called spectrum.

- Cosmic rays
- Gamma rays
- X-rays
- Ultraviolet rays
- Visible light
- Infrared rays
- Microwaves
- Radiowaves
**Aufbau Principle**

Aufbau is a German word meaning ‘building up’. This principle states that electrons are filled in various orbitals in order of increasing energies. The sequence of orbitals in order of increasing energy is:

\[ 1s < 2s < 2p < 3p < 4s < 3d < 4p < 5s < 4d < 5p < 6s < 4f < 5d < 6p < 7s \ldots \]

3. Periodic classification of Elements

Father of periodic table—Mendelev.

The arrangement of the known elements in certain groups in such a way so that the elements with similar properties are grouped together is known as classification of elements.

**Genesis of periodic classification:**

1. Lavoisier classified the elements into metals and non-metals.
2. Dobereiner’s Triads: In 1829, Dobereiner, a German chemist arranged certain elements with similar properties in groups of three in such a way that the atomic mass of the middle element was nearly the same as the average atomic masses of the first and third elements.

<table>
<thead>
<tr>
<th>Triad</th>
<th>Lithium</th>
<th>Sodium</th>
<th>Potassium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atomic mass</td>
<td>3.73</td>
<td>23</td>
<td>39</td>
</tr>
</tbody>
</table>

atomic mass of sodium = \( \frac{39 + 7}{2} = \frac{46}{2} = 23 \)

But only few elements could be covered under triads.

3. Newland’s law of octaves: In 1866, John Newlands, an English Chemist proposed the law of octaves by stating that, When elements are arranged in order to increasing atomic masses, every eighth element has properties similar to the first, just like musical notes.

But this generalization was also rejected because it could not be extended to the elements with atomic mass more than 40.

4. Lothert’s-Mayer’s atomic volume curve: In 1869 Lothert Mayer plotted a graph between atomic volume of the elements and their atomic mass and he pointed that the elements with similar properties occupy similar position in the curve.

5. Mendelev’s periodic law: The physical and chemical properties of the elements are the periodic function of their atomic masses.

Mendelev’s arranged all the elements known at that time in increasing order of atomic mass and this arrangement becomes periodic table.

**In a periodic table:**

- Horizontal line is called periods and Vertical line is called group.
- In Mendelev’s periodic table: Total number of periods are seven and total number of groups are nine i.e.,
  - Period—7
  - Group—9 (I, II, III, IV, V, VI, VII, VIII, Zero)

6. Modern Periodic law: Modern periodic law was given by Moseley.

According to Moseley: “The physical and chemical properties of the elements are periodic function of their atomic numbers.”

In modern periodic table: There are seven and eighteen groups i.e.,

<table>
<thead>
<tr>
<th>Period</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Elements</td>
<td>2</td>
<td>8</td>
<td>8</td>
<td>18</td>
<td>18</td>
<td>32</td>
<td>Incomplete</td>
</tr>
</tbody>
</table>

Modern periodic table is classified as:

1. **s-block**: Elements are known as Alkali & Alkaline earth metals.
2. **p-block**: Elements are known as Chalcogen, Pnicogens, Halogens and inert gases.
3. **d-block**: Elements are known as Transition elements.
4. **f-block**: Elements are known as Inner transition elements.

The periodic table shows two horizontal rows each containing 14 elements at the bottom. The first row contains 14 elements from atomic number 58 to 71 and is called Lanthanides series. The second row also contains 14 elements from atomic number 90 to 103 and is called Actinides series.

**Periodic properties:**

1. **Atomic radii**: The distance from the centre of the nucleus to the outermost shell containing electrons called atomic radius.

   It is not possible to measure the absolute value of atomic radius of an element. However, it may be expressed in three different forms: ionic radii, metallic radii, Van der wall radii. The size of these atomic radii are as

   Van der wall radii > metallic radii > ionic radii.

   Atomic radii decreases from left to right in a period and increases in a group from top to bottom.

2. **Ionic radii**: The effective distance from the centre of nucleus of the ion up to which it exerts its influence on the electron cloud is called ionic radii. The size of ionic radii and atomic radius are as

   Anionic radii > atomic radii > cationic radii

   Ionic radii decreases from left to right in a period and increases in a group from top to bottom.

3. **Ionization Potential (I.P)**: The amount of energy required to remove an electron from isolated gaseous atom is called Ionization Potential (I.P) or Ionization Energy (I.E).

   \[ A(g) - e + \text{Energy required (I.P)} \rightarrow A^+(g) \]

   The unit of ionisation potential is kJ/mol or eV/atom.

4. **Electron affinity (E_a)**: The energy released during addition of an extra electron in isolated gaseous atom is called electron Affinity.

   \[ A(g) + e \rightarrow A^-(g) + \text{Energy released} \]

   Chlorine (Cl) has highest E_a value. The unit of electron affinity is kJ/mol or eV/atom.
Electron affinity increases from left to right in a period and decrease from top to bottom in a group.

5. Electronegativity ($E_n$): The relative electron attracting tendency of an atom for a shared pair of electrons in a chemical bond is called electronegativity. It has no unit.

Fluorine ($F$) is the most electronegative atom

$$E_n = \frac{I.P. + E_a}{2.6}$$

Where, $E_n$ = Electronegativity, I.P. = Ionisation Potential, $E_a$ = Electron Affinity

- For ionic compound $E_n$ value is greater than 1.7
- For polar co-valent compound $E_n$ value is less than 1.7
- For non polar co-valent compound $E_n$ value is 0

Electronegativity increases from left to right in a period and decreases from top to bottom in a group.

6. Lattice Energy: The amount of energy released during formation of one mole of ionic compound from its constituent ions is called Lattice energy.

7. Hydration Energy: The amount of energy released during dissolution of one mole of compound into water, is called hydration energy.

If hydration energy is greater than Lattice energy, then compound is soluble in water and if hydration energy is less than Lattice energy, then compound is insoluble in water.

4. Chemical Bonding

The force that holds together the different atoms in a molecule is called chemical bond. There are many types of chemical bond.

1. Ionic bond (Electrovalent bond): A bond formed by the complete transfer of one or more electrons from one atom to another atom is called ionic bond. **Example**—

   - Formation of NaCl:
     $$\text{Na} \rightarrow \text{Na}^+ \quad \text{Cl}^- \rightarrow \text{Na}^+ \text{Cl}^-$$

   *Condition of ionic bond:* Ionization energy of metal should be low and Electron affinity of non-metal should be high.

   *Properties of ionic compounds:*
   - (a) Ionic compounds have high melting point & boiling point.
   - (b) Ionic compounds are good conductor of electricity in molten state or in water.
   - (c) Ionic compounds are bad conductor of electricity in solid state.
   - (d) Ionic compounds are soluble in water.
   - (e) Ionic compounds are insoluble in non-polar covalent like Benzene, Carbon tetrachloride etc.

Covalent bond: A bond formed between two same or different atoms by mutual contribution and sharing of electrons is called covalent bond. **Example**—

(a) $H_2$ molecule:

(b) $Cl_2$ molecule:

Lone pair of electrons: The pair of electrons which do not take part in covalent bond formation are called Lone pair of electrons. For example:

There is one Lone pair in ammonia ($NH_3$) and two Lone pair in water ($H_2O$)

Properties of covalent compounds:

- (a) Covalent compounds have high m.p. & b.p.
- (b) They are generally bad conductor of electricity (exception graphite)
- (c) They are generally insoluble in water.
- (d) They are generally soluble in organic solvent like benzene, acetone, chloroform etc.
- (e) Covalent bonds are directional.

Co-ordinate bond (or Dative bond): Co-ordinate bond is a special type of covalent bond in which one atom donates electrons to other atom. The bonding between donor to acceptor atom is called co-ordinate bond. It is denoted by $\rightarrow$.

**Example**—

\[
\text{SO}_2 \\
\text{O} \quad \text{S} \\
\text{O} \quad \text{S} \\
\text{O} \\
\]

*Sigma bond ($\sigma$-bond):* A bond formed by the linear overlapping of atomic orbitals is called sigma bond. Since, the extent of overlapping of atomic orbitals in $\sigma$-bond in large. Hence $\sigma$-bond is a strong bond.

*Pi-bond ($\pi$-bond):* A bond formed by the side-wise (or lateral overlapping of atomic orbitals is called pi-bond. Since, in this case, extent of overlapping of atomic orbitals is lesser than $\sigma$-bond. So, $\pi$-bond is a weak bond.

Hybridisation: The phenomenon of mixing of two or more atomic orbitals of equivalent energies to form new type of identical number of orbitals is called hybridisation. Hybridisation and new type of orbitals obtained are called hybrid orbitals.

<table>
<thead>
<tr>
<th>Hybridisation</th>
<th>Geometry (Structure/Bond Angle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>sp</td>
<td>Linear $180^{\circ}$</td>
</tr>
<tr>
<td>sp$^2$</td>
<td>Trigonal $120^{\circ}$</td>
</tr>
<tr>
<td>sp$^3$</td>
<td>Tetrahedral $109.5^{\circ}$</td>
</tr>
<tr>
<td>sp$^3d$</td>
<td>Trigonal bipyramidal $120^{\circ}$, $90^{\circ}$</td>
</tr>
<tr>
<td>sp$^3d^2$</td>
<td>Octahedral $90^{\circ}$</td>
</tr>
<tr>
<td>sp$^4d^2$</td>
<td>Pentagonal bipyramidal $72^{\circ}$, $90^{\circ}$</td>
</tr>
</tbody>
</table>
Bond energy: The amount of energy required to break one mole bonds of a particular type between the atoms in the gaseous state of a substance is called bond energy. The bond energy depends upon the following factors.

1. Size of atom
2. Multiplicity of bonds.

Greater the size of atoms, lesser will be bond energy.

Greater the bond multiplicity more will be bond energy.

Bond energy: Single bond < double bond < triple bond

Bond length: The average equilibrium distance between the centres of the two bonded atoms is called bond length. The bond length is influenced by the following factors—1. Size of atoms 2. Multiplicity of bonds.

Greater the size of atoms, greater will be bond length.

Greater the multiplicity of bonds, lesser will be bond length.

Hydrogen bond: When hydrogen atom is present between two most electronegative atoms (N, O, F) then it is bonded to one by a covalent bond and to other by a weak force of attraction which is called hydrogen bond, etc. It is denoted by \( \text{H} - \text{F} \). Example—

1. (HF) \(_n\) \( \quad \text{H} - \text{F} - \text{H} - \text{F} - \text{H} - \text{F} - \text{H} - \text{F} \).

2. (H\(_2\)O) \(_n\) \( \quad \text{H} - \text{O} - \text{H} - \text{O} - \text{H} - \text{O} - \text{H} - \text{O} \).

3. \( \text{H}_2\text{O} \) is liquid due to formation of hydrogen bond. \( \text{H}_2\text{S} \) does not form hydrogen bond. So, it is gas at room temperature.

There are two type of hydrogen bonding

1. Intermolecular hydrogen bond.
2. Intramolecular hydrogen bond.

Intermolecular hydrogen bond arises when hydrogen bonding occurs between two or more molecules. In this case m.p. & b.p. of compound increases due to molecular association.

\( \text{H} - \text{F} - \text{H} - \text{F} - \text{H} - \text{F} \).

When hydrogen bonding occurs within a molecule then it is called intramolecular hydrogen bonding. Due to cyclisation m.p. & b.p. of the compound decreases in this case.

\[
\begin{align*}
\text{O} & \quad \text{N} \\
\text{O} & \quad \text{N}
\end{align*}
\]

Due to intermolecular hydrogen bonding between alcohol and water, alcohol is soluble in water.

\[
\begin{align*}
\text{CH}_3 & \quad \text{O} - \text{H} \quad \text{O} \\
\text{Methyl} & \quad \text{alcohol} \\
\text{H} & \quad \text{Water}
\end{align*}
\]
Oxidation number (O.N.): The charge present on atom in a molecule or ion is called oxidation number. It may be zero, positive or negative.

Rules for determination of oxidation number:
1. Oxidation number of an atom in free state is zero.
2. Oxidation number of alkali metals (Li, Na, K, Rb, Cs) in molecule is always +1.
3. Oxidation number of alkaline earth metals (Be, Mg, Ca, Sr, Ba) in a molecule is always +2.
4. Oxidation number of hydrogen
   - (+1) hydrogen ion
   - (-1) hydride ion
5. Oxidation number of oxygen
   - (-2) oxide
   - \(-\frac{1}{2}\) superoxide
6. Sum of Oxidation number of atoms in a molecule is equal to zero.
7. Sum of oxidation number of atoms in a ion is equal to magnitude of charge with sign.

Oxidation Number of Mn in KMnO₄:
Let O.N. of Mn = x

\[1 + x + (-2) \times 4 = 0\]
\[1 + x - 8 = 0\]
\[x = 7\]

Oxidation Number of Cr in K₂Cr₂O₇:
Let O.N. of Cr = x

\[1 \times 2 + x \times 2 + (-2) \times 7 = 0\]
\[2 + 2x - 14 = 0\]
\[2x - 12 = 0\]
\[4x - 24 = 0\]
\[x = 6\]

Oxidation Number of C in C₆H₅SO₃⁻:
Let O.N. of C = x

\[x \times 12 + 1 \times 22 + (-2) \times 11 = 0\]
\[12x + 22 - 22 = 0\]
\[12x = 0\]
\[x = 0\]

Types of Reactions:
1. Decomposition reactions: In these reactions, compound either of its own or least one is in the elemental state.
   \[2NaH (s) \xrightarrow{\Delta} Na (s) + H₂ (g)\]
   \[2H₂O (l) \xrightarrow{\Delta} 2H₂ (g) + O₂ (g)\]

2. Combination reactions: In combination reactions, compounds are formed as a result of the chemical combination of two or more elements.
   \[H₂ (g) + \frac{1}{2}O₂ (g) \rightarrow H₂O (l)\]
   \[C (s) + O₂ (g) \rightarrow CO₂ (g)\]
   \[3Mg (s) + N₂ (g) \rightarrow Mg₃N₂ (s)\]

3. Displacement reactions: In these reactions, an atom/ion present in a compound gets replaced by an atom/ion of another element.
   \[FeSO₄ (aq) + Zn (s) \rightarrow ZnSO₄ (aq) + Fe (s)\]
   \[MgO (aq) + 2Na (s) \rightarrow Na₂O (aq) + Mg (s)\]

4. Disproportionation reactions: The chemical reaction in which only one substance is oxidised as well as reduced simultaneously is called disproportionation reaction.
   \[Cl₂ + 2NaOH \rightarrow NaCl + NaOCl + H₂O\]
   \[P₄ + 4NaOH + 2H₂O \rightarrow 2Na₃PO₄ + 2PH₃\]

5. Substitution reaction: In these reactions, one or more atoms or groups present in organic molecule get substituted or replaced by suitable atoms or groups.
   \[C₂H₅Cl + KOH (aq) \rightarrow C₂H₅OH + KCl\]
   \[Ethyl chloride \quad Ethyl alcohol\]

6. Neutralisation reaction: When an acid reacts with a base, salt and water is formed. This reaction is called neutralisation reaction.
   \[\text{acid} + \text{base} \rightarrow \text{salt} + \text{water}\]
   \[HCl + NaOH \rightarrow NaCl + H₂O\]

7. Reversible reaction: A reaction in which reactants combine to form products and again products recombine to reactants is called reversible reaction.
   \[N₂ (g) + 3H₂ (g) \rightleftharpoons 2NH₃ (g)\]

8. Irreversible reaction: A reaction which proceeds in only one direction is called irreversible reaction.
   \[CaCO₃ (s) \rightarrow \Delta \rightarrow CaO (s) + CO₂ (g)\]

6. Solution

A homogeneous mixture of two or more pure non-reacting substances whose composition can be varied within certain limits is called solution. When solution is composed of only two components, it is called binary solution. For example solution of NaCl in water. Similarly solution containing three components is called ternary solution. For example a solution of NaCl and KCl in water. In binary solution, there are two components—

1. Solute
2. Solvent

The component which is in smaller proportion or amount in solution is called solute while the one present in excess is called solvent.

For example—In a binary solution of sugar in water, sugar acts as solute while water is the solvents.

The better solvent is one which has high dielectric constant. Water is universal solvent because it has high dielectric constant.
On the basis of States of matter binary solution is classified as:

<table>
<thead>
<tr>
<th>Nature</th>
<th>Solute</th>
<th>Solvent</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Solution</td>
<td>Gas</td>
<td>Solid</td>
<td>Hydrogen in palladium</td>
</tr>
<tr>
<td></td>
<td>Liquid</td>
<td>Solid</td>
<td>Mercury in Zinc amalgam</td>
</tr>
<tr>
<td>Liquid Solution</td>
<td>Gas</td>
<td>Liquid</td>
<td>Various alloys</td>
</tr>
<tr>
<td></td>
<td>Liquid</td>
<td>Liquid</td>
<td>Aerated water (CO₂ + H₂O)</td>
</tr>
<tr>
<td>Gaseous Solution</td>
<td>Gas</td>
<td>Gas</td>
<td>Sugar in water</td>
</tr>
<tr>
<td></td>
<td>Liquid</td>
<td>Gas</td>
<td>Alcohol in water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solid</td>
<td>Humidity in air</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Iodine vapours in air</td>
</tr>
</tbody>
</table>

**Saturated Solution**: A solution that can not dissolve any more of the solute at a given temperature is called saturated solution.

**Unsaturated Solution**: A solution in which more of the solute can be dissolved at a given temperature is known as unsaturated solution.

**Supersaturated Solution**: A supersaturated solution at a particular temperature is one that is more concentrated (contains more solute) than its saturated solution at that temperature.

**Dilute Solution**: It is the solution in which the amount of solute present is rather small compared to the mass of solvent.

**Concentrated Solution**: It is the solution in which the amount of solute present is relatively large for a given mass of solvent.

**Solubility**: The maximum amount of solute in gram which can dissolved in 100 g of solvent to form saturated solution at particular temperature is called solubility of that solute.

\[
\text{Solubility} = \frac{\text{mass of solute in gram}}{\text{mass of solvent}} \times 100
\]

The solubility of the substance depends upon the nature of solute and solvent, temperature and pressure.

The solubility of the substance increase continuously with increase in temperature, if the process of dissolution is endothermic.

**For example**—

The dissolution of NaNO₃, KNO₃, NaCl, KCl in water is endothermic process. So, their solubility increase with increase in temperature.

- If the process of dissolution is exothermic in nature, the solubility of a substance decrease with increase in nature.

**For example**—

- The solubility of cerium sulphate, lithium carbonate, sodium carbonate monohydrate (Na₂CO₃·H₂O) etc. decreases with increase in temperature.
- The solubility of Na₂SO₄·10H₂O first increases up to 32.4°C and then begins to decreases. So, 32.4°C is the transition temperature:

\[
\text{Na₂SO₄·10H₂O} \overset{\text{above 32.4°C}}{\text{--}} \overset{\text{below 32.4°C}}{\text{Na₂SO₄}}
\]
Dialysis: The process of separating the particles of colloids from those crystallized by diffusion through animal membrane (or parchment) is known as dialysis. It is the process of purification of colloidal solution.

Coagulation (Floculation): The colloidal particles are either positively or negatively charged particles. When an electrolyte is added to colloidal solution, the particles of the colloidal solution take up the oppositely charged ion of the added electrolyte and get neutralized. The ion responsible for the neutralisation of the charge on colloidal particles is called the coagulating ion or flocculating ion and the process is called coagulation.

Electrophoresis: The movement of colloidal particles towards a particle electrode under the influence of an electric field is called electrophoresis. The positively charged colloidal particles move towards cathode and negatively charged colloidal particles move towards anode.

7. Acids, Bases & Salts

Acid
An acid is a substance which
1. is sour in taste
2. turns blue litmus paper into red
3. contains replaceable hydrogen
4. gives hydrogen ion (H+) in aqueous solution (Arrhenius theory)
5. can donate a proton (Bronsted & Lowry concept)
6. can accept electron (Lewis theory)

Uses of acid:
1. As food:
   - (a) Citric acid — Lemons or oranges (Citrus fruits)
   - (b) Lactic acid — Sour milk
   - (c) Butyric acid — Rancid butter
   - (d) Tartaric acid — Grapes
   - (e) Acetic acid — Vinegar
   - (f) Maleic acid — Apples
   - (g) Stearic acid — Fats
   - (h) Oxalic acid — Tomato, wood sorrel.
   - (i) Carbonic acid — Soda water aerated drinks
2. Hydrochloric acid (HCl) is used in digestion
3. Nitric acid (HNO₃) is used in the purification of gold & silver
4. Concentrated H₂SO₄ and HNO₃ is used to wash iron for its galvanization
5. Oxalic acid is used to remove rust spot.
6. Boric acid is a constituent of eye wash.
7. Formic acid is present in red ants.
8. Uric acid is present in urine of mammals

Strength of acids

Strong acid
(completely ionised in water)
HCl, HNO₃, H₂SO₄

Weak acid
(partially ionised in water)
CH₃COOH, H₂CO₃, HCOOH

Classification of acids

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydracids</td>
<td>NH₃, H₂S, HCl, HBr, HF</td>
</tr>
<tr>
<td>Oxycids</td>
<td>HNO₃, H₂SO₄, HClO₃, HIO₄</td>
</tr>
</tbody>
</table>

Basicity of an acid: The number of removable hydrogen ions from an acid is called basicity of that acid.

- Mono basic acid (one removable H⁺ ion) — HCl, HNO₃
- Dibasic acid (two removable H⁺ ion) — H₂SO₄, H₂CO₃, H₃PO₄
- Tribasic acid (three removable H⁺ ion) — H₃PO₄

Acidic strength
1. HF < HCl < HBr < HI
2. CH₃COOH < H₂SO₄ < HNO₃ < HCl

Uses of HCl
1. HCl present in gastric juices are responsible for the digestion.
2. Used as a rust remover.
3. As an antiseptic.
4. In the manufacture of aluminium.
5. In the manufacture of rayon.
6. In the manufacture of dyes & drugs.

Uses of HNO₃
1. In the manufacture of explosives like TNT, TNB.
2. In the manufacture of fertilizers like ammonium nitrate.
3. Nitro Glycerine (Dynamite).
4. Found in rain water (first shower).
5. It forms nitrates in the soil.
6. In the manufacture of rayon.
7. In the manufacture of dyes & drugs.

Use of Sulphuric acid (H₂SO₄)
1. In the manufacture of Sulphuric acid (H₂SO₄)
2. In the manufacture of bromine.
3. In the manufacture of dyes & drugs.
4. In the manufacture of fertilizers, drugs, detergents & explosives.

Use of Boric acid: As an antiseptic.

Uses of Phosphoric acid
1. Its calcium salt makes our bones.
2. It forms phosphatic fertilizers.
3. PO₄⁻³ is involved in providing energy for chemical reactions in our body.

Uses of Ascorbic acid: Source of Vitamin C

Uses of Citric acid: Flavouring agent & food preservative.

Uses of Acetic acid: Flavouring agent & food preservative.

quantities of either an acid (H⁺ ions) or a base (OH⁻ ions) is called buffer solution. A buffer solution can be obtained by (a) Mixing of weak acid and its salt with a strong base (CH₃COOH + CH₃COONa), (b) Mixing of weak base and in salt with strong acid NH₄OH + NH₄Cl.

The buffer action of blood is due to the presence of H₂CO₃ and HCO₃⁻.

Salt : When an acid reacts with a base, salt and water are formed.

Acid + Base → Salt + Water

HCl + NaOH → NaCl + H₂O

Uses of some important salts:
1. Sodium Chloride: As a flavouring agent in food. In saline water for a patient of dehydration (0.9% NaCl), In the manufacture of HCl etc.
2. Sodium iodate: Iodised salt to prevent Goitre disease.
3. Sodium Carbonate: As washing soda, manufacturing of glass etc.
4. Sodium Benzoate: As a food preservative for pickles.
5. Potassium nitrate: As a fertilizer giving both K & N to the solid. In gun powder (C + S + KNO₃), In match sticks etc.
6. Calcium Chloride: Dehydrating agent used for removing moisture from gases.
7. Calcium carbonate (lime stone): In the construction of building, In the cement industry, In the extraction of metals etc.
8. Calcium sulphate: Plaster of Paris (2CaSO₄·H₂O) – For moulds & statues, in the cement industry in the form of Gypsum (CaSO₄·2H₂O).
9. Calcium Phosphate: As a fertilizer (Superphosphate of lime)
10. Bleaching powder: (a) As a disinfectant (b) As a bleaching agent (removing colours)
11. Alum (Potassium aluminium sulphate): (a) In the purification of water. (b) In the dyeing industry. (c) As antiseptic after shave.

The acidic and basic nature of some household substances:

<table>
<thead>
<tr>
<th>Acidic</th>
<th>Basic (Alkaline)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bathroom acid</td>
<td>1. Milk of magnesia (Anta acids)</td>
</tr>
<tr>
<td>2. Vitamin C tablets (Ascorbic acid)</td>
<td>2. Toothpaste</td>
</tr>
<tr>
<td>3. Lemon juice</td>
<td>3. Soap solution or detergent soln.</td>
</tr>
<tr>
<td>4. Orange juice</td>
<td>4. Solution of washing soda</td>
</tr>
<tr>
<td>5. Tomato juice</td>
<td>5. Slaked lime &amp; white wash</td>
</tr>
<tr>
<td>6. Vinegar</td>
<td>7. Fizzy drinks (Colas &amp; Sodawater)</td>
</tr>
</tbody>
</table>

8. Behaviour of Gases

1. Boyle's law: At constant temperature, the volume of a definite mass of a gas is inversely proportional to pressure.

   \[ V \propto \frac{1}{p} \quad \text{(at constant } T) \]
2. Charle's law: At constant pressure, the volume of a definite mass of a gas is directly proportional to absolute temperature.
   \[ V \propto T \] (at constant \( p \))

3. Gay-Lussac's law: At constant volume, the pressure of given mass of a gas is directly proportional to the temperature in Kelvin.
   \[ p \propto T \] (at constant \( V \))

4. Avogadro's gas law: At constant temperature and pressure, the volume of a gas is directly proportional to the number of molecules.
   \[ V \propto n \] (at constant \( T \) & \( p \))

5. Ideal gas equation: \( pV = nRT \) is called ideal gas equation. Where:
   - \( p \) = Pressure,
   - \( n \) = number of mole,
   - \( V \) = volume,
   - \( R \) = gas constant,
   - \( T \) = temperature in Kelvin.

\[ R = 0.0821 \text{ liter atm K}^{-1} \text{ mol}^{-1} \]
\[ R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1} \]
\[ R = 1.987 \text{ cal K}^{-1} \text{ mol}^{-1} \]

6. S.T.P. & N.T.P.:
   - S.T.P. — Standard temperature and pressure.
   - N.T.P. — Normal temperature and pressure.

   At S.T.P., for 1 mole gas
   \[ V = 22.4 \text{ litre} = 22400 \text{ ml} \]
   \[ p = 1 \text{ atm} = 76 \text{ cm of Hg} = 760 \text{ mm of Hg} \]
   \[ T = 273 \text{ K} \]

**Diffusion of gases:** The process of intermixing of gases irrespective of the density relationship and without the effect of external agency is called diffusion of gases.

   In a gas, the molecules are far separated and the empty space among the molecules are very large. Therefore, the molecules of one gas can move into the empty spaces or voids of the other gas and vice-versa. This leads to diffusion.

**Graham's law of diffusion:** Under the similar conditions of temperature and pressure, the rates of diffusion of gases are inversely proportional to the square roots of their densities.

   Let \( r_1 \) and \( r_2 \) be the rates of diffusion of two gases \( A \) and \( B \), and \( d_1 \) and \( d_2 \) be their respective densities, then according to Graham’s law of diffusion:

   \[ \frac{r_2}{r_1} = \sqrt{\frac{d_1}{d_2}} = \sqrt{\frac{M_2}{M_1}} \]

Since molecular mass = \( 2 \times \) vapour density.

\[ M = 2 \times d \]

**Dalton’s law of partial pressure:** It states that if two or more gases which mixture is equal to the sum of the partial pressure that each gas exerts when enclosed separately in the same vessel at constant temperature.

---

**9. Electrolysis**

1. **Electrolytes:** These are the substances which allow the electricity to pass through them in their molten states or in the form of their aqueous solutions and undergo chemical decomposition. **Examples**—acids, bases & salts.

2. **Strong electrolytes:** The electrolytes which are almost completely dissociated into ions in solution are called strong electrolytes. **Examples**—NaCl, KCl, HCl, NaOH etc.

3. **Weak electrolytes:** The electrolytes which do not ionise completely in solution are called weak electrolytes. **Examples**—CH₃COOH, H₂CO₃, HCN, ZnCl₂, NH₄OH etc.

4. **Electrolysis:** The process of chemical decomposition of an electrolyte by passage of electric current through its molten state or its solution is called electrolysis.

5. **Electrodes:** In order to pass the current through an electrolyte in molten state or in aqueous solution, two rods or plates are needed to connect with the terminal of a battery. These rods or plates are called electrodes.

   - **Anode:** The electrode which is attached to positive terminal of battery is called anode. Oxidation occurs at anode.
   - **Cathode:** The electrode which is attached to negative terminal of batteries is called cathode. Reduction occurs at cathode.

   **Examples**—Electrolysis of molten NaCl
   
   At anode: \[ \text{Cl}^- \rightarrow \text{Cl} \]
   
   At cathode: \[ \text{Na}^+ + \text{e} \rightarrow \text{Na} \]

So, Cl₂ gas occurs at anode while Na at cathode.

---

**10. Carbon and its Compounds**

Carbon is non-metal having atomic number 6 and mass number 12. It is placed in group (IV) A or group 14 in periodic table.

**Allotropy:**

The substances which have same chemical properties, but different physical properties are called allotropes and this property is called allotropy. **Example**—Allotropes of Carbon—Diamond, graphite, charcoal.

**Diamond:**

1. It is the purest form of carbon.
2. It is the hardest natural known substance.
3. It is transparent, and specific gravity 3.52.
4. It is a bad conductor of electricity and heat.
5. It has high refractive index 2.415.
6. It is chemically inert and on heating above 1500°C, transferred into graphic.
7. It form tetrahedral crystals and hybridisation of Carbon-atom is sp³.
8. It form tetrahedral crystals and hybridisation of Carbon-atom is sp³.
9. Black diamonds called carbonado contains traces of graphite.
Graphite (Plumbago or black lead)
1. It is soft, greasy, dark greyish colored crystalline solid.
2. It is a good conductor of heat and electricity.
3. Its specific gravity is 2.3
4. The hybridization of carbon in graphite is $sp^2$ and it has hexagonal layer structure.
5. It is chemically more reactive than diamond.
6. Its layer structure is held by weak van der waal's force.
7. Graphite is used in making for lining and making electrodes of electric furnaces, in making refractory crucibles, in making lead pencils, as a moderator in nuclear reactor as lubricant in machinery, as a reducing agent in steel manufacturing.

**Forms of Amorphous carbon obtained by destructive distillation.**

1. Wood charcoal Obtained from wood
2. Sugar charcoal Obtained from cane sugar
3. Bone or animal charcoal Obtained from animal bones
4. Coke charcoal Obtained from coal

Hydrocarbons

Compounds made of carbon and hydrogen atoms only are called hydrocarbons. The natural source of hydrocarbons is petroleum.

**Hydrocarbons are classified as:**

1. Saturated hydrocarbons
2. Unsaturated hydrocarbons
3. Aromatic hydrocarbons.

1. **Saturated hydrocarbons**: The hydrocarbons in which carbon atoms are singly bonded are called saturated hydrocarbons. Saturated hydrocarbons are also called alkanes or paraffins. Alkanes are relatively reactive under ordinary laboratory conditions. So, alkanes are also called paraffins because paraffins mean little reactive.

   General formula of alkane $C_nH_{2n+2}$

   **Methane (CH$_4$)**: $\cdot H - C - H$

   **Ethane (C$_2$H$_6$)**: $\cdot H - C - C - H$

2. **Unsaturated hydrocarbons**: The hydrocarbons in which carbon atoms are either doubly or triply bonded are called unsaturated hydrocarbons. Doubly bonded carbon atoms ($C=\equiv C$) hydrocarbons are called alkenes. The general formula of alkene is $C_nH_{2n}$.

   **Ethane (C$_2$H$_4$)**: $\cdot H - C = C - H$

   **Propane (C$_3$H$_6$)**: $\cdot H - C - C = C - H$

Triply bonded carbon atoms ($C\equiv C$) containing hydrocarbons are called alkenes. The general formula of alkenes are $C_nH_{2n-2}$.

3. **Aromatic hydrocarbons**: These are homocyclic compounds which contain at least one benzene ring in which carbon atoms are linked to one another by alternate single and double bonds.

   In Greek, aroma stands for sweet smell. Compounds in this classification have pleasant smell. Hence, they are called aromatic compounds.

   **Example**:

   ![Chemical structures of benzene, naphthalene, and anthracene]

   **Isomerism**: Two or more compounds having same molecular formula but different physical and chemical properties are called isomers and this phenomenon is called isomerism.

   **Petroleum**: The term petroleum (Latin petra = rock, oleum = oil) is applied to the dark-coloured oily liquid with offensive smell found at various depths in many regions below the surface of the earth. It is also called rock oil, mineral oil or crude oil.

   A complete list of petroleum products, approximate composition, boiling range and their uses is given ahead.

<table>
<thead>
<tr>
<th>5. Fraction</th>
<th>Boiling range (°C)</th>
<th>Approximate Composition</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Uncondensed gas</td>
<td>Up to room temperature</td>
<td>$C_1-C_4$</td>
<td>Fuel gases</td>
</tr>
<tr>
<td>2. Crude naphtha on refraction</td>
<td>30-150°</td>
<td>$C_5-C_{10}$</td>
<td>Solvent</td>
</tr>
<tr>
<td>(a) Petroleum ether</td>
<td>30-70°</td>
<td>$C_5-C_6$</td>
<td>Motor fuel, dry cleaning, petrol gas</td>
</tr>
<tr>
<td>(b) Petrol or gasoline</td>
<td>70-120°</td>
<td>$C_8-C_{10}$</td>
<td>Solvent, dry cleaning</td>
</tr>
<tr>
<td>(c) Benzene derivatives</td>
<td>120-150°</td>
<td>$C_8-C_{10}$</td>
<td>Fuel, illuminant, oil gas</td>
</tr>
<tr>
<td>3. Kerosene</td>
<td>150-250°</td>
<td>$C_{11}-C_{16}$</td>
<td>As a fuel for diesel engines converted to gasoline by cracking</td>
</tr>
<tr>
<td>4. Heavy oil</td>
<td>250-400°</td>
<td>$C_{16}-C_{18}$</td>
<td>—</td>
</tr>
<tr>
<td>(a) Gas oil</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>(b) Fuel oil</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>(c) Diesel oil</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>5. Residual oil on fraction by vacuum distillation gives</td>
<td>Above 400°C</td>
<td>$C_{17}-C_{40}$</td>
<td>Lubrication</td>
</tr>
<tr>
<td>(a) Lubricating oil</td>
<td>—</td>
<td>$C_{17}-C_{20}$</td>
<td>Candles, boot polish, wax paper etc</td>
</tr>
<tr>
<td>(b) Paraffin wax</td>
<td>—</td>
<td>$C_{20}-C_{30}$</td>
<td>—</td>
</tr>
</tbody>
</table>
Polymerisation: The simple molecules which combine to form a large molecule is called polymer. The process by which the simple molecules (monomers) are converted into polymer is called polymerisation.

\[ n \text{CH}_2 \text{CH}_2 \xrightarrow{\text{polymerisation}} \left(\text{CH}_2 \text{CH}_2\right)_n \]

Polyethylene, polystyrene, polyvinyl chloride, teflon etc.

Plastics: Plastics are cross linked polymers and are very tough. Lac is a natural plastic chemically plastic can be of two types.

1. Thermoplastic
2. Thermosetting plastics.

Thermoplastic: These are the polymers which can be easily softened repeatedly when heated and hardened when cooled with little change in their properties.

Examples: Polyethylene, polystyrene, polyvinyl chloride, teflon etc.

Thermosetting plastics: These are the polymers which undergo permanent change on heating. On heating they undergo extensive cross linking in moulds and become hard and infusible therefore, they cannot be reused.

Examples: Bakelite, glyptal, terylene etc.

Bakelite (Phenol-formaldehyde resins): It is a condensation polymer and is obtained from phenol and formaldehyde in presence of either an acid or a base catalyst. It is used for making combs, fountain pens, photographs records, electrical goods etc.

Rubber: It is a polymer which is capable of returning to its original length or shape after being stretched or deformed. The rubber obtained from natural sources are called natural rubber and polymer prepared in laboratory which are similar to natural rubber are known as synthesise rubber.

Natural rubber

\[ n \text{CH}_3 \xrightarrow{\text{Polymerisation}} \left[\text{CH}_2 \text{CH} = \text{CH}_2\right]_n \]

Synthetic rubber

1. Neoprene

\[ n \text{CH}_2 \text{C} = \text{C} = \text{CH}_2 \xrightarrow{\text{Polymerisation}} \left[\text{CH}_2 \text{CH} = \text{C} = \text{CH}_2\right]_n \]
Coal gas: It is a mixture of H₂, CH₄, CO and other gases like N₂, C₂H₄, O₂ etc. It is obtained by destructive distillation of coal at about 1000°C.

Oil gas: It is a mixture of H₂, CH₄, C₂H₄, CO and other gases like CO₂. It is obtained by thermal cracking of kerosene oil. It is used in laboratories.

Gobar gas: It contains CH₄, CO and H₂. It is produced by fermentation of gobar in the absence of air. It is used as a domestic fuel in villages.

Natural gas: It is a mixture of gaseous hydrocarbons viz. methane 85%, ethane, propane, butane etc. Liquefied petroleum mainly butane and isobutane.

LPG and CNG (Petroleum Gases)

Liquefied Petroleum Gas (LPG): The petroleum gas liquified under pressure is called liquefied petroleum gas. It is a mixture of butane and iso-butane with small amount of propane and is easily compressed under pressure as liquid and stored in iron cylinders. It is used as domestic fuel.

\[ 2C_4H_{10} + 13O_2 \xrightarrow{\text{burning}} 8CO_2 + 10H_2O + \text{Heat} \]

Compressed Natural Gas (CNG): The natural gas compressed at very high pressure is called compressed natural gas (CNG). It consists mainly of methane (95%) which is a relatively unreactive hydrocarbon and makes it nearly complete combustion possible. The other 5% is made of various gases such as ethane, propane, butane and also includes ethene, H₂S, water vapor etc. The CNG is now being used as a better fuel than gasoline for running buses, cars and three-wheelers in metropolitan cities like Delhi, Mumbai etc. because of its complete combustion and no unburnt carbon is being released in the atmosphere to cause air pollution.

Knocking and Octane Number: The metallic sound produced due to irregular burning of the fuel known as knocking. The knocking lowers the efficiency of the engine and results in the loss of energy. A fuel which has minimum knocking property is always preferred. It has been observed that the straight chain aliphatic hydrocarbons have a higher tendency to knock while branched or unsaturated hydrocarbons have less tendency to knock.

To indicate the quality of gasoline (petrol), a method of gradation has been introduced which is termed octane rating or octane number. Two compounds heptane and iso-octane have been taken as standard. Heptane which causes maximum knocking is assigned to octane number zero while iso-octane which causes minimum knocking is assigned the octane number 100.

\[
\begin{align*}
\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3 & \quad \text{CH}_3\text{CH}_2\text{CH}_3 \\
\text{Heptane} & \quad \text{Iso-Octane}
\end{align*}
\]

Octane number = 0

12. Metallurgy

The process of extracting metal in pure form from its ore is known as metallurgy. A mineral may be a simple compound or a complex mixture.

Ores: Those minerals from which metal can be economically and easily extracted are called ores.

All ores are mineral but all minerals are not ores.

Gangue (or matrix): The ore is generally associated with earthy impurities like sand, rocks and limestone known as gangue or matrix.

Flux: A substance added to ore to remove impurities is called flux. There are two types of flux—1. acidic flux. 2. basic flux.

Acidic flux is added to remove basic impurity

\[
\begin{align*}
\text{SiO}_2 + \text{FeO} & \rightarrow \text{FeSiO}_3 \\
\text{acidic flux} & \quad \text{basic impurity}
\end{align*}
\]

Basic flux is added to remove acidic impurity

\[
\begin{align*}
\text{CaCO}_3 + \text{SiO}_2 & \rightarrow \text{CaSiO}_3 + \text{CO}_2 \\
\text{basic flux} & \quad \text{acidic impurity}
\end{align*}
\]

Slag: Combination of gangue with flux in ores forms a fusible material which is called slag.

\[
\begin{align*}
\text{Gangue + flux} & \rightarrow \text{slag} \\
\text{SiO}_2 + \text{CaO} & \rightarrow \text{CaSiO}_3
\end{align*}
\]

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Nature</th>
<th>% of carbon</th>
<th>Calorific value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Peat</td>
<td>50 – 60%</td>
<td>2500 – 3500</td>
</tr>
<tr>
<td>2.</td>
<td>Lignite</td>
<td>60 – 70%</td>
<td>3500 – 4500</td>
</tr>
<tr>
<td>3.</td>
<td>Bituminous</td>
<td>75 – 80%</td>
<td>7500 – 8000</td>
</tr>
<tr>
<td>4.</td>
<td>Anthracite</td>
<td>90 – 95%</td>
<td>6700 – 7500</td>
</tr>
</tbody>
</table>
### Concentration
The process of removal of gangue from the ore is known as concentration of ore. Concentration of ore can be carried out in the following ways depending upon the nature of the ore.

1. Gravity separation
2. Magnetic concentration
3. Froth flotation process
4. Chemical methods

### Calcination
Calcination is a process in which ore is heated, generally in the absence of air, to expel water from hydrated oxide or carbon dioxide from a carbonate at temperature below its melting point example:

\[
\text{Al}_2\text{O}_3 \cdot \text{2H}_2\text{O} \xrightarrow{\Delta} \text{Al}_2\text{O}_3 + 2\text{H}_2\text{O} \\
\text{CaCO}_3 \xrightarrow{\Delta} \text{CaO} + \text{CO}_2
\]

### Roasting
Roasting is a process in which ore is heated usually in the presence of air, at temperatures below its melting points.

\[
\text{ZnS} + 2\text{O}_2 \rightarrow \text{ZnSO}_4 \\
\text{CuS} + 2\text{O}_2 \rightarrow \text{CuSO}_4
\]

### Smelting
The reduction of oxide ore with carbon at high temperature is known as smelting.

\[
\text{Fe}_2\text{O}_3 + 3\text{C} \rightarrow 2\text{Fe} + 3\text{CO}_2 \\
\text{PbO} + \text{C} \rightarrow \text{Pb} + \text{CO}
\]

A series is obtained by arranging the metals in decreasing order of reactivity which is known as Activity series.

### Corrosion
The process of slow conversion of metals into their undesirable compounds (usually oxides) by reaction with moisture and other gases present in the atmosphere is called corrosion.

Examples Rusting of Iron, Green coating on the surface of copper, tarnishing of silver etc are examples of corrosion.

The formula of rust is \(\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}\):

Reactivity of the metal, Presence of impurities, Air and moisture, Strains in metal, Presence of electrolytes etc are factors which affect the corrosion.

### Important metals and their ores

<table>
<thead>
<tr>
<th>Metal</th>
<th>Ores</th>
<th>Chemical Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium (Na)</td>
<td>Chile salt peter</td>
<td>NaNO₃</td>
</tr>
<tr>
<td></td>
<td>Trona</td>
<td>Na₂CO₃ 2NaHCO₃ · H₂O</td>
</tr>
<tr>
<td></td>
<td>Borax</td>
<td>Na₂B₄O₇ · 10H₂O</td>
</tr>
<tr>
<td></td>
<td>Common salt</td>
<td>NaCl</td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>Dolomite</td>
<td>CaCO₃</td>
</tr>
<tr>
<td></td>
<td>Calcite</td>
<td>CaCO₃</td>
</tr>
<tr>
<td></td>
<td>Gypsum</td>
<td>CaSO₄ · 2H₂O</td>
</tr>
<tr>
<td></td>
<td>Fluorspar</td>
<td>Ca₃F₈</td>
</tr>
<tr>
<td></td>
<td>Asbestos</td>
<td>Ca₃SiO₅ · MgSiO₃</td>
</tr>
<tr>
<td>Bismuth (Bl)</td>
<td>Bismuthite</td>
<td>Fe₂O₃</td>
</tr>
<tr>
<td></td>
<td>Haematite</td>
<td>Fe₂O₃</td>
</tr>
<tr>
<td></td>
<td>Wollastonite</td>
<td>Fe₂O₃</td>
</tr>
<tr>
<td></td>
<td>Magnetite</td>
<td>Fe₂O₃</td>
</tr>
<tr>
<td></td>
<td>Siderite</td>
<td>Fe₂O₃</td>
</tr>
<tr>
<td></td>
<td>Iron Pyrite</td>
<td>CuFe₂S₄</td>
</tr>
<tr>
<td></td>
<td>Copper Pyrites</td>
<td>CuFe₂S₄</td>
</tr>
<tr>
<td></td>
<td>Smectite</td>
<td>NiS</td>
</tr>
</tbody>
</table>

### Metal

<table>
<thead>
<tr>
<th>Ores</th>
<th>Chemical Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum (Al)</td>
<td>Al₂O₃ · 2H₂O</td>
</tr>
<tr>
<td>Bauxite</td>
<td>Al₂O₃</td>
</tr>
<tr>
<td>Corundum</td>
<td>Al₂O₃</td>
</tr>
<tr>
<td>Felspar</td>
<td>Na₃AlF₆</td>
</tr>
<tr>
<td>Cryolite</td>
<td>K₂AlSi₂O₅ · 4Al(OH)₃</td>
</tr>
<tr>
<td>Alunite</td>
<td>3Al₂O₃ · 6SiO₂ · 2H₂O</td>
</tr>
<tr>
<td>Kaolin</td>
<td></td>
</tr>
<tr>
<td>Potassium (K)</td>
<td></td>
</tr>
<tr>
<td>Nitre (salt peter)</td>
<td>KNO₃</td>
</tr>
<tr>
<td>Carnallite</td>
<td>KCl · MgCl₂ · 6H₂O</td>
</tr>
<tr>
<td>Magnesite</td>
<td>MgCO₃</td>
</tr>
<tr>
<td>Dolomite</td>
<td>MgCO₃ · CaCO₃</td>
</tr>
<tr>
<td>Epsom salt</td>
<td>MgSO₄ · 7H₂O</td>
</tr>
<tr>
<td>Kieserite</td>
<td>MgSO₄ · H₂O</td>
</tr>
<tr>
<td>Carnallite</td>
<td>KCl · MgCl₂ · 6H₂O</td>
</tr>
<tr>
<td>Strontium (Sr)</td>
<td></td>
</tr>
<tr>
<td>Strontianite</td>
<td>SrCO₃</td>
</tr>
<tr>
<td>Silexite</td>
<td>SrSO₄</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td></td>
</tr>
<tr>
<td>Cuprite</td>
<td>CuO</td>
</tr>
<tr>
<td>Copper glance</td>
<td>Cu₂S</td>
</tr>
<tr>
<td>Copper pyrites</td>
<td>CuFe₂</td>
</tr>
<tr>
<td>Silver (Ag)</td>
<td></td>
</tr>
<tr>
<td>Ruby Silver</td>
<td>Ag₃S · AgS₂</td>
</tr>
<tr>
<td>Horn Silver</td>
<td>AgCl</td>
</tr>
<tr>
<td>Glass (K)</td>
<td></td>
</tr>
<tr>
<td>Calaverite</td>
<td>Au₂S₃</td>
</tr>
<tr>
<td>Silvenites</td>
<td>AgCl</td>
</tr>
<tr>
<td>Gold (Au)</td>
<td></td>
</tr>
<tr>
<td>Galena</td>
<td>Au₂S₃</td>
</tr>
<tr>
<td>Barytes</td>
<td>AgCl</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td></td>
</tr>
<tr>
<td>Zinc blende</td>
<td>ZnS</td>
</tr>
<tr>
<td>Zincite</td>
<td>ZnO</td>
</tr>
<tr>
<td>Calamine</td>
<td>ZnCO₃</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td></td>
</tr>
<tr>
<td>Cinnabar</td>
<td>HgS</td>
</tr>
<tr>
<td>Tin (Sn)</td>
<td></td>
</tr>
<tr>
<td>Casseterite</td>
<td>SnO₂</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td></td>
</tr>
<tr>
<td>Galena</td>
<td>PbS</td>
</tr>
<tr>
<td>Antimony (Sb)</td>
<td></td>
</tr>
<tr>
<td>Stibnite</td>
<td>Sb₂S₅</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td></td>
</tr>
<tr>
<td>Greenocite</td>
<td>CdS</td>
</tr>
<tr>
<td>Bismuth (Bl)</td>
<td></td>
</tr>
<tr>
<td>Bismuthite</td>
<td>Bi₂S₅</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td></td>
</tr>
<tr>
<td>Haematite</td>
<td>Fe₂O₃</td>
</tr>
<tr>
<td>Lemontite</td>
<td>Fe₂O₃</td>
</tr>
<tr>
<td>Magnetite</td>
<td>Fe₂O₃</td>
</tr>
<tr>
<td>Siderite</td>
<td>Fe₂O₃</td>
</tr>
<tr>
<td>Copper Pyrites</td>
<td></td>
</tr>
<tr>
<td>Smectite</td>
<td>NiS</td>
</tr>
<tr>
<td>Cobalt (Co)</td>
<td></td>
</tr>
<tr>
<td>Milarite</td>
<td>NiS</td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td></td>
</tr>
<tr>
<td>Milarite</td>
<td>NiS</td>
</tr>
</tbody>
</table>
### Metal and Ores

<table>
<thead>
<tr>
<th>Metal</th>
<th>Ores</th>
<th>Chemical Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesi</td>
<td>Pyrolusite, Magnite</td>
<td>MnO, Mn₂O₃ · 2H₂O</td>
</tr>
<tr>
<td>Uranium</td>
<td>Carnetite, Pitchblende</td>
<td>K(UO₂)₂, VO₄ · 3H₂O, UO₂O₆</td>
</tr>
</tbody>
</table>

### Important Alloys & their uses

<table>
<thead>
<tr>
<th>Alloys</th>
<th>Compositions</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brass</td>
<td>Cu (70%) + Zn (30%)</td>
<td>In making utensils</td>
</tr>
<tr>
<td>Bronze</td>
<td>Cu (90%) + Sn (10%)</td>
<td>In making coins, bell and utensils</td>
</tr>
<tr>
<td>German Silver</td>
<td>Cu + Zn + Ni (60% + 20% + 20%)</td>
<td>In making guns, barrels, gears &amp; bearings</td>
</tr>
<tr>
<td>Rolled gold</td>
<td>Cu (90%) + Al (10%)</td>
<td>In making cheap ornaments</td>
</tr>
<tr>
<td>Gun metal</td>
<td>Cu + Sn + Zn + Pb (88%)</td>
<td>In making guns, barrels, gears &amp; bearings</td>
</tr>
<tr>
<td>Delta metal</td>
<td>Cu + Zn + Fe (10% 1% 1%)</td>
<td>In making blades of aeroplane</td>
</tr>
<tr>
<td>Munz metal</td>
<td>Cu (60%) + Zn (40%)</td>
<td>In making coins</td>
</tr>
<tr>
<td>Dutch metal</td>
<td>Cu (80%) + Zn (20%)</td>
<td>In making Artificial ornaments</td>
</tr>
<tr>
<td>Monel metal</td>
<td>Cu (70%) + Ni (30%)</td>
<td>For base containing container</td>
</tr>
<tr>
<td>Rose metal</td>
<td>Bi + Pb + Sn (50% 28% 22%)</td>
<td>For making automatic fuse</td>
</tr>
<tr>
<td>Solder</td>
<td>Pb (50%) + Sn (50%)</td>
<td>For soldering</td>
</tr>
<tr>
<td>Magnalium</td>
<td>Al (95%) + Mg (5%)</td>
<td>For frame of Aeroplane</td>
</tr>
<tr>
<td>Duralumin</td>
<td>Al + Cu + Mg + Mn (94% 3% 2% 1%)</td>
<td>For making utensils</td>
</tr>
<tr>
<td>Type metal</td>
<td>Sn + Pb + Sb (5% 80% 15%)</td>
<td>In printing industry</td>
</tr>
<tr>
<td>Bell metal</td>
<td>Cu (80%) + Sn (20%)</td>
<td>For casting bells, statues</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>Fe + Cr + Ni + C (75% 15% 10% 0.5%)</td>
<td>For making utensils and surgical cutlery</td>
</tr>
<tr>
<td>Nickel steel</td>
<td>Fe (95%) + Ni (5%)</td>
<td>For making electrical wire, automobile parts</td>
</tr>
</tbody>
</table>

**Amalgam:** An alloy in which one of the component metals is mercury, is called amalgam.

### Compounds of metal and non-metal and their uses:

1. **Ferrous oxide** (FeO): In green glass, Ferrous salt.
2. **Ferric oxide** (Fe₂O₃): In electroplating of ornaments and formation of ferric salt.
3. **Ferrous sulphate** (FeSO₄ · 7H₂O): In dye industry, and Mohr's salt.
4. **Ferrous hydroxide** [(Fe(OH)₂)₂]: In laboratory reagent and in making medicines.
5. **Iodine** (I₂): (a) As antiseptic, (b) In making tincture of iodine.
6. **Bromine** (Br₂): (a) In dye industry, (b) As laboratory reagent.
7. **Chlorine** (Cl₂): In the formation of Mustard gas (b) Bleaching powder.
8. **Hydrochloric acid** (HCl): In the formation of aquarea (3 HCl : 1 HNO₃) and dyes.
9. **Sulphuric acid** (H₂SO₄): (a) As a reagent, (b) In purification of petroleum, (c) In lead storage battery.
10. **Sulphur dioxide** (SO₂): (a) As oxidants & reductants, (b) As bleaching agent.
11. **Sulphur** (S): Antiseptics, vulcanization of rubber, gun powder, medicine.
12. **Ammonia** (NH₃): As reagent in ice factory.
13. **Phosphorus** (P₄): Refrigerant, in match industry etc.
14. **Carbon monoxide** (CO): Calomel, Insecticides (Corrosive sublimate).
15. **Carbon dioxide** (CO₂): In phosgene gas (COCl₂).
16. **Water gas** (CO + H₂): (a) As fuel, (b) Welding work.
17. **Coal gas** (a) As fuel, (b) Inert atmosphere.
20. **Carbon oxide** (CO): In phosgene gas (COCl₂).
21. **Graphite**: As electrodes.
22. **Diamond**: Ornaments, Glass cutting, Rock drilling.
23. **Alum** [K₂SO₄ · Al₂(SO₄)₃ · 24H₂O]: (a) Purification of water, (b) Leather industry.
24. **Aluminium sulphate** [Al₂(SO₄)₃ · 18H₂O]: In paper industry, fire extinguisher.
25. **Anhydrous aluminium chloride** (AlCl₃): Cracking of petroleum.
26. **Mercuric chloride** (HgCl₂): Calomel, Insecticides (Corrosive sublimate).
27. **Mercuric oxide** (HgO): Ointment, poison.
28. **Mercury** (Hg): Thermometer, vermilion, amalgam.
29. **Zinc Sulphide** (ZnS): White pigment.
30. **Zinc Sulphate** (ZnSO₄ · 7H₂O): Lithopone, Eye ointment.
31. **Zinc Chloride** (ZnCl₂): Textile industry.
32. **Zinc oxide** (ZnO): Ointment.
33. **Zinc** (Zn): In battery.
34. **Calcium carbide** (CaC₂): Calcium cyanide & acetylene gas.
35. **Calcium carbide** (CaC₂): Calcium cyanide & acetylene gas.
36. **Bleaching powder** [Ca(OCl)₂]: Insecticides, Bleaching actions.
37. **Calcium carbonate** (CaCO₃): Lime & toothpaste.
13. Important Facts About Some Metals

- Zinc phosphide is used for killing rats.
- Wood furnitures are coated with zinc chloride to prevent termites.
- Excess of copper in human beings causes disease called Wilson.
- Galvanised iron is coated with zinc.
- Rusting of iron is a chemical change which increases the weight of iron.
- Calcium hydroxide is called hydrolith.
- Calcium hydroxide is used to prepare fire proof and waterproof clothes.
- In flash-bulb, magnesium wire is kept in atmosphere of nitrogen gas.
- Titanium is called strategic metal because it is lighter than iron.
- Group 1st element are called alkali metals because its hydroxides are alkaline whereas group 2nd elements are called alkaline earth metals.
- Babbitt metal contains 89% Sn (Tin), 9% Sb (Antimony) and 2% Cu (Copper).
- Gun powder contains 75% Potassium nitrate, 10% sulphur and 15% charcoal.
- Chromium trioxide is known as chromic acid.
- Nichrome wire is used in electrical heater [(Ni, Cr, Fe)]
- Potassium carbonate (K₂CO₃) is known as pearlash.
- Generally transition metals and their compounds are coloured.
- Zeolite is used to remove hardness of water.
- In cytochrome iron (Fe) is present.
- Selenium metal is used in photo electric cell.
- Gallium metal is liquid at room temperature.
- Palladium metal is used in aeroplane.
Hydrogen (H₂)

The lightest gas having three isotopes: Proton, Deuterium, Tritium (Radioactive)

Proton is only one isotope in Periodic Table having zero neutron.

Liquid hydrogen is used as rocket fuel.

Hydrogen is known as range element because it may keep in group I & group VII A.

Water (H₂O)

- Hard water – Less froth with soap
- Soft water – more froth with soap.
- Hard water – Due to the presence of soluble impurities of bicarbonates, chlorides & sulphates of Ca & Mg.
- Temporary hardness – Due to the presence of bicarbonate of calcium and magnesium.
- Permanent hardness – Due to the presence of chlorides and sulphates of calcium and magnesium.
- Temporary hardness is removed by boiling and by Clark's method while permanent hardness is removed by Soda ash (Na₂CO₃) process.
- Permanent hardness is also removed by permutit process.
- In ice every molecule of H₂O is associated with four other H₂O molecules by hydrogen bonding in a tetrahedral fashion. Thus, ice has an open structure with large empty space due to existence of hydrogen bonding. Thus ice has less density than water.
- As ice melts at 0°C, a number of hydrogen bonds are broken down and space between water molecules decreases so that water molecules move closer together. Therefore, the density of water increases and maximum at 0°C to 4°C. Above 4°C the increase in Kinetic Energy of the molecules is sufficient to cause the molecule to disperse and the result is that the density steadily decreases with increases in temperature.

Oxygen

Important constituent of air, exists in three different isotopes.

Important constituent of air, exists in three different isotopes.

Ozone (O₃) is the allotrope of Oxygen.

Ozone reduces the effect of ultraviolet rays in the atmosphere.

Nitrogen

- 78% by volume in atmosphere, liquid nitrogen is used for refrigeration.
- Nitrogen gas is essential for protein synthesis.
- Ammonia is an important compound of N₂ which is prepared by Haber's process.
Ammonia
As refrigerant, in the manufacture of HNO₃.
In fertilizer like urea, ammonium sulphate etc.
In the manufacture of Na₂CO₃ & NaHCO₃.
In preparation of ammonium salt.
In preparation of explosive.
In preparation of Artificial silk.
Nitrogen fixation in leguminous plants

Phosphorous
An important constituent of animals and plants. It is present in bones & DNA.
Phosphorous is an essential constituent of nucleic acid.
Phosphorous shows allotropy - White or yellow phosphorous, Red phosphorous, Black phosphorous etc.
White phosphorous is more reactive than red phosphorous.

Sulphur Dioxide (SO₂)
Sulphur dioxide (SO₂) acts as bleaching agent due to its reducing nature and bleaches in presence of moisture.

\[ \text{SO}_2 + 2\text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4 + 2(\text{H}) \]

Coloured matter + H \rightarrow Colourless matter
(Bleached)

The bleaching by SO₂ is temporary. When the bleached article is exposed to air, it regains its original colour.

Halogens
17th group elements

Uses of fluorine: In the preparation of UF₆ and SF₆ for energy production and as dielectric constant respectively.

By using HF, chloro fluoro carbon compound and polytetra fluoro ethylene can be synthesised.

Chlororfluoro carbon is known as Freon used as refrigerant and aerosol.
Non-stick utensil is made up of teflon.
Chlorine is used to prepare PVC, insecticides herbicides etc.
Chlorine also acts as a bleaching agent and its bleaching action is due to oxidation

\[ \text{Cl}_2 + \text{H}_2\text{O} \rightarrow 2\text{HCl} + (\text{O}) \]

Coloured substance + (O) \rightarrow Colourless product
(Bleached)

The bleaching action of chlorine is permanent. The colour of bleached articles can not be restored. It acts as bleaching agent for vegetable and organic matter, petrol. In the preparation of AgBr which is used in photography.

Inert gases
It belongs to 18th group of P.T.

He, Ne, Ar, Kr, Xe, Rn

Except Rn, all inert gases are present in atmosphere.
Argon is used in Arc. welding & electric bulb.
Helium is light & non-inflammable so, used in balloon, weather indicator etc.
Neon is used in discharge tube glow light.

15. Common Facts

<table>
<thead>
<tr>
<th>Catalyst</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe + Mo</td>
<td>Synthesis of NH₃ by Haber's process.</td>
</tr>
<tr>
<td>Ni</td>
<td>Synthesis of vanaspati Ghee (hydrogenation)</td>
</tr>
<tr>
<td>Pt</td>
<td>Synthesis of H₂SO₄ by Contact process.</td>
</tr>
<tr>
<td>NO</td>
<td>In the manufacture of H₂SO₄ by the Lead chamber process.</td>
</tr>
<tr>
<td>Hot Al₂O₃</td>
<td>In the preparation of Ether from Alcohol.</td>
</tr>
<tr>
<td>CuCl₂</td>
<td>Preparation of chlorine gas by Deacon process.</td>
</tr>
</tbody>
</table>

Some Important Explosive

- Dynamite: It was discovered Alfred Nobel in 1863. It is prepared by absorption of raw dust with Nitro-glycerine. In modern dynamite Sodium Nitrate is used in place of Nitro-glycerine.
- Tri Nitro Toluene (TNT)
- Tri Nitro Benzene (TNB)
- Tri Nitro Phenol (TNP): It is also known as picric acid.
- R.D.X is highly explosive known as plastisizer in which Aluminium powder is mixed to increase the temperature and the speed of fire.

Some Important Facts

- Age of fossils and archeological excavation is determined by radioactive carbon (C¹⁴).
- Diamond has maximum refractive index and due to total internal reflection. It has lustre.
- Chloroform in sunlight forms poisonous gas ‘Phosgene’ (COCl₂).
- To decrease the basicity of soil gypsum is used.
- In the preparation of Talcum powder theosophal mineral is used.
- Potassium chloride is most suitable for the removal of permanent hardness of water.
- To avoid melting of ice gelatine is used.
- When dry ice is heated it is directly converted into gas.
- Saccharine is prepared from toluene.
- Cream is a type of milk in which amount of fat is increased while amount of water decrease.
- From one kilogram of honeybee 3500 calorie energy is produced.
- N₂O is known as laughing gas.
- Bones contain about 58% calcium phosphate.
- Phosphine gas is used in voyage as Holmes signal.
Chlorine gas bleaches the colour of flower due to oxidation.
- Red phosphorus is used in match industry.
- Urea contains 46% nitrogen.
- In the electroplating of vessel NH₄Cl is used.
- Power alcohol is prepared from mixing pure alcohol in benzene which is used as rocket fuel.
- Artificial perfumes are prepared from Ethyl acetate.
- Urea was the first organic compound synthesised in Laboratory.
- Vinegar contains 10% acetic acid.
- Acetylene is used for light production.
- Ferric chloride is used to stop bleeding.
- Barium is responsible for green colour in fireworks.
- Cesium is used in solar cells.
- Yellow phosphorus is kept in water.
- Sea weeds contains iodine.
- During cooking maximum vitamin is lost.
- For the preparation of silver mirror, glucose is used.
- When cream is separated from milk, it's density increases.
- For artificial respiration mixture of oxygen and helium gas cylinder is used.
- In cold places, to decrease the freezing point ethylene glycol is used.
- Hydrogen peroxide is used for oil paintings.
- Sodium is kept in kerosene oil.
- The heaviest element is Osmium (Os).
- The lightest element, least dense and most reductant is lithium (Li).
- Fluorine is the most oxidising agent.
- Silver is the best conductor of electricity.
- Radon is the heaviest gas.
- Polonium has the maximum number of isotopes.
- Sulphuric acid is known as oil of vitriol.
- Noble metals — Ag, Au, Pt, Ir, Hg, Pd, Rh, Ru, and Os.
- When methyl alcohol (methanol) is taken even in minute quantities, it acts as poison and serves as a cause for blindness.
- Glass makes a soluble silicate in hydrofluoric acid (HF). This is the reason why hydrofluoric acid is not stored in glass containers.
- The density of gold is higher than the density of mercury. So, gold 
  in mercury.
- Bisphenol A is a chemical used for progress in food packaging material.
- Xenon is also called stranger gas.
- If soluble substance is added to a liquid, the surface tension of that liquid is increased.
- Conversion of force nitrogen in atmosphere into nitrates is known as Nitrogen fixation.

Picric acid is an organic compound which is used as a reagent in Laboratory.
- Bones are composed of 8% phosphorous.
- Safety matches are made by using red phosphorous.
- Ammonium chloride is used to electroplate utensils.
- Benzene or Ether is dissolved in pure alcohol to form power alcohol, which is used as a fuel for aeroplanes.
- Milk is an emulsion.
- Platinum is also called 'White Gold'.

16. Man made substances

1. Fertilizers: The substances added to the soil to make up the deficiency of essential elements are known as fertilizers, these are either natural or synthetic (chemical). For a chemical fertilizer, the following requirements should be met:
   (a) It must be sufficiently soluble in water
   (b) It should be stable so that the element in it may be available for a longer time.
   (c) It should contain nothing injurious to plants.

Phosphatic Fertilizers: The minerals of phosphorous such as phosphorite
  (Ca₅(PO₄)₃) and apatite (3Ca₃(PO₄)₂ - CaF) are sparingly soluble in water and thus
don't serve as a source of phosphorous for plants. Therefore, these are converted
into soluble materials which can act as good fertilizers. Important phosphatic
fertilizers are—

1. Calcium superphosphate
2. Nitrophosphate
3. Triple phosphate
4. Phosphatic slag

Nitrogenous Fertilizers: Plants need nitrogen for rapid growth and increase
in their protein content. For this reason, nitrogenous fertilizers become more
important. The chief nitrogenous fertilizers are ammonium sulphate, calcium
cyanamide, ammonium nitrate, urea, calcium ammonium nitrate. Urea contains
46.6% nitrogen.

Potash Fertilizers: Potassium gives the structural length to plants. Potassium
nitrate, potassium chloride and potassium sulphaes etc. are important potash fertilizers.

NPK Fertilizers: Fertilizers containing N, P, and K in suitable adjusted proportions
are known as NPK fertilizers. These are obtained by mixing nitrogenous, phosphatic
and potash fertilizers in suitable proportions. Expression like 4-8-2 used for a mixed
fertilizer indicates that it contains 4% N, 8% P₂O₅ and 2% K₂O.

2. Dyes: Coloured substances used for colouring textiles, foodstuffs, silk, wool,
etc. are called dyes.

Different classes of dyes are given below.

(a) Nitro dyes: These are polynitro derivatives of phenol where nitro group
acts as a chromophore and hydroxyl group as auxochrome.

(b) Azo dyes: These are an important class of dyes and are characterised by the
presence of azo group (—N—N—) as the chromophore. The groups like NH₂,
NR₂ or —OH, etc. present in the molecule containing one or more azo groups act
as the auxochromes.
(c) Triphenylmethane dyes: These dyes contain the paraquinoid moiety as a chromophore and \(-\text{OH}, -\text{NH}_2\) or \(-\text{NR}_2\) as auxochrome. These dyes are not fast to light and washing and hence are mainly used for colouring paper or typewriter ribbons, e.g. malachite green which is used for dyeing wool and silk directly and cotton after mordanting with tannin.

(d) Mordant dyes: Those dyes which are fixed on the fibre with the help of a mordant are known as mordant dyes. For acidic dyes, basic mordants (such as hydroxides of iron, aluminium and chromium) are used, while for basic dyes, acidic mordants (like tannic acid) are used. Here the fabric is first dipped into a solution of mordant and then into the dye solution. The colour produced depends on the nature of the mordant used.

(e) Vat dyes: These are water insoluble dyes and are introduced into the fibre in its soluble reduced form, also known as leucoform (colourless). These are called vat dyes because reducing operation (using sodium hydrosulphite) was formerly carried out in wooden vats. Indigo is a vat dye and is used for dyeing cotton.

Cement: It is a complex material containing the silicates of calcium and aluminium. A paste of it in water sets into a hard rocky mass—called the setting of cement. A paste of sand, cement and water called mortar, is very conveniently used for joining bricks and plastering walls.

A mixture of stone chips (gravel) sand cement and water known as concrete sets harder than ordinary mortar. It is used for flooring and making roads. Concrete with steel bars and wires called reinforced concrete (RC) forms a very strong material. It is used for constructing roofs, bridges and pillars.

In 1824, by an English Mason, Joseph Aspdin who observed that when strongly heated mixture of limestone and clay was mixed with water and allow to stand, it hardened to a stone-like mass which resembled Portland rock—a famous building stone of England. Since then the name Portland cement has been given to a mixture containing high percentage of lime with silica, iron oxide, alumina etc.

Glass: Supercooled liquid called glass, \(\text{SiO}_2\) is its common constituent.

(a) Soda glass or soda lime glass: It is Sodium calcium silicate (\(\text{Na}_2\text{O} \cdot \text{CaO} \cdot 5 \text{SiO}_2\)). It is the cheapest of all glasses and used for making window panes and bottles and easily attacked by chemicals.

(b) Potash glass: It contains potassium in place of sodium. It has higher softening temperature as also a greater resistance to chemicals. So it is used for chemical apparatus: beakers, flasks, funnels etc.

(c) Optical glass: It is used for making lenses, prisms and optical instruments like telescopes and microscopes. It contains boric oxide (\(\text{B}_2\text{O}_3\)) and silica (\(\text{SiO}_2\)).

Types:
1. Crown glass: Contains \(\text{K}_2\text{O} \& \text{BaO}\) as the basic oxide
2. Flint glass: Contains PbO as the basic oxide.

(d) Crooks glass: for spectacles: Absorbs ultraviolet rays which are harmful for the eyes.

(e) Lead crystal and crystal glass: Lead glass sparkles used for making decorative items. It contains 24% or more of PbO called lead crystal. If it contains term than 24% lead oxide called crystal glass.

(f) Borosilicate glass: It contains less alkali (\(\text{K}_2\text{O} \text{ or CaO}\)) and more \(\text{SiO}_2\) than potash glass and some \(\text{B}_2\text{O}_3\).

(g) Coloured glass:

<table>
<thead>
<tr>
<th>Colour</th>
<th>Substance added to the glass melt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Selenium (Se) or copper (I) oxide ((\text{Cu}_2\text{O}))</td>
</tr>
<tr>
<td>Green</td>
<td>Chromium III oxide ((\text{Cr}_2\text{O}_3))</td>
</tr>
<tr>
<td>Violet</td>
<td>Manganese IV oxide ((\text{MnO}_2))</td>
</tr>
<tr>
<td>Blue</td>
<td>Copper II oxide ((\text{CuO})) or cobalt II oxide ((\text{CoO}))</td>
</tr>
<tr>
<td>Brown</td>
<td>Iron on III oxide ((\text{Fe}_2\text{O}_3))</td>
</tr>
</tbody>
</table>

It is used for making artificial jewellery, crockery and stained glass windows.

(h) Milky glass: Milky glass is prepared by adding tin oxide (\(\text{SnO}_2\)). Calcium phosphate (\(\text{Ca}_3(\text{PO}_4)_2\)) or cryolite (\(\text{AlF}_3\cdot3\text{NaF}\)) to the melt glass. All these substances are white so look milky.

(j) Glass laminates: It is made by fixing polymer sheets between layers of glass. It is used to make windows & Screens of cars, trains and aircraft specially manufactured glass laminates are used bulletproof material.

Polymerisation: The simple molecules which combine to form a macro molecule is called polymer. The process by which the simple molecules (monomers) are converted polymer is called polymerisation.

\[
n\text{CH}_2 = \text{CH}_2 \xrightarrow{\text{polymerisation}} \left(-\text{CH}_2-\text{CH}_2-\right)_n
\]

Some common man-made polymers and their uses.

<table>
<thead>
<tr>
<th>Polymer</th>
<th>Use</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polythene</td>
<td>Packaging material, carry bags, bottles.</td>
<td>Bottles, Crates.</td>
</tr>
<tr>
<td>Polypropene</td>
<td>Pipes insulation</td>
<td>Fibres, ropes</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC)</td>
<td>Nonstick kitchen ware</td>
<td></td>
</tr>
<tr>
<td>Nylon (Polyester)</td>
<td>Rubber erasers</td>
<td></td>
</tr>
<tr>
<td>Teflon</td>
<td>Foam Thermocole</td>
<td>Foam Thermocole</td>
</tr>
<tr>
<td>Polystyrene</td>
<td>Rubber bubble gum</td>
<td>Rubber bubble gum</td>
</tr>
<tr>
<td>Pol (Styrene butadiene)</td>
<td>Electrical insulation buttons</td>
<td></td>
</tr>
<tr>
<td>Bakelite</td>
<td>Bullet proof glass</td>
<td>Bullet proof glass</td>
</tr>
<tr>
<td>Lexan</td>
<td>Crockery</td>
<td>Crockery</td>
</tr>
</tbody>
</table>

Melamine

Paints: Paints can be applied on a surface to protect it from corrosion and weathering or to give it an attractive look.

A paint contains a pigment, a vehicle and a thinner. Zinc oxide, white lead and titanium oxide are the commonly used white pigments. The pigments is mixed with weathering or to give it an attractive look.
1. Introduction

Biology – Branch of science in which living being is studied.

Bios = Life & Logos = Study. Therefore study of life is called Biology. The term biology was first coined by Lamarck and Treviranus in the year 1801. Biology has two main branches—

1. Botany: Study of different aspects of plants. Theophrastus is known as the father of Botany.
2. Zoology: Study of various aspects of animals. Aristotle is called father of Zoology as well as Biology.

Important Terms of Biology:

- Anatomy: Study of internal structure of organism.
- Agrology: Soil science dealing specially with production of crop.
- Agrostology: Study of grass.
- Arthology: Study of joints.
- Apiculture: Rearing of honey bee for honey.
- Anthropology: Study of origin, development and relationship between the culture of past and present human.
- Anthology: Study of flower and flowering plant.
- Angiology: Study of blood vascular system including arteries and veins.
- Andrology: Study of male reproductive organ.
- Bryology: Study of Bryophytes.
- Biometrics: Static study of Biological problem.
- Biomedical Engineering: Production and designing of spare part for overcoming various defects in man e.g., Artificial limbs, Iron lung, Pacemaker etc.
- Biotechnology: Technology concerned with living beings for wilful manipulation on molecular level.
- Bacteriology: Study of bacteria.
- Cytology: Study of cell.
- Cryobiology: It is the study of effect of low temperature on organisms and their preservation.
- Clone: Clones are genetically identical individual in a population.
- Cardiology: Study of heart.
- Demography: Study of population.
- Diffusion: Random movement of molecule/ion or gases from a region of higher concentration to lower concentration.
- Dermatology: Study of skin.
- Dendrochronology: Counting and analysing annual growth rings of tree to know its age.
Evolution: Study of origin of life, variation and formation of new species.
Embryology: Study of fertilization of egg, formation of zygote and development of embryo.
Eugenics: Study of factors connected with the improvement of human race.
Euthenics: Study of environmental conditions that contribute to the improvement of human beings.
Euphenics: Treatment of defective in heredity through genetics engineering.
Ethnology: Study of science dealing with different races of human.
Ethology: Study of animal behaviour in their natural habitats.
Etiology: Study of causative agent of disease.
Entomology: Study of insects.
Exobiology: Study of possibility of life in space.
Floriculture: Cultivation of plant for flower.
Food technology: Scientific processing, preservation, storage and transportation of food.
Forensic science: Application of science for analysis of various facts and evidence to identify the cause or the person involved in criminal act.
Fishery: Catching, breeding, rearing and marketing of fishes.
Forestry: Development and management of forest.
Fermentation: Process of incomplete oxidation that occurs in microbes and other cells in absence of oxygen, leading to the formation of ethyl alcohol.
Genetics: Study of variation and transmission of heredity character from parents to their young ones.
Growth: Permanent increase in weight, volume and size of an organism.
Genetic Engineering: Manipulation of gene in order to improve the organism.
Gynecology: Study of female reproductive organ.
Gerontology: Study of ageing.
Gastroenterology: Study of alimentary canal or stomach and intestine related disorders.
Hypertonic: When two solutions have different solute concentration. The solution which have higher concentration is called hypertonic.
Hypotonic: In two solutions which have lower solute concentration is called hypotonic.
Homeothermic: Animals who have constant body temperature are called homeothermic or warm blooded animal.
Histology: Study of tissue organisation and their internal structure with the help of microscope.
Hygiene: Science taking care of health.
Hydroponics: Study of growing plant without soil in water which contain nutrient.
Haematology: Study of blood.
Hepatology: Study of liver.
Linnaeus is called ‘Father of Taxonomy’. Due to disputed position of organism like bacteria, virus, fungi and euglena, there is a need of reconsideration of system of classification.

The book ‘Genera plantarum’ was written by Bentham and Hooker.

Five Kingdom Classification

Five Kingdom Classification was proposed in 1969 by R.H. Whittaker. The criteria of classifying organism into five kingdoms are complexity of cell structure, complexity of body of organism, mode of nutrition, life style and phylogenetic relationship.

1. Monera: It includes all prokaryotic organisms like bacteria, cyanobacteria and archiobacteria. Filamentous bacteria also come under this kingdom. All organisms of this kingdom are microscopic.

2. Protista: This kingdom includes unicellular forms usually found in aquatic habitats. On the basis of mode of nutrition they are autotrophic, parasitic, and saprophytic. Diatoms, flagellates and protozoa come under this kingdom. Euglena have both heterotrophic and autotrophic mode of nutrition. So, it is placed between plant and animal.

3. Fungi: This kingdom includes non-green plants. It has saprophytic nutrition and growing on dead and decaying organic matter. The cell wall is composed of chitin. Examples: Mushroom, Mucor, Albuta etc.

4. Planatae: This kingdom includes all plants except algae, diatoms, fungi and members of monera and protista.

5. Animalia: Almost all animal comes under this kingdom except protozoan.

Binomial nomenclature: There was a need of uniform international naming of organism. In biology every organism is given two proper names. The first name is genus name always started with capital letter and the second name is species started with small letter. For example scientific name of human is Homo sapiens, Homo is the name of genus, whose one species is sapiens.

Carlos Linnaus is the father of taxonomy.

Scientific Names of Some Organisms

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man</td>
<td>Homo sapiens</td>
</tr>
<tr>
<td>Cat</td>
<td>Felis domestica</td>
</tr>
<tr>
<td>Mango</td>
<td>Mangifera indica</td>
</tr>
<tr>
<td>Gram</td>
<td>Cicer aritinum</td>
</tr>
<tr>
<td>Frog</td>
<td>Rana tigrina</td>
</tr>
<tr>
<td>Dog</td>
<td>Canis familiaris</td>
</tr>
<tr>
<td>Rice</td>
<td>Oryza sativa</td>
</tr>
<tr>
<td>Cow</td>
<td>Bos indicus</td>
</tr>
<tr>
<td>Mustard</td>
<td>Brassica campestris</td>
</tr>
<tr>
<td>Housefly</td>
<td>Musca domestica</td>
</tr>
<tr>
<td>Wheat</td>
<td>Triticum aestivum</td>
</tr>
<tr>
<td>Pea</td>
<td>Pisum sativum</td>
</tr>
</tbody>
</table>

4. Study of Cell

Study of cell is called cytology.

Cell: Cell is the basic structural and functional unit of life.

The word ‘cell’ was first coined by British scientist Robert Hook in the year 1665.
Main features of the cell theory:

1. All organism are composed of cell.
2. Body of every organism is made of cell.
3. Each cell arises from pre-existing cell.
4. Every organism starts its life from single cell.

Cell is of two kinds

1. Prokaryotic cell: These are primitive cell having three basic structure of typical cell but lack nuclear membrane. Nuclear material is present in a region of cytoplasm called nucleoid. Other membrane bound organelles are absent such as mitochondria, lysisome, golgi bodies etc. Ex.- Virus, bacteria and cyanobacteria are prokaryotes.

   - Number of Mitochondria in bacterial cell is zero.
   - The smallest known prokaryotic organism is Mycoplasma.

2. Eukaryotic cell: These are complete cell which contain membrane bound organelles and nucleus. Unicellular and multicellular plant and animal have eukaryotic cell.

   - The biggest single called organism is Acetabularia.
   - Nucleus contain chromatin made up of DNA and histone protein.
   - Nucleolus is present inside nucleus.


<table>
<thead>
<tr>
<th>Difference between Prokaryotes and Eukaryotes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prokaryotes</strong></td>
</tr>
<tr>
<td>1. Size of cell is generally small.</td>
</tr>
<tr>
<td>3. It contain single chromosome which is circular in shape.</td>
</tr>
<tr>
<td>4. Membrane bound cell organelles are absent.</td>
</tr>
<tr>
<td>5. Cell division takes place by fission or budding.</td>
</tr>
</tbody>
</table>

Structure of typical cell:

1. Cell wall: A cell have following structure. In plant cell there is a rigid cell wall which is non living and rigid to the cell.

   - Cell wall of bacteria is made up of peptidoglycan.

2. Cell membrane: It is also known as plasma membrane which form the outer covering of animal cell. In plant cell it is found within cell wall. It is thin, elastic, double layer, permeable membrane. It is made up of phospholipid molecules.

   - Function: It regulates movement of molecules inside and outside of the cell.

3. Protoplasm: The whole fluid present inside plasma membrane is protoplasm. The name protoplasm is given by Purkenje in 1839. Protoplasm is made up of various chemical substances like water, ions, salt and organic molecule. It is the living part of cell.

   - Protoplasm is divided into two parts.

   a. Cytoplasm: The fluid found outside the nuclear membrane.

   b. Nucleoplasm: The fluid found inside the nuclear membrane.

   - 99% of protoplasm is made up of oxygen (76%), carbon (10.5%) hydrogen (10%) and nitrogen (2.5%).

   - 80% of protoplasm is water.

   - The ratio of inorganic and organic compound found in protoplasm is 81:19.

4. Mitochondria: Discovered by Altman in the year 1886. These are cylindrical, rod shaped or spherical structure found in cytoplasm. It is surrounded by double layered membrane. Inner membrane has many fold called cristae. The fluid present inside mitochondria is called matrix, which contains many enzyme and co-enzyme.

   - Mitochondria is considered as prokaryotic cell inside eukaryotic.

   - Function: Mitochondria is the respiratory site of cellular respiration. Mitochondria synthesize energy rich compound ATP. It is also known as ‘Power House’ of the cell.

5. Golgi bodies: Discovered by scientist Camilo Golgi. Golgi bodies are made up of group of tubes, vesicles and vacuoles. In plant it is more in number and here it is known as dictyosomes.

   - Function: It work as storage, processing and packaging of material. It also involved in the synthesis of cell wall, plasma membrane and lysosomes.

   - It help in the synthesis of carbohydrate from simple sugar which combine with protein made by ribosome forming glycoprotein.

6. Endoplasmic reticulum: Membranous network of tubules like structure found in cytoplasm is called endoplasmic reticulum. It is attached with the nucleus on one side and on other side it is joined with plasma membrane.

   - Function: Endoplasmic reticulum helps in the distribution of material. It forms supporting framework of cell.

7. Ribosome: Discovered by Palade. Small granules like structure found attached to the endoplasmic reticulum or in free state. It is made up of ribonucleic acid (RNA).

   - Function: Take part in protein synthesis.

8. Lysosome: Discovered by De Duve. These are sac like structure bounded by single membrane and contain hydrolytic enzyme.

   - Function: It helps in intracellular digestion. The enzyme found in lysosome may digest the entire cell. So it is also known as suicidal bag.

9. Centrosome: Discovered by Boveri. It is only found in animal cell taking part in cell division. It is not bounded by membrane consist of two centriole.

   - Function: Help in the formation of spindle fibre between pole during cell division.

10. Plastid: Only found in plant cell. It is of three type: (a) Chloroplast (b) Chromoplast (c) Leucoplast.
(a) Chloroplasts: These are green pigment found in green plant involve in photosynthesis. So, it is known as 'Kitchen of the cell'. Chloroplast is bounded by two unit membrane having grana and stroma. Grana are membrane bounded sac-like structure found in stacks containing chlorophyll molecule. Stroma is the matrix present inside the chloroplast which contain photosynthetic enzymes and starch grain. Granum is the site of light reaction during photosynthesis while stroma is the site of dark reaction.

Function: Chloroplast provides green colour to plant & take part in photosynthesis.

(b) Chromoplast provides various colours to the plant like flower, fruit etc.

Chromoplasts are of different kind.

Lycopene: In tomato it provide red colour.

Carotene: Provide yellow or orange colour in plant. Example—Carrot.

Betanin: Found in sugar beet.

(c) Leucoplast is colourless. It stores the food in the form of starch, fat & protein.

Leucoplast is found in root and underground stem.

11. Vacuole: It is fluid filled single membrane bounded, dead organelles of cell. In plant cell it is larger in size but in animal it is smaller in size.

Function: It helps in osmoregulation. It stores toxic metabolic waste.

12. Nucleus: The nucleus is a spherical, centrally located is a major structure found in the cell. In plant cell it is shifted towards periphery. It is bounded by double layered nuclear membrane having pore. Within nucleoplasm nucleolus and chromatin material is present. Nucleolus is rich in protein and RNA. Chromatin material is thin thread like structure forming network. This is made up of genetic substance DNA (deoxyribo nucleic acid) and histone protein. During cell division chromatin breaks into pieces and form chromosome.

Function: It controls all the activity of cells. So it is also known as 'control room' of cell. Chromatin transmits hereditary characters from parents to their offspring.

Other than nucleus DNA is also found in mitochondria and chloroplast.

### Difference between Plant and Animal Cells

<table>
<thead>
<tr>
<th>Plant cell</th>
<th>Animal Cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Plant cells are larger in size.</td>
<td>1. Animal cells are generally smaller in size.</td>
</tr>
<tr>
<td>2. Cell wall present, made up of cellulose and chitin.</td>
<td>2. Cell wall absent.</td>
</tr>
<tr>
<td>3. Plastid present.</td>
<td>3. Plastid absent.</td>
</tr>
<tr>
<td>5. Vacuoles are larger in size.</td>
<td>5. Vacuoles are smaller in size.</td>
</tr>
</tbody>
</table>

> The process of imbibition involves both diffusion and capillary action.

> A cell increases in volume when it is placed in hypotonic solution.

### Chromosome

Chromosome is thread like structure found in the nucleus. It becomes visible during cell division. Each chromosome is made up of two chromatids joined together at a point centromere. Bead like structure found on chromosome is called gene. Genes are made up of DNA (deoxyribo nucleic acid) which is the carrier of genetic information from generation to generation. In some viruses RNA is the genetic material called retrovirus. In prokaryotes there is only one chromosome, like bacteria and virus.

Chromosome was named by Waldeyer in 1888 capable of self replication, which transmit coded information from one generation to other.

Eukaryotic cell possess many chromosome. A particular kind of species have definite number of chromosome in their cell, which are in pair known as diploid. The set of unpaired chromosome is called haploid. Gametes have haploid set of chromosome.

<table>
<thead>
<tr>
<th>Number of chromosome in different organism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organism</td>
</tr>
<tr>
<td>Pig</td>
</tr>
<tr>
<td>Cat</td>
</tr>
<tr>
<td>Onion</td>
</tr>
</tbody>
</table>

### Nucleic Acid

Nucleic acid is complex organic compound found in cell. It contains special genetic instruction in coded form. Nucleic acids are of two kinds—

- A. Deoxyribo Nucleic Acid (DNA):
  - **Frederic Mescher** was the first who isolated DNA from the nucleus of pus cells. DNA is a macro molecule in which large number of nucleotides are present. Chemically a nucleotide has three components:
    - 1. Nitrogen base
    - 2. Sugar
    - 3. Phosphate group

  - Nitrogen base are of two types—*Purines & Pyrimidines*. Purines contain two types of nitrogen base—*Adinine and Guanine*. Pyrimidine nitrogen base are *Thymine and Cytosine*.

  Thus there are four kinds of nucleotides present in DNA.

  *Watson and Crick* gave the structural model of DNA—

  1. DNA molecule is consist of two polynucleotide strand, forming a double helix. Each strand has a backbone of sugar and phosphate. Nitrogen base is attached to the sugar.

  - Sugar + Nitrogen base = Nucleoside.

  - Sugar + Nitrogen base + Phosphate = Nucleotide

2. Nitrogenous base of the two strands of a double helix form a pair with the help of hydrogen bonds. Adenine pairs with thymine where as guanine pairs with cytosine. Adenine and thymine are complementary to each other and cytosine is complementary to guanine.

Nucleotide
complementary to guanine. Hydrogen bonding between nitrogenous base holds the two strands together. This structure can be compared with the steps of spiral staircase.

**Function:**
1. It contains genetic information in coded form.
2. DNA synthesise RNA.

**Note:** DNA is mainly found in nucleus. In small amount it is also found in mitochondria and chloroplast.

- Phosphorous is an essential constituent of nucleic acid.

**Gene:** Gene is hereditary unit which is made by a segment of DNA found on the chromosome.

**B. Ribonucleic Acid (RNA):** RNA is single stranded nucleic acid made up of phosphate, ribose sugar and nitrogen base uracil, adenine, guanine and cytosine. It is found in nucleus as well as cytoplasm.

**RNA is of three kind—**
1. **Messenger RNA (mRNA):** It brings the message from DNA found in the nucleus to cytoplasm in the coded form.
2. **Ribosomal RNA (rRNA):** Present in ribosome which is the site of protein synthesis.
3. **Transfer RNA (tRNA):** It is the carrier of amino acid and transfer it to the ribosome.

**Function:** Synthesis of protein.

**Difference between RNA and DNA**

<table>
<thead>
<tr>
<th>DNA</th>
<th>RNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sugar is deoxyribose type.</td>
<td>1. Sugar is ribose type.</td>
</tr>
<tr>
<td>2. It contains the base adenine, thymine and cytosine and guanine.</td>
<td>2. It contains uracil at the place of thymine.</td>
</tr>
<tr>
<td>3. It is double stranded structure.</td>
<td>3. It is single stranded structure.</td>
</tr>
<tr>
<td>4. It is mainly found in nucleus.</td>
<td>4. It is found in both nucleus and cytoplasm.</td>
</tr>
</tbody>
</table>

**Cell cycle:** It is the sequence of events in which cell duplicates its genetic material, synthesise the other constituents of cell and ultimately divide into two daughter cell.

**Cell Division:** The process in which cell increase in their number is called cell division. It is needed for growth, development and repair of body. There are mainly two kind of cell division—

**A. Mitosis:** Mitosis cell division occur in somatic cell which take part in growth, repair and development. In unicellular organism asexual reproduction takes place by this type of cell division.

**Significance of Mitosis:**
1. After Mitosis cell division one cell divided into two daughter cell in which number of chromosome is equal to the parent cell.
2. Uncontrolled Mitosis may cause tumor or cancerous growth.

**B. Meiosis:** 1. Meiosis cell division occur in reproductive cell. This type of division takes place during the formation of haploid gamete. i.e. ova & sperm.

**2. It is also known as reduction division during which each daughter cell have haploid number of chromosome.**

**3. Four daughter cells are produced from one meiotic cell division.**

**Terms related to cytology:**
- **Karyokinesis:** Division of nucleus during cell division is called Karyokinesis.
- **Cytoplasma:** Division of cytoplasm is called cytoplasma.
- **Diploid:** Two complete set of chromosome is called diploid, found in somatic cell.
- **Haploid:** Single set of chromosome in cell is called haploid, found in gametes.
- **Crossing over:** Exchange of genetic material between two non sister chromatids takes place during meiosis cell division is called crossing over.
- **Homologous chromosome:** A pair of chromosome having same size and shape bearing corresponding gene.
- **Allele:** Alternative form of characters governed by gene.
- **Phenotype:** The character of organism which can be seen directly.
- **Genotype:** Genetic constitution of organism is called genotype.
- **Tonoplast:** The membrane surrounding the vacuole.
- **Unit membrane:** The basic trilamellar structure of cell membrane.

**5. Genetics**

- Transmission of character from one generation to next generation is called heredity.
- The process of transfer of hereditary character from generation to generation is called genetics.
- The name genetics was first coined by W. Watson in 1905.
- Johannes was first used the name gene in 1909.
- Gregor Johann Mendal was the first who gave the idea of heredity based on his experiment in 1822-1884. He is also known as father of genetics.
- Mendal chosen pea plant for his experiment.
- Mendal made a cross between two pure plant having contrasting character for single trait called monohybrid cross i.e. tall and dwarf plant for height.

**Monohybrid Cross**

```
TT (tall plant) × tt (Dwarf plant)
F₁ generation - Tt (All are tall)
F₂ generation - Self pollination
TT (25% tall)   Tt (50% tall hybrid)   tt (25% Dwarf)
Phenotypic ratio : 3:1
Genotypic ratio : 1:2:1
```

```
Dihybrid cross: Mendel made a cross between two pure plant having in two pair of contrasting character i.e. colour and shape of seed called dihybrid cross. He made a cross between plant having round seed with yellow colour and wrinkled seed with green colour.

RRYY  
(Round & yellow seed)  

rryy  
(Wrinkled & green)  

Gametes — RY  

Cross Pollination  

F1 generation: Rr Yy (All are round and yellow seed)  

F2 generation: Self pollination  

<table>
<thead>
<tr>
<th>O</th>
<th>Q</th>
<th>RY</th>
<th>Ry</th>
<th>rY</th>
<th>ry</th>
</tr>
</thead>
<tbody>
<tr>
<td>RY</td>
<td>round</td>
<td>round</td>
<td>round</td>
<td>round</td>
<td>round</td>
</tr>
<tr>
<td>Ry</td>
<td>round</td>
<td>yellow</td>
<td>yellow</td>
<td>yellow</td>
<td>yellow</td>
</tr>
<tr>
<td>rY</td>
<td>yellow</td>
<td>green</td>
<td>green</td>
<td>green</td>
<td>green</td>
</tr>
<tr>
<td>ry</td>
<td>yellow</td>
<td>wrinkled</td>
<td>wrinkled</td>
<td>wrinkled</td>
<td>green</td>
</tr>
</tbody>
</table>

Phenotypic ratio of F2 generation — 9:3:3:1  
Genotypic ratio: 1:2:1:2:4:2:1:2:1  
On the basis of mono and dihybrid cross Mendal proposed law of heredity

1. Law of paired unit: Mendel proposed that when two dissimilar unit factors are present in an individual only one is able to express. One that expresses itself is dominant unit factor while other which fail to express is recessive unit factor. For example tallness is dominant over dwarfness.

2. Law of dominance: Offspring of cross breed parent only show dominant characters in F1 generation.

3. Law of segregation: In F2 generation both the character which is governed by gene is separated.

4. Law of independent assortment: During dihybrid and trihybrid cross two or three pair of characters are taken. These characters segregate separately without depending on other in F2 generation.

Term related to genetics:

- Linkage: Linkage is an exception of Mendel law. When two different gene are present on the same chromosome they express themself together instead of independently. This phenomenon is known as Linkage. The word linkage first coined by Morgan (1910).

- Mutation: A sudden change in the gene which is heritable from one generation to other. The term Mutation was first coined by Hugo De Vries.

Variation: When characters are transmitted from one generation to next generation there is some change. Change in characters by recombination of gene in offspring takes place they looks different from their parents. This phenomenon is known as Variation.

Chromosomal aberrations: Any change in chromosomal structure is known as Chromosomal aberrations.

Cloning: It is a process of producing many identical organism from a single cell having same genetic character as his mother. Ex: Sheep Dolly was produced from single cell.

Tetrapotency: It is the potential ability of a plant cell to grow in a complete plant.

Pluriopotency: It is the potential ability of a cell to develop into any kind of the cell of animal body.

Genetically modified organism (GMO): Manipulation of gene by cutting or joining the segment of DNA to get desired varieties of organism is called genetically modified organism. This is also known as genetic engineering.

Autosomes: Chromosomes found in cell which are responsible for characters other than sex are called autosomes.

Sex chromosome: The pair of chromosome which determine the sex of organism is called sex chromosome. Human have 23 pair of chromosomes in which 22 pair are autosomes and one pair is sex chromosome.

Genome: All gene present in a haploid cell is called genome.

Plasmagen: Gene are found in organelles found in cytoplasm called plasmagen.

Cistron: Functional unit of gene is called cistron.

Muton: Unit of gene responsible for mutation.

Recon: Unit of gene take part in recombination.

S. Benzer (1962) had given the modern definition of gene.

6. Sex Determination in Human

In human male sex chromosome is ‘XY’, where as in female sex chromosome is XX. During gamete formation in male half of the sperm contain ‘X’ chromosome while other half contain ‘Y’ chromosome. In female all gametes contain only one chromosome ‘X’. Thus when a male gamete i.e. sperm carrying type of chromosome that is ‘X’. Thus when a male gamete i.e. sperm carrying ‘X’ chromosome fertilize an ova, the zygote develop into female. When a sperm carrying ‘Y’ chromosome fertilizes an egg, zygote develops into male.

Parent: Female  
Male

Offsprings: Female  
Male  
Female  
Male

Sex determination in human
Barr body is found in female somatic cells.

Fertilization is done in test tube but further development takes place inside mother womb in test tube baby.

Sometime sex determination is regulated by environmental factor. In some reptiles temperature determine the sex at which the fertilized egg is incubated.

In human each cell contains 46 chromosomes. Any addition or removal in the number of sex chromosome or autosome cause genetic disorder.

1. Klinefelter Syndrome: When a male have an extra X or Y chromosome in sex chromosome then the condition will be XXY or XYY instead of XY. The male individual with this syndrome have masculine development but feminize development is not completely suppressed and the individual became sterile.

In female when extra X chromosome is present instead of XX they show normal development but limited fertility. Mental retardness is also seen in this type of syndrome. Number of chromosome became 47 instead of 46.

2. Turner's Syndrome: When female has single sex chromosome (X0) their ovaries are rudimentary, lack of secondary sexual character.

3. Down's Syndrome: When an extra chromosome is added to 21st autosomal chromosomes this lead to develop Down's syndrome. In this syndrome person became Mangolism. The person is mentally retarded, eyes protruded an irregular physical structure is present.

4. Patau's Syndrome: This type of syndrome is develop by an addition of autosomal chromosome in 13th chromosome. There is a cut mark in the lip and person is mentally retarded.

5. Sickle Cell Anaemia: In this disorder erythrocytes destroyed more rapidly than normal leading to anaemia. These occur due to change in 13th autosomal chromosome.

6. Phenylketonuria: It is an in born error of metabolism which result in mental retardation due to change in 12th autosomal chromosomes.

7. Haemophilia: Gene responsible for this disorder is linked with sex chromosomes. This disease lead to failure of blood clotting.

8. Colour blindness: This disorder lead to failure to distinguish red & green colour. The gene responsible for this disease is situated on sex chromosomes.

Number of Chromosomes in Different Organisms:

<table>
<thead>
<tr>
<th>Organism</th>
<th>Chromosomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigeon</td>
<td>80</td>
</tr>
<tr>
<td>Chimpanzee</td>
<td>46</td>
</tr>
<tr>
<td>Rabbit</td>
<td>44</td>
</tr>
<tr>
<td>Frog</td>
<td>26</td>
</tr>
<tr>
<td>House fly</td>
<td>12</td>
</tr>
<tr>
<td>Dog</td>
<td>78</td>
</tr>
<tr>
<td>Potato</td>
<td>48</td>
</tr>
<tr>
<td>Wheat</td>
<td>48</td>
</tr>
<tr>
<td>Tomato</td>
<td>24</td>
</tr>
<tr>
<td>Mosquito</td>
<td>6</td>
</tr>
<tr>
<td>Horse</td>
<td>64</td>
</tr>
<tr>
<td>Human</td>
<td>46</td>
</tr>
<tr>
<td>Cat</td>
<td>38</td>
</tr>
<tr>
<td>Pea</td>
<td>14</td>
</tr>
<tr>
<td>Ascaris</td>
<td>2</td>
</tr>
</tbody>
</table>

7. Organic Evolution

More and more creation of organism by gradual changes from low category to higher animal is called organic evolution. There are several evidence regarding organic evolution.

Homologous organ: Organ which are seen different due to use in its function but internal structure and embryonic development are similar. Ex - Flipper of whale, feather of bat, forelimb of horse, Paw of cat, and hands of human.

Analogous organ: Organ which looks similar due to be used in similar function but their internal structure and embryonic development are different. Ex - Feather of butterfly, bats and birds all looks similar but their internal structure and origin are different.

Vestigial organ: These are organs which appear functionless in an organism but functional in their ancestor. For example, vermiform appendix of large intestine and nictitating membrane of human. Vermiform appendix is functional in herbivorous mammal even now.

Fossils: Fossils are the remains of ancient plant or animal which provide evidences for evolution. Example - Archaeopteryx.

Archaeopteryx: It is a fossils look like bird but bear a number of features found in reptiles. So, it is a connecting link between aves and reptile.

Theories of evolution

1. Carolus Linnaeus (1707-1778) contribution to classification provide an evolutionary relationship among the organism. He was also supported an idea that no species is new. Each and every species originates from some pre-existing species.

2. Jean Baptiste Lamark (1744-1829) tried to explain the evolutionary process in his book Philosophie zoologique. The theory proposed by Lamark is known as theory of inheritance of acquired characters. According to this theory, the use and disuse of an organ lead to acquiring change in the features of that organ. These changes are also inherited to offspring. The favourable changes after long period of time result in evolution of new species. But Lamarkism was very strongly criticised by August Weismann.

3. Charles Robert Darwin (1809-1882) explain the evolutionary principle in his book 'The origin of species'. The theory proposed by him is popularly known as 'Theory of natural selection' or Darwinism. Darwin explained that despite having the enormous potential of fertility, the population of organism remains within a limit. It is due to struggle between members of same species and different species for food, space and mate. Struggle eliminates the unfit individual. The fit organism possess some variations which are favourable and they can leave the progeny to continue the favourable variation. The variation when accumulated for long time give rise to origin of new species with progress in genetics, the sources of variation were explained and Darwin's theory was modified. Now the most excepted theory of evolution is Modern synthetic theory, in which origin of species is based on the interaction of genetic variation and natural selection.

- Among permian, Triassic, Cretaceous and Jurassic geological era cretaceous is the newest one.
- The book which contains information about plant is called red data book.
BOTANY

1. Classification of Plantae

In the year 1883, Eichler has classified the Botanical world as under:

![Plant Kingdom Diagram]

I. Cryptogamous plants

There are no flower and seed in these types of plants. These are classified into the following groups:

1. Thalophyta:
   1. This is the largest group of the plant kingdom.
   2. The body of the plants in this group is thallus like i.e., plant are not differentiated into root, stem and leaves.
   3. There is no conducting tissue. It is divided into two groups.

(a) Algae
   1. The study of algae is called Phycology.
   2. The algae normally have chlorophyll and autotrophic mode of nutrition.

(b) Fungi
   1. Study of fungi is called Mycology.

(b) Fungi
   1. Study of fungi is called Mycology.

II. Phanerogamous or Floral plant

1. These plants are in the forms of trees and bushes. Plant body are differentiated into root, stem & leaves.
2. Plants are woody, perennial and tall. Plant bear naked seed.
3. Its tap roots are well developed.
4. Pollination takes place through air.

The longest plant of the Plant kingdom, *Sequoia gigantea* comes under it. Its height is 120 meters. This is also called Red Wood of California.

- The smallest plant is *Zamia Pygmaea*.
- Living fossils are *Cycas*, *Ginkgo biloba* and *Metasequoia*.
- *Ginkgo biloba* is also called Maiden hair tree.
- Ovule and Antherozoids of *Cycas* is the largest in Plant kingdom.
- Corolloid roof of cypress help in absorption of water and fixation of nitrogen.
- The pollen grains of *Pinus* are so much in number that later it turns into sulphur showers.

**Importance of Gymnosperm**

1. **As a food** - Sago is made by extracting the juice from the stumps of *Cycas*. Therefore, *Cycas* is called *Sago-palm*.
2. **Wood** - The wood of Pine, *Sequoia*, Deodar, Spruce etc is used for making furniture.
3. **Vapour oil** - We get Tarpin oil from the trees of Pine, Cedrus oil from Deodar tree and Cedcast oil from Juniperous wood.
4. **Tannin** - It is useful in tanning and making ink.
5. **Resin** - Resin is extracted from some conical plants which are used in making varnish, polish, paint etc.

- Resin is the product of coniferous tree.
- Best example of polyembryony is citrus.

**(B) Angiosperm**

1. In the plants of this sub-group seeds are found inside the fruits.
2. In these plants root leaves, flowers, fruits and seeds are fully developed.

In the plants of this sub-group there is seed-coat in seeds. On the basis of number of cotyledons plants are divided into two categories -

1. **Monocotyledon**
2. **Dicotyledon**

**Monocotyledon plants** : Those plants which have only one cotyledon in seed.

<table>
<thead>
<tr>
<th>Name of category</th>
<th>Name of main plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liliaceae</td>
<td>Garlic, Onion etc.</td>
</tr>
<tr>
<td>Palmae</td>
<td>Nut, Palm, Coconut, Date etc.</td>
</tr>
<tr>
<td>Gramineae</td>
<td>Wheat, Maize, Bamboo, Sugarcane, Rice, Bajra Oat etc.</td>
</tr>
</tbody>
</table>

**Dicotyledon plants** : Those plants which have two cotyledon in its seed are called dicotyledons. Example :

<table>
<thead>
<tr>
<th>Name of category</th>
<th>Name of main plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cruciferae</td>
<td>Radish, Turnip, Mustard etc.</td>
</tr>
<tr>
<td>Malvaceae</td>
<td>Jute, Lady’s finger</td>
</tr>
</tbody>
</table>

**Name of category** | **Name of main plants**
---|---------------------|
| Leguminosae       | Sunflower, Marigold, Lily etc. |
| Composite         | Lemon, Orange etc. |
| Rutaceae          | Melon, Water melon, Guard bitter etc. |
| Cucurbitaceae     | Potato, Chilly, Brinjal, Belladonna, Tomato etc. |
| Solanaceae        | Strawberry, Apple, Almond etc. |
| Rosaceae          | Leaves are the lungs of plant. |

**Virus**

- Study of virus is called virology.
- Virus was discovered by Russian scientist *Ivanovsky* in the year 1892. (During the tests of Mosaic disease in tobacco).
- In nature, there are ultra microscopic particle known as viruses.
- It has both the characters of living and non living, so it is a connecting link between living & non living.
- Dr. Stanley first isolated the virus causing mosaic disease in tobacco in the form of crystals.

**Characters of virus**

1. They became active inside a living cells.
2. Nucleic acids replicate themselves and they reproduce rapidly.
3. They cause disease like bacteria & fungi.

According to parasitic nature, virus is of three types -

1. **Plant virus** - RNA is present as its nucleic acid.
2. **Animal virus** - DNA or sometimes RNA is found in it.
3. **Bacteriophage** - They depend only on bacteria. They kill the bacteria. DNA is found in them. *Example* - T-2 phage.

- In man virus cause disease like mumps, chicken pox, hepatitis, polio, AIDS and Herpes.
- HIV often change its shape due to the presence of an enzyme reverse transcriptase.
- **Bacteriophages**: Bacteriophages are those virus which infect the bacteria. Example - Tobacco mosaic virus.

**Note**: Those viruses in which RNA is found as genetic material are called Retrovirus.

**Bacteria**

It was discovered by Antony Von Lduwenhook of Holland in the year 1683.

- *Lduwenhook* is called the father of Bacteriology.
- *Lduwenhook* called the father of Bacteriology.
- In the year 1829 *Ehrenberg* called it bacteria.
- The year 1843-1892 - Robert Koch discovered the bacteria of Tuberculosis diseases.
The year 1812-1892 - Louis Pasteur discovered the vaccine of Rabies and pasteurization of milk.

- **Bacillus:** This is rod-like or cylindrical.
- **Round or Coccus:** These are round and the smallest bacteria.
- **Comma shaped or Vibrio:** Like the English sign (,) example - *Vibrio cholerae*.
- **Spirillum:** Spring or screw shaped.

- Some species of *Azotobacter*, *Azospirillum* and *Clostridium* bacteria live freely in the soil and fix atmospheric nitrogen into the nitrogenous compound.
- The bacteria capable of converting nitrite to nitrate is *Nitrosomonas*.
- *Anabaena* and *Nostoc* cyanobacteria fix atmospheric nitrogen into soil.
- The species of *Rhizobium* and *Bradyrhizobium* etc. bacteria live in the roots of Leguminous plants capable of converting atmospheric nitrogen into its compound.
- *Rhizobium* are called symbiotic bacteria.
- The harmful substances produced by the microbes are known as Toxins.

**Note:** To preserve the milk for many days pasteurization is done. There are two methods of pasteurization:

1. **Low temperature holding method (LTHH):** Milk is boiled at 62.8° degree Celsius for 3 minutes.
2. **High temperature short time method (HTST):** Milk is boiled at 71.7° degree Celsius for 15 seconds.

- In leather industry separation of hair and fat from leather is done by bacteria. This is called tanning of leather.
- Pickles, syrup is kept in salt or in dense liquid of sugar so that in case of bacterial attack bacteria are lysed and destroyed. Therefore, pickles etc do not get spoiled soon and can be preserved for long time.
- The citrus fruit and pickles are not stored in iron container because it contain organic acid.
- In the cold storage objects are kept at low temperature (-10 degree Celsius to -18 degree Celsius).
- **Mycoplasma:** Smallest known prokaryotic cell causing pleuropneumonia. It is also known as PPLo.

### 2. Plant Morphology

**Morphology:** The study of forms and features of different parts of plants like roots, stems, leaves, flowers, fruits etc is called Morphology.

**Root**
- Root is the descending part of the plant which develops from radicle.
- Root generally grows in the soil away from light.
- Roots are of two types -
  1. **Tap root**
  2. **Adventitious root**
- Root hairs arises from epidermis.

**Stem**
- This is the part of a plant which grows towards light.
- So, they are usually positively phototropic.
- It develops from *plumule*.
- The modification of stems are as under -

#### Underground stem

1. **Tuber** - like Potato.
2. **Corm** - like Colocasia, Saffron etc.
3. **Bulb** - like Onion, Garlic etc.
4. **Rhizome** - like Turmeric, Ginger etc.

**Leaf**
- It is green. Its main function is synthesis of food through photosynthesis.
- In cactus leaves are modified into spines.
- Cactus is referred as xerophyte.

**Flower**
- This is the reproductive part of the plant.
- In the flower *Calyx*, *Corolla*, *Androecium* and *Gynoecium* are found. Out of these androecium is male sex organ and the gynoecium is female sex organ.
- **Androecium:** Unit of androecium is stamen there is one or more stamens in the androecium. Pollen grains are found in anther.
- **Gynoecium:** Unit of gynoecium is carpel. There are three parts of carpel -
  1. **Ovary**, 2. **Style** and 3. **Stigma**.
- **Pollination:** After maturation of anther, the process of transfer of pollen grains to stigma is called pollination. Pollination is of two types -
  1. **Self-pollination**
  2. **Cross-pollination**
- **Fertilization:** Pollen tube reaches the egg cell after entering into the ovule through a pore called microspore. After that a male nucleus fuse with egg-cell. This is called fertilization. Fertilized egg is called zygote.
- In angiosperm, the fertilization is triple fusion where as in other category of plants it is double fusion.
- **Parthenocarpy:** In some plants fruits are developed from ovary without fertilization. This type of fruit is called parthenocarpy. Normally these types of fruits are seedless. Example - Banana, Papaya, Orange, Grapes, Pine-apple etc.
- **Bulb** take part in vegetative reproduction.
- The inflorescence of wheat is spike.

**Formation of fruits**
- Fruit is a matured or ripened ovary developed after fertilization.
Formation of fruit takes place from ovary. Fruits are divided into three types—
1. Simple fruit - like Banana, Guava etc.
2. Aggregate fruit - Strawberry, Custard apple etc.
3. Composite fruit - Jackfruit, Mulberry etc.

In the development of some fruits, Calyx, Corolla and thalamus takes part. These types of fruits are called False fruits. Example - Apple, Jackfruit, pear etc.

Some fruits and their edible parts

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Edible part</th>
<th>Fruit</th>
<th>Edible part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>Fleshy thalamus</td>
<td>Wheat</td>
<td>Starchy endosperm</td>
</tr>
<tr>
<td>Pear</td>
<td>Fleshy thalamus</td>
<td>Cashew nut</td>
<td>Peduncle &amp; cotyledons</td>
</tr>
<tr>
<td>Mango</td>
<td>Mesocarp</td>
<td>Lichi</td>
<td>Aril</td>
</tr>
<tr>
<td>Guava</td>
<td>Entire fruit</td>
<td>Gram</td>
<td>Cotyledons &amp; embryo</td>
</tr>
<tr>
<td>Grapes</td>
<td>Pericarp and Placenta</td>
<td>Groundnut</td>
<td>Cotyledons</td>
</tr>
<tr>
<td>Papaya</td>
<td>Mesocarp</td>
<td>Mulberry</td>
<td>Entire fruit</td>
</tr>
<tr>
<td>Coconut</td>
<td>Endoderm</td>
<td>Jackfruit</td>
<td>Bract, Perianth and seed</td>
</tr>
<tr>
<td>Tomato</td>
<td>Pericarp and Placenta</td>
<td>Pine apple</td>
<td>Bract and Perianth</td>
</tr>
<tr>
<td>Banana</td>
<td>Mesocarp &amp; Endocarp</td>
<td>Orange</td>
<td>Juicy hair</td>
</tr>
</tbody>
</table>

- Water of coconut is liquid nucellus.
- The medicinal plant used in the preparation of skin care is aloevera.
- In the seed of neem major pesticidal properties are present.
- The alkaloid naturally found in Coffee, Cocoa, and Cola nut is Caffeine.
- Hot peppers are hot due to presence of capsaicin.

3. Plant Tissue

Tissue: The group of cells of similar origin, structure and functions is called tissue.

Types of Plant Tissue

- Meristematic
- Apical
- Lateral
- Intercalary
- Simple
- Parenchyma
- Collenchyma
- Sclerenchyma
- Permanent
- Complex
- Xylem
- Phloem

(A) Meristematic tissue: Growing regions of the plants are called Meristem. Meristematic tissue have capability of cell division. Daughter cells formed out. It grow and constitute the different parts of the plant. This process continues till the life-span of the plant.

- Specific features of the Meristematic tissues are as follows –
  - It is round, oval or multisided.
  - Its wall is thin and cytoplasm is homogeneous.

3. Cell contains dense cytoplasm and a single large nucleus.
4. There is lack of inter-cellular spaces between the cells.

Apical Meristems: These tissues are found in the root and stem apex and the initial growth (specially length) of the plants take place due to these tissue.

Lateral Meristems: Due to the division in these tissue growth in the girth of roots and stems takes place. Hence, it increases the width of the root and stem.

Intercalary Meristems: They are located at the base of internode. In fact, this is the remains of the Apical Meristems, which is divided by the incoming of permanent tissues in the centre. Plants increase its length by the activity of this. Its importance is for those plants whose apical parts are eaten by vegetarians. After being eaten, the apex part the plants grow with the help of intercalary meristems only. Like - grass.

(B) Permanent tissue: Permanent tissues are made of those mature tissues that have lost their capacity of division and attain a definite forms for various works. These cells can be alive or dead.

- Simple tissue: If permanent tissue is made up of similar types of cells, it is called simple tissue.
- Complex tissue: If permanent tissue is made up of one or more types of cells, it is called Complex tissue.
- Xylem: This is usually called wood. This is conducting tissue. Its two main functions are –
  - Conduction of water and minerals and
  - To provide mechanical consistency.

The determination of age of the plant is done by counting annual rings of the xylem tissue. The method of determining the age of plants is called Dendrochronology.

- Phloem: This is a conducting tissue. Its main function is to conduct foods prepared by the leaves to different parts of the plant.
- Companion cells of phloem are found in angiosperm.
- Transpiration in plant is a process of water loss from its aerial part.
- The cells which are closely associated and interacting with guard cells are subsidiary cells.

4. Photosynthesis

In the presence of water, light, chlorophyll and carbon dioxide, the formation of carbohydrates in plant is called photosynthesis.

$$6CO_2 + 12H_2O \xrightarrow{\text{Light}} C_6H_{12}O_6 + 6H_2O + 6O_2$$

Carbon dioxide, water, chlorophyll and sunlight are necessary for photosynthesis.

- Terrestrial plants takes CO₂ from atmosphere whereas aquatic plants use carbon dioxide dissolve in water.
- Water enters into the cells of the leaves through osmosis and CO₂ through diffusion from atmosphere or release during respiration.
- Water necessary for photosynthesis is absorbed by the roots. Oxygen produced during photosynthesis is due to photolysis of water.
The green colour of the plants is due to the presence of chlorophyll. Chlorophyll are photoreceptor molecules that trap solar energy. There are different types of chlorophyll molecule like 'a', 'b', 'c', 'd', & 'e'. Chlorophyll 'a' & 'b' are the most common and are found in plant.

There is an atom of magnesium in the centre of chlorophyll.

Chlorophyll absorbs the violet, blue and red colours of light. The rate of photosynthesis is maximum in red light and is minimum in violet light.

The process of photosynthesis is a reaction of oxidation and reduction. Oxidation of water takes place forming oxygen and reduction of carbon dioxide takes place forming glucose.

The stages of photosynthesis are:
1. Photochemical reaction or light reaction and
2. Dark chemical reaction

1. Photochemical reaction: This reaction is completed in the grana of the chlorophyll. This is also called Hill reaction. In this process breaking down of water takes place releasing hydrogen ions and electrons. For photolysis of water, energy is received from the light. At the end of this process, ATP is formed from ADP & P.

2. Dark chemical reaction: This reaction takes place in the stroma of chlorophyll. In this reaction reduction of carbon dioxide takes place and sugar or starch are formed. It is also known as Calvin Benson cycle.

Root pressure is measured by auxanometer.

The cell which are closely associated and interacting with guard cells are subsidiary cells.

Conversion of starch to sugar is essential for stomatal opening.

5. Plant Hormones

Following five hormones are found in plants –

1. Auxins: Auxins was discovered by Darwin in the year 1880. This is the hormone which controls the growth of plants. Its formation takes place in the apical parts of the plants. Its main functions are –
   1. It prevents the separation of the leaves.
   2. It destroys the straws.
   3. It saves the crops from falling.

2. Gibberellins: It was discovered by a Japanese scientist Kurosava in the year 1926. The growth hormone gibberellins was first extracted from fungus in 1938 by Yabuta and Sumiki.

Functions:
1. It turns the dwarf plants into long plants. It helps in creating flowering.
2. It helps in breaking the dormancy of plant.
3. It motivates the seeds to be sprout.
4. It increases the activity of cambium in the wooden plants.
5. Large sized fruits and flowers can be produced by its scattering.

Cytokinins: It was discovered by Miller in the year 1955 but it was named by Behrens.

Functions:
1. It naturally works in coordination with auxins.
2. It helps in cell division and development in the presence of auxins.
3. It helps in breaking the dormancy of seed.
4. It helps in making RNA and protein.
5. It is helpful in making DNA.

Abscisic Acid or ABA: This hormone was initially discovered by Carnes and Adiee and later on by Waring.

Functions:
1. This hormone is against the growth.
2. It keeps the seeds & bud in dormant condition.
3. It plays the main role in separation of leaves.
4. It delays in flowering of long day plant.
5. Ethylene: This is the only hormone found in gaseous form. In 1962 Burg proven it as hormone.

Functions:
1. It helps in the ripening of the fruits.
2. It increases the number of female flowers.
3. It motivates the separation of leaves, flowers and fruits.
4. Gas used for artificial ripening of fruits is ethane or ethylene.
5. Florogens: It is formed in leaves but helps in blooming of the flowers. Therefore, it is also called flowering hormones.
6. Traumatin: This is a type of dicarboxylic acid. It is formed in injured cells by which the injury of plants is healed.

7. The concept of tissue culture was introduced by Haberlandt.

6. Plant Diseases

1. Viral Diseases: (a) Mosaic disease of tobacco: In this disease leaves get shrunked and become small. The chlorophyll of leaves get destroyed. The factor of this disease is Tobacco Mosaic Virus (TMV).

Control – Affected plants should be burnt.

(b) Bunchy top of banana – This disease is caused by banana virus. In this disease plants become dwarf and all the leaves get accumulated like a rose on the branch.

2. Bacterial Disease: (a) Vilt of Potato: It is also known as ring disease because brown ring is formed on the xylem. The factor of this disease is Pseudomonas bacteria. In this disease the conduction system of the plant is affected.

(b) Black Arm of cotton: The factor of this disease is Xanthomonas Bacteria.

(c) Bacterial blight of Rice: This disease is caused by Xanthomonas oryzae bacteria. Yellow-greenish spot is seen on both side of leaves. Vascular bundles get blocked due to bacterial growth.
(d) *Citrus Canker*: The factor of this disease is *Xanthomonas citri* bacteria. It has originated in China. Leaves, branches, fruits all are affected by this disease.

(e) *Tundu disease of wheat*: The factors of this disease are *Corinobacterium titricum* bacteria and Enzuina Tritriki Nematode. In this disease lower parts of the leaves are faded and turned.

3. **Fungal Diseases**: The diseases included in this group are caused by fungi.
   - Rust of wheat is a disease caused by fungi *Puccinia*.

### Disease caused due to deficiency of element

<table>
<thead>
<tr>
<th>Disease</th>
<th>Deficiency of Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little leaf of mango and brinjal</td>
<td>Zinc (Zn)</td>
</tr>
<tr>
<td>Dieback of lemon</td>
<td>Copper</td>
</tr>
<tr>
<td>Little leaf of lemon</td>
<td>Copper (Cu)</td>
</tr>
<tr>
<td>Marsh disease of pea</td>
<td>Manganese (Mn)</td>
</tr>
<tr>
<td>Black hut disease of potato</td>
<td>O₂</td>
</tr>
<tr>
<td>Microtic of amla</td>
<td>Boron</td>
</tr>
<tr>
<td>Burning of leaf of litchi</td>
<td>Potassium (K)</td>
</tr>
<tr>
<td>White bud in maize</td>
<td>Zinc (Zn)</td>
</tr>
<tr>
<td>Koter spot of Turnip</td>
<td>Calcium (Ca)</td>
</tr>
</tbody>
</table>

### Some Important Facts Regarding Botany

#### Facts

- **Largest angiosperm tree**: *Eucalyptus.*
- **Longest tree in the world**: *Sequoia giganteum*. This is a gymnosperm. Its height is 120 meter. This is also called *Coast Red Wood of California*.
- **Smallest (in shape) angiosperm plant**: *Lemna*. This is an aquatic angiosperm which is found in India too.
- **Plant with largest leaf**: *Victoria Regia*. This is an aquatic plant which is found in West Bengal in India.
- **Largest seed**: *Lodoicea*. This is also called double coconut. This is found in Kerala in India.
- **Smallest Pteridophyta**: *Azolla*. This is an aquatic plant.
- **Smallest seed**: *Orchid*.
- **Largest flower**: *Wolofa*. Its diameter is 0.1 millimeter.
- **Largest flower**: *Relieta arnoldii*. Its diameter is 1 meter and its weight can be 8 kilograms.
- **Smallest angiosperm parasite**: *Arachnothrium* is a parasite on the stems of gymnosperms.
- **Largest male couplet**: *Cycas*. This is a gymnosperm plant.
- **Largest seed-egg**: *Cycas*.
- **Alive fossil**: *Cycas*.
- **Smallest chromosomes**: *In algae*.
- **Longest chromosomes**: *In Trillium*.
- **The plant with the largest chromosomes**: *Ophioglossum (Fern)*. There are 1266.

#### Example and details

- **Number of Chromosomes**: Chromosomes in its Diploid cell.
- **The plant with the least number of chromosomes**: *Heleopapopus gracilis*.
- **The smallest gymnosperm plant**: *Zamia pygmaea*.
- **The heaviest wooden plant**: *Hardwichia binata*.
- **The lightest wooden plant**: *Ochroma lagopus-balsa*.
- **The smallest cell**: *Mycoplasma gallisepticum*.
- **Fruit like a tennis ball**: *Keneth*.
- **Fire of the forest**: *Dhak*.
- **Coffee giving plant**: *Coffee arabica*. Caffin contains in it.
- **Coco giving plant**: *Theobroma cacao*. Theobromin and caffeine contain in it.
- **Morphine**: *Papaver somniferum (Opium plant)*. Morphine is obtained from fruit coat (pod).
- **Green manure**: Decomposing green legume.
- **Clove**: Bud of flower.
- **Saffron**: Stigma of flower.

7. **Ecology**

- Study of inter relationship between living organisms and their environment.
- Environment include both biotic and abiotic factors.
- Various population of living in a definite geographical region is called *Biotic Community*.
- Ecosystem or Ecological system word was first coined by the scientist namely *Tansley*.

Every ecosystem is made up of two components –

(a) **Biotic component** – Living part

(b) **Abiotic component** – Non living part

(a) **Biotic components**: It is divided into three parts –

1. **Producer**
2. **Consumer**
3. **Decompilers**

(b) **Producer**: Those components that make their own food. Like – green plants.

(c) **Consumer**: Those components that consumes the food made by plant. Consumers are of three types –

   (a) **Primary consumers**: In this category those organisms are included that lives on green plants or some parts of them.

   (b) **Secondary consumers**: In this category those organisms are included that depends on the primary consumers as their food. Like – fox, wolf, peacock etc.

   (c) **Tertiary consumers**: In this category those organisms are included that depends on the secondary consumers. Like – tiger, lion, cheetah etc.

(b) **Decompilers**: Mainly fungi and bacteria are included in this category. These decomposes dead producers and consumers and changes them into physical elements.
8. Nitrogen cycle

Nitrogen fixation is a process in which free atmospheric nitrogen is converted by living organisms into nitrogenous compound that can be used by plants.

Ammonification: Formation of ammonia from organic compound like proteins and nucleic acid by microorganisms.

Nitrification: A process in which ammonia is converted into nitrates and nitrites by Nitrobacteria.

Denitrification: It is the process of converting nitrate to nitrites, nitrates and ammonia into free nitrogen by denitrifying bacteria eg Pseudomonas.

9. Pollution

Unwanted changes in the chemical and physical features of air, water and land (environment) that are dangerous to human and other organisms, their life conditions, industrial process and cultural achievements are called pollution.


1. Air pollution: When the pollution is in the atmosphere and the sufficient quantity of atmosphere reduces then it is called Air pollution.

Main air pollutants – Carbon monoxide (CO), Sulphur dioxide (SO₂), Hydrogen sulphide (H₂S), Hydrogen fluoride (HF), Nitrogen oxide (NO and NO₂), Hydrocarbon, Ammonia (NH₃), Smoke of tobacco, Fluorides smoke and particles of smoke, Aerosols etc.

Sulphur dioxide (SO₂), Sulphur trioxide (SO₃), Nitrogen oxide (NO) react with environmental water and form Sulphuric acid and Nitric acid. These acids reach to the earth with rain water called acid rain.

On 3rd December, 1984 an incidence of leakage of Methyl Isocyanide gas took place in the fertilizer making Union Carbide Factory (Bhopal).

2. Water pollution: Mixing of unwanted substances with water is called water pollution.

Only 2.5 to 3% water present on the earth is usable.

Sources of water pollution: The water pollution takes place mainly due to mixing up of Carbonate, sulphates of Magnesium and Potassium, Ammonia, Carbon monoxide, Carbon dioxide and Industrial remains in water. Sea water pollution is due to mixing up of heavy metals, hydro carbon, petroleum etc in water.

Oil spill from the tanker spread soon on the surface of sea water.
Psychosis: It is a mild form of mental illness where the patient shows prolonged emotional reaction.

Drug abuse: When drugs are taken for a purpose other than their normal clinical use in an amount that impairs one's physical, physiological and psychological function of body is called drug abuse.

Biosphere: The space retaining life in any form is called biosphere.

**ZOOLOGY**

Zoology: Scientific study of the structure, form and distribution of animals.

1. **Classification of Animal Kingdom**
   Animals kingdom of the world is divided into two sub-kingsoms:
   1. Unicellular animal
   2. Multicellular animal or Metazoans.

   Unicellular animals are kept in a single phylum Protozoa whereas multicellular animals are divided into 9 phyla.

   Classification of animals according to Stoner and Usinger—

   A. **Phylum Protozoa: Main features**—Unicellular
   1. It's body is made of only one cell.
   2. There is one or more nuclei in its cytoplasm.
   3. It is parasitic and free living.
   4. All the metabolic activity (eating, digestion, respiration, excretion, reproduction) takes place in unicellular body.
   5. Respiration and excretion take place by diffusion.

   Example—Amoeba, Euglena, Trypanosoma etc.

   B. **Phylum Porifera**: All animal of this group are found in marine water & bear pores in body.
   1. These are multicellular animals but cells do not make regular tissues.
   2. Numerous pores known as ostia found on body wall.
   3. Skeleton is made up of minute calcareous or silicon spicules.

   Example—Sycon, Sponge etc.

   C. **Phylum Coelenterate: Main features**—Coelenteron is present inside body.
   1. Animals are aquatic and diploblastic.
   2. Around the mouth some thread-like structure are found known as tentacles, which help in holding the food.
   4. Specialized cnidoblast cell are found help in catching the food.

   Example—Hydra, Jelly fish, Sea Anemone etc.

   D. **Phylum Platyhelminthes: Main features**—Flat worm
   1. Triploblastic and nobody cavity.
   2. Dorso-ventrally flattened animal.
   3. Alimentary canal with single opening, anus absent.

   E. **Phylum Aschelminthes: Main features**—Round worm
   1. Long, cylindrical, unsegmented worm.
   2. Bilaterally symmetrical and triploblastic.
   3. Alimentary canal is complete in which mouth and anus both are present.
   4. There is no circulatory and respiratory systems but nervous system is developed.
   5. Excretion takes place through Protonephridia.
   6. They are unisexual.
   7. Most form are parasitic but some are free living in soil and water.

   Example—Round worm, like—Ascaris, Thread worm, Wucheria etc.

   Note: 1. Enterobius (pin worm/thread worm) — It is found mainly in the anus of child. Children feel itching and often vomits. Some children urinate on the bed at night.

   2. Eller's disease is caused by Wucheria bancrofti.

   F. **Phylum Annelida: Main features**—Annulus body Bearing ring
   1. Body is long, thin, soft and metamerically segmented.
   2. Locomotion takes place through Setae made up of Chitin.
   3. Alimentary canal is well developed.
   4. Normally respiration through skin, in some animals it takes place through gills.
   5. Nervous system is normal and blood is red.
   6. Excretion by nephridia.
   7. True coelom is present.
   8. Both unisexual and bisexual.

   Example—Earthworm, Nerels, Leech etc.

   Note: There are four pairs of heart in earthworm.

   G. **Phylum Arthropoda: Main features**—Jointed leg
   1. Body is divided into three parts—Head, Thorax and Abdomen.
   2. Body is covered with a thick chitinous exoskeleton.
   4. Circulatory system is open type.
   5. Its body cavities are called haemocoeel.
   6. Trachea, book lungs, body surface are respiratory organ.
   7. These are mainly unisexual and fertilization takes place inside the body.

   Example—Cockroach, prawn, crab, bug, fly, mosquito, bees etc.

   Note: 1. There are six feet and four wings in insects.

   2. There are 13 chamber in the Cockroach's heart.

   3. Ant is a social animal which reflects labour division.

   4. Termite is also a social animal which lives in colony.

   The main excretory organ of insects are malpighian tubules.
H. Phylum Mollusca: Main features – Soft bodies animal
1. Body is soft divided into head and muscular foot.
2. Mantle is always present in it, which secretes a hard calcareous shell.
3. Alimentary canal is well developed.
4. Respiration takes place through gills or ctendia.
5. Blood is colourless.
6. Excretion takes place through kidneys.
Example—Pila, Octopus, Loligo, Squid etc.

Note: Mollusca Other name in vogue
Aplysia Sea rabbit
Doris Sea lemon
Octopus Devil-fish
Sepia Cuttle-fish

I. Phylum Echinodermata: Main features – Spiny skin
1. All the animals in this group are marine.
2. Water vascular system is present.
3. There is tube feet for locomotion, taking food which works as sensation organ.
4. Brain is not developed in nervous system.
5. There is a special capacity of regeneration.
Example—Star fish, Sea urchin, Sea cucumber, Brittle stars etc.

Note: The function of the Aristotle lantern is to chew the food. It is found in sea urchin.

J. Phylum Chordata: Main features
1. Notochord is present in it.
2. All the chordates are triploblastic, coelomate and bilaterally symmetrical.
3. A dorsal hollow tubular nerve cord and paired pharyngeal gill slits are other features of chordates.

According to classification there are two subphyla in Chordata.
(a) Protostomia and (b) Vertebrata

Some main groups of phylum Chordata:
1. Pisces: Main features – Aquatic life
(a) All these are cold blooded animals.
(b) Its heart pumps only impure blood and have two chamber.
(c) Respiration takes place through gills.
Example—Hippopotamus, Scoliodon, Torpedo etc.

2. Amphibia: Main features – Found both on land & water
(a) All these creatures are amphibian.
(b) All these are cold-blooded.
(c) Respiration takes place through gills, skin and lungs. Heart have three chamber two auricles and one ventricle.
Example—Frog, Necturus, Toad etc. Ichthyophis, Salamander.

Note: In fact the croaking of frogs is the call for sex.

3. Reptilia: Main features – Crawling animal
(a) Land vertebrate, cold-blooded, terrestrial or aquatic vertebrates.
(b) It contains two pair of limbs.
(c) The skeleton is completely flexible.
(d) Respiration takes place through lungs.
(e) Its eggs are covered with shell made up of Calcium carbonate.
Example—Lizard, snake, tortoise, crocodile, turtle, sphenodon etc.

Note: Mesozoic era is called the era of reptiles.
>
- Cobra is the only snake which makes nests.
- Cobra emits their venom through fangs.
- Heloderma is the only poisonous lizard.
- Sea snake which is called Hydrophobus is the world’s most poisonous snake.

4. Aves: Main features – Warm blooded tetrapod vertebrates with flight adaptation.
(a) Its fore-feet modified into wings to fly.
(b) Boat shaped body is divisible into head, neck, trunk and tail.
(c) Its respiratory organ is lungs.
(d) Birds have no teeth. Beak help in feeding.

Beak is formed by jaw.

Example—crow, peacock, parrot etc.

Note: 1. Flightless Birds—Kiwi and Emus. 2. Largest alive bird is Ostrich. 3. Smallest bird is Humming-bird. 4. Largest zoo in India is Alipore (Kolkata) and the largest zoo of the world is Cruiser National Park in South Africa.

5. Mammalia: Main features
(a) Sweat glands and oil glands are found on skin.
(b) All these animals are warm blooded.
(c) Its hearts are divided into four chamber.
(d) Tooth comes twice in these animals. (Diphysodon)
(e) There is no nucleus in its red blood cells (except in camel and lama).
(f) Skin of mammals have hair.
(g) External ear (Pinna) is present in mammal.

Pinna is present in mammal.

Mammals are divided into three sub-classes:
1. Prototheria – It lays eggs. Example—Echidna
2. Metatheria – It bears the immature child. Example—Kangaroo
3. Eutheria – It bears the well developed child. Example—Human

Note: 1. In mammal the highest body temperature is of goat. (Average 39 degree Celsius)
2. Echidna and Duck billed Platypus are the egg laying mammal.

2. Animal Tissue

1. Epithelial Tissue: Epithelial tissue cover the external surface of the body and internal free surface of many organs. Epithelial cell arranged very close to each other. There is no blood vessels supplying nourishment to epithelial cells. They receive nourishment from underlaying connective tissue. The principle functions of epithelial tissues are covering and lining of free surface.

Example: skin, intestine, gland, hollow organ like fallopian tube, nasal passage bronchioles, trachea etc.

2. Connective Tissue: These tissue connect and bind different tissues or organs. It provides the structural frame work and mechanical support to body. It play role in body as defense tissue, repair fat storage etc.

Example: Adipose tissue found beneath the skin. Ligament made up of fibrous connective tissue. Cartilage, bone and blood.

Note: Blood is only tissue which is found in the form of fluid.

3. Muscular Tissue: This is also known as contractile tissue. All the muscles of the body are made up of this tissue. Muscle tissue is of three types - (a) Unstriped (b) Striped and (c) Cardiac.

(a) Unstriped: This muscle tissue is found on the walls of those parts which do not controlled by will. These are called involuntary muscle, like – Alimentary canal, Rectum, Ureter, Blood vessels. Unstriped muscles control the motions of all those organs that move on their own.

(b) Striped: These muscles are found in the parts of the body that move voluntary. Normally one or both of the end of these muscles turn and connect with bones as tendon.

(c) Cardiac: These muscles are found only on the walls of the heart. The contraction and expansion of the heart is due to these muscles that move throughout the life without fail.

> There are 639 muscles in the human body.
> The largest muscle of the human body is Gluteus Maximus (muscle of the hip).
> The smallest muscle of the human body is Stapedius.

4. Nervous Tissue: This tissue is also called sensitive tissue. The nervous systems of the organisms is made up of these tissues. This is made up of two specific cells – (a) Nerve cell or Neurons and (b) Neuroglia.

Nervous tissue controls all the voluntary and involuntary activities of the body.

3. Human Blood

Blood is a fluid connective tissue.

> The quantity of blood in the human's body is 7% of the total weight.
> This is a dissolution of base whose pH value is 7.4.
> There is an average of 5-6 litres of blood in human body.
> Female contains half litre of blood less in comparison to male.

Blood consist of two part:

(A) Plasma and (B) Blood corpuscles.

(A) Plasma: This is the liquid part of blood. 60% of the blood is plasma. Its 90% parts is water, 7% protein, 0.9% salt and 0.1% is glucose. Remaining substances are in a very low quantity.

Function of plasma: Transportation of digested food, hormones, excretory product etc from one part of the body to another part.

> Serum: When Fibrinogen and protein is extracted out of plasma, the remaining plasma is called serum.

(B) Blood corpuscles: This is the remaining 40% part of the blood. This is divided into three parts –

1. Red Blood Corpuscles (RBCs)
2. White Blood Corpuscles (WBCs) and 3. Blood platelets.


> There is no nucleus in it. Exception – Camel and Lama

RBC is formed in Bone marrow.

(At the embryonic stage its formation takes place in liver).

> Its life span is from 20 days to 120 days.

> Its destruction takes place in liver and spleen. Therefore, liver is called grave of RBC.

> It contains haemoglobin, in which haeme is iron containing compound and due to this the colour of blood is red.

Globin is a proteinous compound. With haeme it is extremely capable of combining with oxygen and carbon dioxide.

> The iron compound found in haemoglobin, as haematin.

> The main function of RBC is to carry oxygen from the lung to all cells of the body and bring back the carbon dioxide.

> Anaemia disease is caused due the deficiency of haemoglobin.

> At the time of sleeping RBC reduced by 5% and people who are at the height of 4200 meters RBC increases by 30% in them.

Number of RBC is measured by an instrument called hemocytometer.

2. White Blood Corpuscles (WBC) or Leucocytes: In shape is similar to Amoeba.

> Its formation takes place in Bone marrow, lymph node and sometimes in liver and spleen.

> Its life span is from 2 to 4 days.

> Nucleus is present in the White Blood Corpuscles.

> Its main function is to protect the body from the disease.

3. Blood Platelets or Thrombocytes: It is found only in the blood of human and other mammals.

> There is no nucleus in it.

> Its formation takes place in Bone marrow.

> Its life span is from 3 to 5 days.

> It dies in the spleen.

> Its main function is to help in clotting of blood.

> In dengue fever number of platelets reduced.

In dengue fever number of platelets reduced.
Functions of blood:
1. To control the temperature of the body and to protect the body from diseases.
2. Clotting of blood.
3. Transportation of \(O_2\), \(CO_2\), digested food, conduction of hormones etc.
4. To help in establishing coordination among different parts.

Clotting of Blood: Three important reactions during clotting of blood.
1. Thromboplastin + Prothrombin + Calcium = Thrombin.
2. Thrombin + Fibrinogen = Fibrin.
3. Fibrin + Blood Corpuscles = Clot.

The formation of Prothrombin and Fibrinogen of the blood plasma takes place with the help of Vitamin K. Vitamin K is helpful in making clots of blood. Normally clotting takes the time from 2 to 5 minutes.

The compulsory protein in making clots of blood is Fibrinogen.

Blood Group of Human: Blood Group was discovered by Landsteiner in 1900. For this, he was awarded with Nobel Prize in the year 1930.

> The main reason behind the difference in blood of human is the glyco protein which is found in Red Blood Corpuscles called antigen.

Antigen are of two types - Antigen A and Antigen B.

> On the basis of presence of Antigen or Glyco Protein, there are four group of blood in human:
   (a) That contains Antigen A - Blood Group A.
   (b) That contains Antigen B - Blood Group B.
   (c) That contains both the Antigen A and B - Blood Group AB.
   (d) That contains neither of the Antigen - Blood Group O.

An opposite type of protein, is found in blood plasma. This is called antibody.

This is also of two types - Antibody ‘a’ and Antibody ‘b’.

Therefore, with the four groups of blood division of antibody is as under:

<table>
<thead>
<tr>
<th>Blood Group</th>
<th>Antigen (In Red Blood Corpuscles)</th>
<th>Antibody (In plasma)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Only ‘A’</td>
<td>Only ‘b’</td>
</tr>
<tr>
<td>B</td>
<td>Only ‘B’</td>
<td>Only ‘a’</td>
</tr>
<tr>
<td>AB</td>
<td>Both ‘A’ and ‘B’</td>
<td>Absent</td>
</tr>
<tr>
<td>O</td>
<td>Absent</td>
<td>Both ‘a’ and ‘b’</td>
</tr>
</tbody>
</table>

Blood Transfusion: Antigen ‘A’ and antibody ‘a’, Antigen ‘B’ and antibody the blood. This is called agglutination of blood. Therefore, in blood transfusion of blood do not takes place.

Blood Group O is called Universal Donor because it does not contain any antigen.

Blood Group AB is called Universal Receptor because it does not contain any antibody.

Rh factor: In the year 1940, Landsteiner and Wiener discovered a different type of antigen in the blood. They discovered it in the Rhesus monkey; therefore, it is called Rh-factor. In the blood of that person it is found, their blood is called Rh-positive and in the blood of that person it is not found, is called Rh-negative.

At the time of blood transfusion Rh-factor is also tested. Rh+ is given to Rh+ and Rh- is given Rh- blood only.

If the blood of Rh+ blood group is transferred to a person with Rh-blood group, then due to the less quantity for the first time there does not seem any bad effect but if this process is repeated then due to agglutination the person with Rh-blood group dies.

Erythroblastosis Foetalis: If the father’s blood is Rh- and the mother’s blood is Rh- then the child to be born dies at the pregnancy or short span of time after the birth. (This happens in the case of second issue).

The possible blood group of the child on the basis of blood group of mother and father.

<table>
<thead>
<tr>
<th>Blood group of Mother and father</th>
<th>Expected blood group of the child</th>
<th>Unexpected blood of the child</th>
</tr>
</thead>
<tbody>
<tr>
<td>O × O</td>
<td>O</td>
<td>O, A, O, A, A, B, AB, A, AB, AB</td>
</tr>
<tr>
<td>O × B</td>
<td>O, B</td>
<td>A, B, O, A, A, B, AB, A, AB, AB</td>
</tr>
<tr>
<td>O × AB</td>
<td>O, A, B, AB</td>
<td>O, A, A, B, AB, A, AB, AB, AB</td>
</tr>
<tr>
<td>A × A</td>
<td>A, O</td>
<td>A, B, A, B, AB, A, AB, AB, AB</td>
</tr>
<tr>
<td>A × B</td>
<td>A, B</td>
<td>O, A, A, B, AB, A, AB, AB, AB</td>
</tr>
<tr>
<td>A × AB</td>
<td>A, B, AB</td>
<td>O, A, A, B, AB, A, AB, AB, AB</td>
</tr>
<tr>
<td>B × B</td>
<td>B, O</td>
<td>A, A, A, B, AB, A, AB, AB, AB</td>
</tr>
<tr>
<td>B × AB</td>
<td>A, B, AB</td>
<td>O, A, A, B, AB, A, AB, AB, AB</td>
</tr>
<tr>
<td>AB × AB</td>
<td>A, B, AB</td>
<td>O, A, A, B, AB, A, AB, AB, AB</td>
</tr>
</tbody>
</table>

Haemolymph: Body fluid of arthropods is colourless made of plasma and haemocytes. It donot contain any respiratory pigment Ex-Cockroach.

4. System of the Human Body

(a) Digestive System

The complete process of nutrition is divided into five stages:
1. Ingestion
2. Digestion
3. Absorption
4. Assimilation
5. Defecation

1. Ingestion: Taking the food into the mouth is called Ingestion.

2. Digestion: Conversion of nonabsorbable food into absorbable form. The digestion of the food is started from the mouth.

   > Saliva is secreted by salivary gland in mouth in which enzyme amylase is present. They convert starch into simple sugar and make it digestible.
   > In human secretion of saliva is approximately 1.5 litre per day.
   > The nature of saliva is acidic (pH 6.8).
   > From the mouth food reach into stomach through food pipe.
   > No digestion takes place in food pipe.
   > The teeth used for grinding of food is molar.
Digestion in Stomach
> The food lies approximately for four hours in stomach.
> After reaching the food in stomach gastric glands secrete the gastric juice. This is a light yellow acetic liquid.
> Hydrochloric acid secreted from the oxyntic cells of the stomach kills all the bacteria coming with food and accelerates the reaction of enzymes. Hydrochloric acid makes the food acidic by which amylase reaction of the saliva end.
> The enzymes in the gastric juice of stomach are - Pepsin and Renin.
> Pepsin breaks down the protein into peptones.
> Renin breaks down the caseinogen into casein found in milk.

Digestion in Duodenum
> As soon as the food reaches the duodenum bile juice from liver combines with it. Bile juice is an alkaline and it turns the acidic medium of food into alkaline.
> Here, pancreatic juice from pancreas combines with food. It contains three types of enzymes:
  (a) Trypsin: It converts the protein and peptone into peptides and amino acid.
  (b) Amylase: It converts the starch into soluble sugar.
  (c) Lipase: It converts the emulsified fats into glycerol and fatty acids.

Small Intestine
> Here, the process of digestion completed and absorption of digested foods start.
> From the wall of small intestine, intestinal juices secrete. The following enzymes contain:
  (a) Epepsin: It converts the remaining protein and peptone into amino acids.
  (b) Maltase: It converts the maltose into glucose.
  (c) Sucrase: It converts the sucrone into glucose and fructose.
  (d) Lactase: It converts the lactose into glucose and galactose.
  (e) Lipase: It converts the emulsified fats into glycerol and fatty acids.

Intestinal juice is alkaline in nature.
In a healthy people approximately 2 litres of intestinal juice secretes every day.

3. Absorption: Digested food get mixed into blood is called absorption.
> The absorption of digested foods takes place through villi found in the wall of small intestinal.

4. Assimilation: Use of absorbed food in the body is called assimilation.

5. Defecation: Undigested food reaches into large intestine where bacteria turns it into faeces, which is excreted through anus.

The main organs participating in digestion:
Liver: This is the largest gland of the human body. Its weight is approximately 1.5-2 kilogram.
> Bile is secreted through liver only. This bile accelerate the reaction of enzymes present in the intestine.
> Liver convert excess of amino acid into ammonia by deamination. These ammonia are further converted into urea by ornithine cycle. Urea comes out from body through kidney.
> Liver converts some quantity of protein into glucose during deficiency of carbohydrate.
> In carbohydrates metabolism liver converts the excess of glucose found in blood into glycogen and stores it into hepatic cell as reserve nutrients. If the necessity of glucose arises the liver convert reserve glycogen into glucose. Thus, it regulates the quantity of glucose in the blood.
> In case of decrease of fat in food liver converts some of the parts of the carbohydrates into fat.
> The production of fibrinogen protein takes place by liver which helps in clotting of blood.
> The production of Heparin protein takes place in liver which prohibit the clotting of blood inside the body.
> The dead RBC is destroyed by the liver only.
> The liver reserve some quantity of iron, copper and vitamin.
> The liver reserve some quantity of iron, copper and vitamin.
> It helps in regulating the body temperature.
> It helps in regulating the body temperature.
> Liver is an important clue in investigating a person's death that has been due to poison in food.

Gall Bladder: Gall bladder is a pear shaped sac, in which the bile coming out of liver is stored.
> Bile comes into the duodenum from gall bladder through the bile duct.
> Secretion of bile into the duodenum takes place by reflex action.
> Bile is a yellowish-green coloured alkaline liquid. Its pH value is 7.7.
> The quantity of water is 85% and the quantity of bile pigment is 12%.
> The quantity of water is 85% and the quantity of bile pigment is 12%.
> The main functions of bile are as under:

The Main functions of bile are as under:
1. It makes the medium of food alkaline so that pancreatic juice can work.
2. It kills the harmful bacteria coming with food.
3. It emulsifies the fats.
4. It accelerates the bowel movement of intestine by which digestive juices in the food mix well.
5. It is helpful in the absorption of vitamin K and other vitamins mixed in fats.

In case of obstruction in bile duct, liver cells stop taking bilirubin from blood. As a result, bilirubin spreads throughout the body. This is called jaundice.

**Pancreas**: This is the second largest gland of the human body. It acts as simultaneously endocrine and exocrine type of gland.

- Pancreatic juice secretes out of it in which 9.8% water and the remaining parts contain salt and enzymes. It is alkaline liquid, whose pH value is 7.5 - 8.3. It contains the enzymes which can digest all the three types of food materials (like carbohydrates, fat and protein), therefore it is called complete digestive juice.

**Islets of Langerhans**: This is a part of the Pancreas.

- It was discovered by the medical scientist Langerhans.
- From its β cell – insulin, from α cell – glucagons and from δ cell – somatostatin hormones are secreted.

**Insulin**: It is secreted by β-cell of islets of Langerhans.

- Glucagon is secreted by α-cell and somatostatin hormone is secreted by γ-cell of islets of langerhans.
- It was discovered by Banting and Best in the year 1921.
- It controls the process of making glycogen from glucose.
- It is produced by the pancreas.
- Excessive flow of insulin causes hypoglycemia in which one loses the reproducing capacity and vision deterioration.

**Glucagon**: It re-converts the glycogen into glucose.

**Somatostatin**: This is a polypeptide hormone which increases the duration of assimilation of food.

**(b) Circulatory System**

The discovery of blood circulation was done by William Harvey in the year 1628.

There are four parts under it –
- **Heart**
- **Arteries**
- **Veins**
- **Blood**

- **Heart**: It remains safe in the pericardial membrane. Its weight is approximately 300 grams.
- Heart of the human is made up of four chambers. In the anterior side there is a right auricle and a left auricle. In the posterior side of the heart there is a right ventricle and a left ventricle persist.
- **Between the right auricle and the right ventricle there is a tricuspid valve.**
- **Between the left auricle and left ventricle there is a bicuspid valve.**

- **The blood vessels carrying the blood from the body towards the heart is called vein.**
- **In the vein there is impure blood i.e. carbon dioxide mixed blood. Its exception is pulmonary vein, which always carry pure blood.**
- **Pulmonary vein carries the blood from lungs to left auricle. It has pure blood.**
- **The blood vessels carrying the blood from the heart towards the body is called artery.**
- **In artery there is pure blood i.e. oxygen mixed blood. Its exception is pulmonary artery.**
- **Pulmonary artery carries the blood from right ventricle to lungs. It contains impure blood.**
- **In the right part of the heart, there remains impure blood i.e. carbon dioxide mixed blood and in the left part of the heart there remains pure blood i.e. oxygen mixed blood.**
- **The artery carrying blood to the muscles of the heart are called coronary arteries. Any type of hindrance in it causes heart attack.**

**Course of circulation**: Mammals have double circulation. It means blood have to cross two times from heart before circulating throughout the body.

- **Right auricle receive impure blood from body which goes into right ventricle.**
- From here the blood went into pulmonary artery which send it to lungs for purification. After purification it is collected by pulmonary vein which bring it back to heart in left auricle. From auricle it went into left ventricle. Now this purified blood is went into aorta for different organ of body. This circulation is done is a cardiac cycle.

- **Cardiac cycle**: Rhythmic systole (contraction) and diastole (relaxation) of auricle and ventricle constitutes a cardiac cycle.

- **Heart beat**: Heart keeps beating rhythmically throughout the life. There is a node from which originate contraction of heart.

1. **Sino auricular node (SA node)**: It is a specialised area of cardiac muscle fibre in right auricle. SA node is also known as pacemaker as it generates each wave of cardiac impulse.

2. **Auriculo Ventricular node (AV node)**: AV node is present close to the interatrial septum near the right AV aperature. Wave of contraction is picked up by AV node which spread through.

- Wave of excitation is picked up by AV node which spread through AV bundle which spread through the atrio ventricular septum.

- **Artificial pacemaker**: When SA node becomes defective or damaged, the cardiac impulses do not generate. This can be cured by surgical grafting of an electric device in the chest of the patient. It stimulate artificial pacemaker at regular intervals.

- **Systole and diastole of the heart are collectively called heart beat.**

In the normal condition the heart of the human beats 72 times and in a single beat it pumps approximately 70 ml blood.
The blood pressure of a normal human is 120/80. (Systolic – 120 and Diastolic – 80).

Blood pressure is measured by sphygmomanometer.

Thyroxin and adrenaline are the hormones which independently controls the heart beat.

The CO₂ present in the blood accelerates the heart beat by reducing the pH.

**Lymph Circulatory System**

- The light yellow fluid found in the inter-cellular intervals between different tissues and cells is called *lymph*.
- Lymph is a fluid whose composition is like blood plasma, in which nutrient, oxygen and various other substances are present.
- The corpuscles found in lymph are called *lymphocytes*. In fact, these are White Blood Corpuscles (WBC).
- Lymph flows only in one direction from tissue towards heart.

**Functions of lymph**:

1. The lymphocytes present in lymph helps to prevent the body from diseases by killing the harmful bacteria or other substances.
2. Lymph form the lymphocytes.
3. The node found in lymph vessels are called *lymph node* works as a filter in the human body.
4. Lymph helps in healing the wounds.
5. Lymph circulates different material from tissues to veins.

**Excretory System**

Excretion: Removal of nitrogenous substances formed during metabolism from the body of man called excretion. Normally excretion means the release of nitrogenous excretory substances like urea, ammonia, uric acid etc.

The main excretory organs of human are as follows—


1. **Kidneys**: The main excretory organ in human and other mammals is a pair of kidneys. Its weight is 140 grams. There are two parts of it. Outer part is called *cortex* and the inner part is called *medulla*. Each kidney is made up of approximately 1,30,00000 kidney ducts which are called *nephrons*. Nephron is the structural and functional unit of the kidney. There is a cup like structure in the every nephron called *Bowman’s capsule*. Glomerulus is made up of thin blood vessels found in the Bowman’s capsule which is made up of two types of arterioles.

   (a) **Afferent arteriole**: Which carries the blood to the glomerulus.

   (b) **Efferent arteriole**: By which the blood is taken out of the glomerulus.

   The main function of the kidneys is purification of blood plasma i.e. to excrete the unwanted nitrogenous waste substances through urination.

   The supply of blood to kidneys takes place in large quantity in comparison to other organs.

**Hemodialysis**: Process of removal of excess urea from the blood of patient using artificial kidney.

**Nervous System**

Under this system thin thread like nerves are spread throughout the body. After receiving the information of environmental changes from the sensitive and coordination among different organs.

Nervous System of human is divided into three parts:

1. Central Nervous System
2. Peripheral Nervous System
3. Autonomic Nervous System

- **Central Nervous System**: Part of the nervous system which keeps control on the whole body and on nervous system itself is called Central Nervous System. The Central Nervous System of human is made up of two parts - Brain and Spinal Cord.

  Brain is covered by membrane called meninges. It is situated in a bony box called *cranium* which protect it from external injury.

- In the kidneys average 125 ml per minute blood is filtrated i.e. 180 litres per day. Out of it 1.45 litres urine is formed daily and the remaining is absorbed back by the cells of nephron and mix into the blood.

- In the normal urine there is 95% water, 2% salt, 2.7% urea and 0.3% uric acid.

- The colour of the urine is light yellow due to the presence of *urochromes* in it. Urochrome is formed by the dissociation of haemoglobin.

- Urine is acidic. Its pH value is 6.

- The stone formed in the kidneys is made up of calcium oxalate.

2. **Skin**: Oil gland and sweat glands found in the skin respectively secretes *sebum* and *sweat*.

3. **Liver**: Liver cells play the main role in excretion by converting more and more amino acids and ammonia of blood into urea.

4. **Lungs**: The lungs excretes two types of gaseous substances carbon dioxide and water vapour. The excretion of some substances like garlic, onion and some spices in which vapour component is present excreted by the lungs.
There are 12 pairs of cranial nerves and 31 pairs of spinal nerve found in a human.

> The unit of nervous tissues is called Neuron or nerve cell.

3. **Autonomic Nervous System**: Autonomic Nervous System is made up of some brain nerves and some spinal cord nerves. It supplies nerves to all the internal organs and blood vessels of the body. Langley, first presented the concept of Autonomic Nervous System in the year 1921. There are two parts of Autonomic Nervous System:

   (a) Sympathetic Nervous System
   (b) Parasympathetic Nervous System.

**Functions of Sympathetic Nervous System**

1. It narrows the blood vessels in the skin.
2. By its action hair gets erected.
3. It reduces the secretion of salivary glands.
4. It increases the heart beat.
5. It increases the secretion of sweat glands.
6. It stretches the pupil of eye ball.
7. It relax the muscles of urinary bladder.
8. It reduces the speed of contraction & relaxation of intestine.
9. The rate of respiration increase.
10. It increases the blood pressure.
11. It increases the sugar level in the blood.
12. It increases the number of Red Blood Corpuscles in the blood.
13. It helps in clotting of blood.
14. Collective impact of this affects fear, pain and anger.

**Functions of Parasympathetic Nervous System**

The functions of this system is normally the opposite of Sympathetic Nervous System. For example:

1. It widens the lumen of blood vessels except the coronary blood vessels.
2. It increases the secretion of saliva and other digestive juices.
3. The contraction of pupil is caused by this.
4. It creates contraction in the other muscles of the urinary bladder.
5. It creates contraction and motion in intestinal walls.
6. The effect of this nervous system collectively creates the occasion of rest and joy.

(f) **Skeletal System**

The skeletal system of human is made up of two parts:

(a) Axial skeleton
(b) Appendicular skeleton.

(a) **Axial skeleton**: The skeleton, which makes the main axis of the body is called axial skeleton. Skull, vertebral column and bones of chest comes under it. There are 80 bones in axial skeleton.

(B) **Mid Brain**

The function of Corpora quadrigemina: This is the centre of control on vision and hearing power.

(C) **Hind Brain**

(i) Function of cerebellum: It is some what at the back of head and consist of two cerebellar hemisphere like cerebrum. It is large reflex centre for coordination of muscular body movements and maintenance of posture.
(ii) Pons: It act as bridge carrying ascending and descending tracts between brain and spinal cord.
(iii) Medulla: It is posterior most part of brain and continuous into the spinal cord. It connect and communicate the brain with spinal cord. It contains the cardiac respiratory and vasomotor centres that control complex activity like heart action, respiration, coughing, sneezing etc.

> The brain of the human is covered in the cranium which protects it from external injury. Brain is covered by membrane called meanings.

**Spinal cord**: The posterior region of the medulla oblongata forms the spinal cord. Its main functions are:

(a) Coordination and control of reflex actions i.e. it works as the centre of the reflex actions.
(b) It carries the impulses coming out of brain.

Note: Reflex action was first discovered by the scientist, Marshall Hall.
(i) Skull: There are 29 bones in it. Out of these, 8 bones jointly protect the brain of the human. The structure made up of these bones is called forehead. All the bones of the forehead remain joined strongly by the sutures. There are 14 bones in addition to this which form the face. Six ear ossicles and one hyoid bone.

(ii) Vertebral Column: The vertebral column of the human is made up of 33 vertebra. All the vertebrae are joined by intervertebral disc. Vertebra is made flexible by these intervertebral disc. We divide the whole vertebral column into the following parts –

- Its first vertebra which is called atlas holds the skull.

Functions of vertebral column:
1. Holds the head.
2. Provides the base to the neck and body.
3. Helps the human in standing, walking etc.
4. Provides flexibility to the neck and body by which a human can move its neck and body in any direction.
5. Provides protection to spinal cord.

(b) Appendicular skeleton: The following are the parts of it –
(i) Foot bones – Both hands and feet have 118 bones.
(ii) To hold the forelimb and hind limb on the axial skeleton in human there are two girdles.

- The girdle of forelimb is called *pectoral girdle* and girdle of hind limb is called *pelvic girdle*.

- Pectoral girdle joined with forelimb is called *humerus* and the bone from pelvic girdle join to hind limb is called *femur*.

Functions of the skeletal system:
1. To provide a definite shape to the body.
2. To provide protection to soft parts of the body.
3. To provide a base to the muscles for joining.
4. To help in respiration and nutrition.
5. To form Red Blood Corpuscles.

- The total number of bones in a human’s body — 206
- The total number of bones during childhood — 300
- The total number of bones of head (forehead-8, facial-14, ear-6, hyoid -1) — 29
- The total number of bones in vertebral column, initially -33

After development
- 26 (5 sacral fuse into 1 and 4 caudal fuse into 1)

- The total number of bones of ribs
- The largest bone of the body
- The smallest bone of the body
- Foramen Magnum is an aperture found in the skull.

The name and number of bones of some specific regions –

<table>
<thead>
<tr>
<th>Ear bones</th>
<th>Maleus (2)</th>
<th>Upper arm</th>
<th>Humerus (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incus (2)</td>
<td>Fore arm</td>
<td>Radius ulna (2)</td>
<td></td>
</tr>
<tr>
<td>Stapes (2)</td>
<td>Wrist</td>
<td>Carpals (16)</td>
<td></td>
</tr>
<tr>
<td>Palm</td>
<td>Femur (2)</td>
<td>Hind limb</td>
<td>Tibia fibula (4)</td>
</tr>
<tr>
<td>Thigh</td>
<td>Meta carpals (10)</td>
<td>Fingers</td>
<td></td>
</tr>
<tr>
<td>Knee</td>
<td>Patella (2)</td>
<td>Ankle</td>
<td>Tarsal (14)</td>
</tr>
<tr>
<td>Sole</td>
<td>Meta tarsal (10)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- External ear of man is mainly made up of Cartilage.

Note: 1. The muscles and bones are joined together by tendon.
2. The muscle which join bone to bone is called ligaments.
3. Ligaments of human body are made up of yellow fibre.

(g) Endocrine System

(a) Exocrine glands: Gland which have duct are called *exocrine gland*. Secretion of enzymes pass through it. Example – *Digestive gland, Sweat gland, Mucous gland, Salivary gland* etc.

(b) Endocrine gland: These are *ductless gland*. Hormones are secreted by these gland. Hormones are sent to the different parts of the body through blood plasma. Example – *Pituitary gland, Thyroid gland, Parathyroid gland* etc.

Functions and effect of the main endocrine system of the human body and hormone secreted by them –

1. Pituitary gland: It is situated in a depression of the sphenoid bone of the forehead. This is called *sella-tunica*.
   - Its weight is approximately 0.6 grams.
   - This is also known as *master gland*. Pituitary gland is controlled by hypothalamic.

The functions of the hormones secreted by Pituitary gland:

1. STH Hormone (Somatotrophic hormone): It controls the growth of the body especially the growth of bones. By the excessiveness of STH gigantism and acromegaly are caused, in which height of the human grows abnormally. Lack of STH causes *dwarfism* in human.
2. TSH Hormone (Thyroid Stimulating Hormone): It stimulates the thyroid gland to secrete hormone.
3. ACTH Hormone (Adrenocorticotropic Hormone): It controls the secretion of adrenal cortex.
4. GTH Hormone (Growth Hormone): It controls the functions of gonads. This is of two types:
   a. FSH Hormone (Follicle Stimulating Hormone): In male it stimulates spermatogenesis in the seminiferous tubules of the testis. In female, it stimulates the Graaffian follicles of the ovary to secrete the hormone *oestrogen*.
   b. LH Hormone (Luteinising Hormone): Interstitial cell stimulating hormone – secretion of testosterone hormone takes place in male and in case of female *oestrogen* hormone secreted.
5. LTH Hormone (Lactogenic Hormone): Its main function is to stimulate secretion of milk in breasts for infants.

6. ADH Hormone (Antidiuretic Hormone): It causes increase in blood pressure. It is helpful in maintaining the water balance in the body and reduce the volume of urine.

2. Thyroid gland: This is situated below the larynx on both side of respiratory trachea in throat of human.

> The hormones secreted by it are Thyroxine and Triiodothyronine.

**Functions of Thyroxin:**

1. It increases the speed of cellular respiration.
2. It is necessary for the normal growth of the body particularly for the development of bones, hair etc.
3. The normal functions of reproductive organs depend on the activeness of thyroid gland.
4. It controls the water balance of the body in coordination with the hormones of pituitary gland.

**Diseases Caused by the Deficiency of Thyroxin:**

1. Cretinism: This disease affects the children. The mental and physical retardness of the child.
2. Myxedema: In this disease which normally attack during youth the metabolism does not take place properly which causes reduction in heart beat and blood pressure.
3. Hypothyroidism: This disease is caused due to a chronic deficiency of thyroxin hormone. Due to this disease the normal reproduction is not possible. Sometimes due to its deficiency, human becomes dumb and deaf.
4. Goitre: This disease is caused by the deficiency of iodine in food. In this disease the shape of the thyroid gland enlarges abnormally.

**Diseases caused by the Excessiveness of Thyroxin:**

3. Parathyroid gland: This is situated in the right back of the thyroid gland of the throat. Two hormones are secreted by it:
   (a) Parathyroid hormone: This hormone is secreted when there is a deficiency of calcium in the blood.
   (b) Calcitonin: This hormone is released when there is excess of calcium in the blood is present.

Hence, hormone secreted by parathyroid gland controls the quantity of calcium in blood.

4. Adrenal gland: There are two parts of this gland - (a) outer part is cortex and (b) inner part is medulla.

Hormones secreted by cortex and their function:
(i) Glucocorticoids: This controls the metabolism of carbohydrate, protein and fat.

(iii) Mineralocorticoids: Its main function is reabsorption of ions by kidney ducts and to control the quantity of other ions in the body.

(ii) Sex hormone: It controls the sexual behaviour and secondary sexual characters.

**Note:**
1. Cortex is essential for life. If it is extracted completely from the body, human will remain alive only for a week or two.
2. In case of deformation of cortex, the process of metabolism gets disturbed; this disease is called Addison’s disease.

Hormones secreted by Medulla and their function:
(a) Epinephrine - This is an amino acid.
(b) Nor epinephrine - This is also an amino acid.

- The work of both the hormones is similar. These equally increase the relaxation and contraction of heart muscles. As a result, blood pressure increases and decreases.
- In case of sudden stop of heart beat, epinephrine is helpful in re-starting the heart beat.
- The hormone secreted by Adrenal gland is called fight flight, fright fight hormone.

5. Gonads:

1. **Ovary:** The following hormones are secreted by this:
   (a) Estrogen: It completes the development of reproductive organs.
   (b) Progesterone: It stimulates the thickening of uterus lining during ovariens cycle.
   (c) Relaxin: During pregnancy it is found in uterus and placenta. This hormone smoothenes the pubic symphysis and it widens the uterine cervix so that a child is delivered easily.

2. **Testes:** The hormone secreted by it is called testosterone. It motivates the sexual behaviour and growth of secondary sexual characters.

**Respiratory System**

> The most important organ of the respiratory system of human is lungs where the exchange of gases takes place.

> All those organs comes under respiratory system which help in exchange of gases are - Nasal passage, Pharynx, Larynx or Voice box, Trachea, Bronchi, Bronchioles, Lungs etc.

> Nasal passage: Its main function is related to sniffing. Its inner cavity is lined with mucous membrane. This secretes approximately ½ litre of mucous everyday. This prevents the particles of dust, bacteria or other small organisms everyday. This prevents the particles of dust, bacteria or other small organisms everyday. This prevents the particles of dust, bacteria or other small organisms everyday. This prevents the particles of dust, bacteria or other small organisms everyday. This prevents the particles of dust, bacteria or other small organisms everyday. This prevents the particles of dust, bacteria or other small organisms everyday.

> Pharynx: It is situated behind the nasal cavity a common passage for both respiratory and digestive system.

> Larynx: Pharynx open into anterior wider part of trachea called larynx. The opening is called glottis. A cartilaginous flop like structure cover the glottis called epiglottis which prevent the entry of food during swallowing. A pair of vocal cord is present inside the larynx help in producing sound.
Transportation of carbon dioxide takes place through circulation of blood:

(a) By mixing with plasma: Carbon dioxide forms carbonic acid after mixing in plasma. Transportation of 7% carbon dioxide takes place in this form.

(b) In the form of bicarbonates: 70% of carbon dioxide in the form of bicarbonates is transported. It mixes with potassium and sodium of blood and forms potassium bicarbonate and sodium bicarbonate.

3. Internal respiration: Inside the body, gaseous exchange takes place between blood and tissue fluid which is called internal respiration.

Note: The gaseous exchange in lungs is called external respiration.

4. Cellular respiration: Glucose is oxidised by oxygen reached into the cell. This process is called cellular respiration.

Types of cellular respiration:

There are two types of Respiration
(a) Anaerobic respiration: If the oxidation of food takes place in absence of oxygen. During this only 2 ATP molecules are produced from one molecule of glucose. Final product of anaerobic respiration in animal tissue like skeletal muscle cell is lactic acid.

In yeast and certain bacteria ethyl alcohol or ethanol is produced.

\[
\text{C}_6\text{H}_12\text{O}_6 \rightarrow 2\text{C}_2\text{H}_5\text{OH} + \text{Energy (in animal)}
\]

(Lactic acid)

\[
\text{C}_6\text{H}_12\text{O}_6 \rightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2 + \text{Energy (in plant)}
\]

(Ethyl alcohol)

(b) Aerobic respiration: It takes place in the presence of oxygen. The complete oxidation of glucose takes place. As a result \( \text{CO}_2 \) and \( \text{H}_2\text{O} \) is formed and energy is released in huge amount.

\[
\text{C}_6\text{H}_12\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + 2870 \text{ KJ energy. (38 ATP)}
\]

The complex process in cellular respiration is divided into two parts—
1. Glycolysis (cytoplasm)
2. Kreb's cycle (Mitochondria)

1. Glycolysis: Its study was first done by Embden Meyerhof pathway. Therefore, it is also called EMP path

- Glycolysis is present in both types of respiration, Aerobic and Anaerobic. This process takes place in cytoplasm.

- As a result of decomposition of one glucose atom in glycolysis two atoms of pyruvic acid is formed.

- To start this process 2 atoms of ATP (Adenosine Triphosphate) takes part but at the end of the process 4 atoms ATP are obtained. Therefore, as a result of glycolysis 2 atom ATP are obtained i.e. \( 16000 \text{ calorie (2 \times 8000)} \) energy is obtained.

- There is no need of oxygen in glycolysis. Hence, this process is similar in both anaerobic and aerobic respiration.

- In this, four molecules of hydrogen formed which is used in converting NAD to 2NADH₂.

- The enzyme which take part in glycolysis during respiration are found in cell cytoplasm.
2. Kreb's Cycle: It was described by Hans Krebs in 1937.
   - This is also called Citric Acid Cycle or Tricarboxylic Cycle.
   - This process is completed inside the Mitochondria in the presence of specific enzymes.
   - Two atoms of each ADP and ATP are formed.
   - In this cycle, 4 pair of hydrogen atom are released.
   - In complete cycle two molecule of pyruvic acid produce 12 molecule of carbon dioxide.
   - In our system maximum number of ATP molecule are formed during Kreb's Cycle.

Production of energy: By the oxidation of pyruvic acid one atom of ATP, five atoms of NADH and one atom of NADH, are formed. From one atom of NADH, three atoms of ATP and from one atom of NADH, two atoms of ATP are obtained. Hence, from one atom of pyruvic acid \( 1 + (3 \times 5) + (2 \times 1) = 18 \) atoms of ATP are formed. From one atom of glucose two atoms of pyruvic acid are formed, by which, 36 atoms of ATP are released. During the glycolysis, two atoms of ATP are obtained. Hence, during oxidation of one atom of glucose total 2 + 36 = 38 ATP atoms are obtained.

Respiratory substances: Carbohydrate, fat, protein are the main respiratory substances. At first, oxidation of glucose takes place, then fat. After the consumption of carbohydrate and fat, oxidation of protein start.

Note: Respiration is a Catabolic Process. It also reduces the weight of the body.

5. Nutrients

To maintain life organisms performs some basic function is called nutrition. Nutrition is one of the basic functions of life in which intake of food, digestion, absorption, assimilation and excretion of undigested foods are included.

Nutrient: Nutrient are the substance by which an organism get energy or it is used for biosynthesis of its body.

For example carbohydrate and fat are the source of energy. Whereas proteins and minerals are the nutrient used for biosynthesis.

1. Carbohydrate: Carbohydrates are organic compounds, in which the ratio of Carbon, Hydrogen and Oxygen is 1:2:1. Carbohydrate in the form of sugar and starch are major intake in animals and human. 50 to 75% energy is obtained by oxidation of carbohydrate. Carbohydrate containing aldehyde group is called aldose and with ketone group is called ketose. Carbohydrates are derivatives of polyhydroxy alcohols.

Classification of carbohydrate: Carbohydrates are classified into three major groups.

   (a) Monosaccharides: These are the simple sugar made up of single polyhydroxy or ketone unit. Most abundant monosaccharides found in nature is glucose containing six carbon atom. Triose, tetrose, pentoses, heptoses are the type of monosaccharides.

> Glucose is a type of hexose sugar.

(b) Oligosaccharides: When 2 to 10 monosaccharides join together they form oligosaccharides. They are usually crystalline in nature and sweet in taste. Maltose, sucrose, lactose are disaccharides made up of two monosaccharides.

(c) Polysaccharides: These are the compound of sugar which are formed due to joining large number of monosaccharide. There are insoluble and tasteless. Some example of polysaccharides are starch, glycogen, cellulose, chitin etc.

Function of Carbohydrate

1. Carbohydrate works as fuel. During the process of respiration, glucose break into CO₂ and H₂O with the release of energy. One gram of glucose gives 4.2 kilo calories energy.
2. Glucose is the source of immediate energy production in the cell.
3. Nucleic acids are polymers of nucleotides and nucleotides and contain pentose sugar.
4. Lactose of milk is formed from glucose and galactose.
5. Glucose is used for the formation of fat and amino acid.
6. Carbon skeleton of monosaccharides is used in the formation of fatty acid, chitin, cellulose etc.

Source of Carbohydrate: Wheat, rice, maize, sweet potato, potato and other plant and animals are the sources of carbohydrate.

2. Protein: Protein word was first used by J. Berzelius. This is a complex organic compound made up of 20 type of amino acids. Approximately 15% of the human body is made up of protein. Nitrogen is present in protein in addition to C, H & O.

> N₂ gas is essential for protein synthesis.

Twenty types of amino acid are necessary for human body, out of which 12 are synthesized by body itself and remaining 8 are obtained by food are called essential amino acid.

Types of proteins:

On the basis of chemical composition

It is divided into three types.

1. Simple Protein: It consists of only amino acid.
   Example- Albumins, Globulins, Histones etc.
2. Conjugated Protein: Having some another chemical compounds in addition to amino acid.
   Example- Chromoprotein, Glycoprotein etc.
3. Derived Protein: It is derived from the partial digestion of natural proteins or its hydrolysis.
   Example- Peptone, Peptide, Proteinase etc.

Function of Protein:

1. It takes part in the formation of cells, protoplasm and tissues.
2. These are important for physical growth. Physical growth hampers by its deficiency. Lack of proteins causes Kwashiorkor and Marasmus diseases in children.
3. In case of necessity these provide energy to the body.
4. Control the development of genetic characters.
5. Helpful in conduction also.
Kwashinokor: In this disease hands and legs of children get slimmed and the stomach comes out.

Marasmus: In this disease muscles of children are loosened.

3. Fats: Fat is an ester of glycerol and fatty acid.

In these carbon, hydrogen and oxygen are present in different quantities, but proportionally less oxygen than carbohydrate.

Normally fat remains as solid at 20°Ctemperature, but if it is in liquid form at this temperature, this is called oil.

Fatty acids are of two types – Saturated and unsaturated. Unsaturated fatty acids are found in fish oil and vegetable oil. Only coconut oil and palm oil are the examples of saturated oil.

9.3 kilo calorie energy is liberated from 1 gram fat.

Normally an adult person should get 20-30% of energy from fat.

Main functions of fat:
1. It provides energy to the body.
2. It remains under the skin and prevents the loss of heat from the body.
3. It makes the food material testy.
4. It protects different parts of the body from injury.

Due to the lack of fat skin gets dried, weight of the body decreases and the development of the body checked.

Due to the excessiveness of fat the body gets fatty, heart disease takes place and blood pressure increases.

4. Vitamins: Vitamin was invented by Sir F. G. Hopkins. The term vitamin was coined by Funk.

Vitamins are organic compound required in minute quantities. No calorie is obtained from it, but it is very important in regulating chemical reactions in the metabolism of the body.

On the basis of solubility, vitamins are of two types:
(a) Vitamin soluble in water: Vitamin-B and Vitamin-C.
(b) Vitamin soluble in fat: Vitamin-A, Vitamin-D, Vitamin-E and Vitamin-K.

The diseases caused by the deficiency of vitamins and their sources

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Chemical name</th>
<th>Deficiency diseases</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin-A</td>
<td>Retinol</td>
<td>Colour blindness, xerophthalmia</td>
<td>Milk, Egg, Cheese, Green vegetables fish liver oil</td>
</tr>
<tr>
<td>Vitamin-B₂</td>
<td>Thymine</td>
<td>Beriberi</td>
<td>Groundnut, Rapeseed, Dried Chilli, Pulse, Liver, Egg, Vegetables etc.</td>
</tr>
<tr>
<td>Vitamin-B₃</td>
<td>Riboflavin</td>
<td>Cracking of skin, red-dish eye, cracking of tongue</td>
<td>Meat, Green vegetables, Milk etc.</td>
</tr>
<tr>
<td>Vitamin-B₃</td>
<td>Nicotinamide or Niacin</td>
<td>Whitening of hair, mentally retardness</td>
<td>Meat, Milk, Nut, Tomato, Sugarcane etc.</td>
</tr>
<tr>
<td>Vitamin-B₆</td>
<td>Pantothenic acid</td>
<td>Pellagra 4-D Syndrome</td>
<td>Meat, Ground Potato, Tomato, nut, Leafy vegetables etc.</td>
</tr>
<tr>
<td>Vitamin-B₆</td>
<td>Pyridoxine</td>
<td>Anaemia, skin disease</td>
<td>Liver, Meat, Grains etc.</td>
</tr>
</tbody>
</table>

Vitamin-B₇: Biotin

Vitamin-B₁₁: Folic acid

Vitamin-B₁₂: Cynomobalamin

Vitamin-C: Ascorbic acid

Vitamin-D: Calciferol

Vitamin-E: Tocopherol

Vitamin-K: Phylloquinone

Deficiency diseases Sources
- Paralysis, body pain, hair falling: Meat, Egg, Liver, Milk etc.
- Anaemia, dysentery: Pulse, Liver, Egg
- Anaemia, jaundice Todi: Meat, Milk etc.
- Anaemia, diarrhoea: Pulses, Liver, Vegetables, Eggs etc.
- Scurvy, Swelling of gums: Lemon, Orange, Tomato, Sour substances, Chilly, Sprouted grain
- Rickets (in children), Fish liver oil, Milk, Eggs etc.: Osteomalasia (in adults)
- Less fertility: Leafy vegetables, Milk, Butter, Sprouted wheat, Vegetable oil etc.
- Non-clotting of blood: Tomato, Soybean oil, Green vegetables etc.

Cobalt is found in Vitamin-B₁₂.

Synthesis of vitamins cannot be done by the cells and it is fulfilled by the vitamin containing foods.

However, synthesis of Vitamin-D and K takes place in our body.

Synthesis of Vitamin-D takes place by the ultra violet rays present in the sunlight through cholesterol (Isterester) of skin.

Vitamin-K is synthesized in our colon by the bacteria and from there it is absorbed.

6. Minerals: Mineral is a homogenous inorganic material needed for body. These control the metabolism of body.

Important Minerals and their functions

<table>
<thead>
<tr>
<th>Minerals</th>
<th>Daily quantity</th>
<th>Main sources</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium (as sodium chloride)</td>
<td>2 – 5 gram</td>
<td>Normal salt, fish, meat, eggs, milk etc.</td>
<td>It normally found in external fluid of body and is related to following functions: Contractions of muscles, In the transmission of nerve impulses in nerve fiber. Control of positive electrolyte balance in body etc.</td>
</tr>
<tr>
<td>Potassium</td>
<td>1 gram</td>
<td>Approximately all edibles</td>
<td>It is normally found in protoplasm. It is important for following different chemical reactions in cells: Muscular contractions, nerve conduction, maintenance of positive electrolyte in body etc.</td>
</tr>
<tr>
<td>Calcium</td>
<td>Approx 1.2 gram</td>
<td>Milk, cheese, eggs, grains, gram, fish etc.</td>
<td>This provides strength to bones and teeth with vitamin, Important role in blood formation, Related with muscular contraction, Help in clotting the blood etc.</td>
</tr>
</tbody>
</table>
Deficiency of calcium and iron is generally found in pregnant women.

Water: Human gets it by drinking. Water is the important component of our body. 65-75% weight of the body is water.

Main functions of water:
1. Water controls the temperature of our body by sweating and vaporizing.
2. It is the important way of excretion of the excretory substances from the body.
3. Maximum chemical reactions in the body perform through hydrolysis.

Balance Diet: That nutrition, in which all the important nutrients for organism are available in sufficient quantity, is called Balance Diet.

Balance nutrition is obtained from Balance Diet, which is given in the chart below:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain (wheat, rice)</td>
<td>400 g</td>
<td>520 g</td>
<td>670 g</td>
<td>410 g</td>
<td>440 g</td>
<td>440 g</td>
</tr>
<tr>
<td>Pulses</td>
<td>40 g</td>
<td>50 g</td>
<td>60 g</td>
<td>40 g</td>
<td>45 g</td>
<td>45 g</td>
</tr>
<tr>
<td>Leafy vegetables</td>
<td>40 g</td>
<td>40 g</td>
<td>100 g</td>
<td>100 g</td>
<td>50 g</td>
<td>50 g</td>
</tr>
<tr>
<td>Vegetables (other)</td>
<td>60 g</td>
<td>70 g</td>
<td>80 g</td>
<td>40 g</td>
<td>50 g</td>
<td>50 g</td>
</tr>
<tr>
<td>Milk</td>
<td>150 g</td>
<td>200 g</td>
<td>250 g</td>
<td>100 g</td>
<td>150 g</td>
<td>150 g</td>
</tr>
<tr>
<td>Tuber root</td>
<td>50 g</td>
<td>60 g</td>
<td>80 g</td>
<td>50 g</td>
<td>50 g</td>
<td>50 g</td>
</tr>
<tr>
<td>Sugar</td>
<td>30 g</td>
<td>35 g</td>
<td>55 g</td>
<td>20 g</td>
<td>20 g</td>
<td>20 g</td>
</tr>
<tr>
<td>Fat and oil</td>
<td>40 g</td>
<td>45 g</td>
<td>65 g</td>
<td>20 g</td>
<td>25 g</td>
<td>25 g</td>
</tr>
</tbody>
</table>

Necessary calorie for a human being:

<table>
<thead>
<tr>
<th>Nature of work</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light worker</td>
<td>2000 calorie</td>
<td>2100 calorie</td>
</tr>
<tr>
<td>Eight hours</td>
<td>3000 calorie</td>
<td>2500 calorie</td>
</tr>
<tr>
<td>Hard worker</td>
<td>3600 calorie</td>
<td>3000 calorie</td>
</tr>
<tr>
<td>Sodium Benzoate is used as preservative to preserve food item.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk is not considered as complete due to lack of vitamin C and iron.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Human Diseases

Diseases caused by Protozoa:

<table>
<thead>
<tr>
<th>Disease</th>
<th>Affected organ</th>
<th>Parasites</th>
<th>Carrier</th>
<th>Symptoms</th>
<th>Mosquito</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td>RBC &amp; Liver</td>
<td>Plasmodium</td>
<td>Anophelines</td>
<td>Fever with shivering</td>
<td></td>
</tr>
<tr>
<td>Pyorrhoea</td>
<td>Gums</td>
<td>Entamoeba gingivalis</td>
<td>Tse-Tse flies</td>
<td>Bleeding from gums.</td>
<td></td>
</tr>
<tr>
<td>Sleeping sickness</td>
<td>Brain</td>
<td>Trypanosoma</td>
<td></td>
<td>Fever with severe sleep.</td>
<td></td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>Intestine</td>
<td>Entamoeba histolytica</td>
<td>—</td>
<td>Mucous &amp; Diarrhoea with blood.</td>
<td></td>
</tr>
<tr>
<td>Kala-ajar</td>
<td>Bone marrow</td>
<td>Leishmania donovani</td>
<td>Sand flies</td>
<td>High fever.</td>
<td></td>
</tr>
</tbody>
</table>

Malignant malaria is pellagric malaria.
Charles Leveran discovered the Malaria parasite, Plasmodium in the blood of the affected person in the year 1880.
Ronald Ross (1897) confirmed the Malaria is caused by malaria parasite and told that mosquito is the carrier of it.

Diseases caused by Bacteria:

<table>
<thead>
<tr>
<th>Disease</th>
<th>Affected organ</th>
<th>Name of Bacteria</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetanus</td>
<td>Nervous system</td>
<td>Clostridium tetani</td>
<td>High fever, spasm in body, Closing of jaws etc</td>
</tr>
<tr>
<td>Cholera</td>
<td>Intestine</td>
<td>Vibrio cholerae</td>
<td>Continuous stool and vomiting</td>
</tr>
<tr>
<td>Typhoid</td>
<td>Intestine</td>
<td>Salmonella typhi</td>
<td>High fever, headache, Repeated coughing</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>Lungs</td>
<td>Mycobacterium tuberculosis</td>
<td>Difficulty in inspiration and suffocation</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>Respiratory tube</td>
<td>Corynebacterium diphtheriae</td>
<td>Very high fever, muscular eruptions on the body</td>
</tr>
<tr>
<td>Plague</td>
<td>Lungs, area between the two legs</td>
<td>Hemophilus pestis</td>
<td>Continuous coughing</td>
</tr>
<tr>
<td>Whooping cough</td>
<td>Respiratory system</td>
<td>Diplococcus pneumoniae</td>
<td>High fever, swelling in lungs</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>Lungs</td>
<td>Mycobacterium leprae</td>
<td>Spots on body, nerves affected</td>
</tr>
</tbody>
</table>

Leprosy | Nervous System Skin | Mycobacterium leprae |
Diseases caused by Viruses

<table>
<thead>
<tr>
<th>Disease</th>
<th>Affected organ</th>
<th>Name of virus</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>Defense system (WBC)</td>
<td>HIV</td>
<td>Immune system of body became weak</td>
</tr>
<tr>
<td>Dengue fever</td>
<td>Body, particularly head, eyes and joints</td>
<td>Billions of virus</td>
<td>Pain in eyes, muscles, head and joints</td>
</tr>
<tr>
<td>Polio</td>
<td>Throat, backbone (Nerve)</td>
<td>Pillo virus</td>
<td>Fever, body pain, backbone and intestine cells are destroyed</td>
</tr>
<tr>
<td>Influenza</td>
<td>Whole body</td>
<td>Mixo virus</td>
<td>Suffocation, sneezing, restlessness</td>
</tr>
<tr>
<td>Chicken Pox</td>
<td>Whole body</td>
<td>Varicola virus</td>
<td>High fever, radish eruption on body</td>
</tr>
<tr>
<td>Small Pox</td>
<td>Whole body</td>
<td>Varicella virus</td>
<td>Light fever, eruption of bile on body</td>
</tr>
<tr>
<td>Goitre</td>
<td>Parathyroid gland</td>
<td>--</td>
<td>Difficulty in opening the mouth with fever</td>
</tr>
<tr>
<td>Measles</td>
<td>Whole body</td>
<td>Morbevi virus</td>
<td>Reddish eruptions on body</td>
</tr>
<tr>
<td>Trachoma</td>
<td>Eyes</td>
<td>--</td>
<td>Reddish eyes, pain in eyes</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Liver</td>
<td>--</td>
<td>Yellow urine, eyes and skin become yellow</td>
</tr>
<tr>
<td>Rabies</td>
<td>Nervous system</td>
<td>Rabies virus</td>
<td>The patient becomes mad with severe headache and high fever</td>
</tr>
<tr>
<td>Meningitis</td>
<td>Brain</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Herpes</td>
<td>Skin</td>
<td>Herpes virus</td>
<td>--</td>
</tr>
</tbody>
</table>

Note: AIDS = Acquired Immuno Deficiency Syndrome

Elisa Test: Test of HIV Virus (AIDS)
7. Miscellaneous

**Medicinal Discoveries**

<table>
<thead>
<tr>
<th>Inventions/Discoveries</th>
<th>Inventor/Discoverer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin*</td>
<td>F. G. Hopkins, Cosmim Funk</td>
</tr>
<tr>
<td>Vitamin-A</td>
<td>Mc. Collum</td>
</tr>
<tr>
<td>Vitamin-B</td>
<td>Mc. Collum</td>
</tr>
<tr>
<td>Vitamin-C</td>
<td>Holst</td>
</tr>
<tr>
<td>Vitamin-D</td>
<td>Mc. Collum</td>
</tr>
<tr>
<td>Sulpha drugs</td>
<td>Dagmarck (Dagmanck)</td>
</tr>
<tr>
<td>Streptomycin</td>
<td>Selman Waksman</td>
</tr>
<tr>
<td>Heart Transplantation</td>
<td>Christian Bernard</td>
</tr>
<tr>
<td>Homoeopathy</td>
<td>Hahnemann</td>
</tr>
<tr>
<td>Malaria parasite and treatment</td>
<td>Ronald Ross</td>
</tr>
<tr>
<td>Diarrhoea and treatment of plague</td>
<td>Kitajato</td>
</tr>
<tr>
<td>Sex hormone</td>
<td>Stensh</td>
</tr>
<tr>
<td>Open heart surgery</td>
<td>Wintallilahk</td>
</tr>
<tr>
<td>Contraceptive pills</td>
<td>Pincus</td>
</tr>
<tr>
<td>First test tube baby</td>
<td>Edwards and Stepto</td>
</tr>
<tr>
<td>Electrocardiograph</td>
<td>Ivanyan</td>
</tr>
<tr>
<td>Antigen</td>
<td>Karl Landsteiner</td>
</tr>
<tr>
<td>RNA</td>
<td>James Watson and Arther Arga</td>
</tr>
<tr>
<td>DNA</td>
<td>James Watson and Crick</td>
</tr>
<tr>
<td>Insulin</td>
<td>Banting</td>
</tr>
</tbody>
</table>

* Funk named it 'Vitamine' (in 1912)

**Important Information:**

- **Largest and heaviest mammal:** Blue whale
- **Largest land mammal:** African elephant
- **Largest living reptile:** Sea turtle (Tortoise)
- **Largest living bird:** Ostrich
- **Largest snake:** Python
- **Largest monkey:** Gorilla
- **Smallest bird:** Shrew
- **Smallest mammal:** Ostrich's egg
- **Largest egg:** Cheetah (Panther)
- **Fastest running animal:** Spine tailed Swift
- **Fastest flying bird:**"
Some Important facts
1. The study of dreams is called Oneirology.
2. The study of the beauty of human is called Kalology.
3. At the time of creation of life there was no oxygen.
4. The strongest part in the body is the enamel of teeth.
5. The sex determination of human depends on male sex chromosomes.
6. The fastest nervous speed is 532 kmph.
7. The internal area of the lungs of human is 93 sq. m. which is forty times of the external area of the body.
8. The bones are as strong as concrete and as hard as granite.
9. Inside the body approximately 150 lakh cells are destroyed every second.
10. The weight of the uterus of the woman which has not given birth to a child is 50 grams and after giving birth to a child the weight becomes 100 grams.
11. The weight of the kidney is approximately 150 grams.
12. In a single inhaling, a normal adult takes 500 ml air inside the body.
13. The capacity of heart to pump the blood is 4.5 liters per minute.
14. The length of the small intestine is approximately 7 meter and its diameter is 2.5 centimeter.
15. The blood circulation inside the body takes approximately 23 seconds.
16. The antibiotic namely, penicillin is obtained from penicillium fungus.
17. Human is the most intelligent hominid of the universe.
18. Albatross is the largest sea bird, whose spread of feather is 10-12 ft.
19. There are approximately 50 lakhs hair in the body of human.
20. In the initial stage of formation of placenta, H.C.G. hormones flow at a large quantity and excreted through urine. At this time, in the testing of urine due to presence of this hormone pregnancy test is carried out.
21. The heart beat of a child is more than that of an adult.
22. A single respiration completes in 5 seconds i.e. 2 seconds of inspiration and 3 seconds of expiration.
23. Everyday blood in the body of the human carries approximately 350 liters of oxygen to the cells of the body. Out of this 97% oxygen is carried by haemoglobin and remaining 3% is circulated by blood plasma.
24. Zinc sulphide is used as rodenticide.
25. First child born after operative procedure was Caesar.
26. The largest living ape is Gorilla.
27. Fish is first class protein as it contain essential amino acid.
28. The soil which are rich in calcium are known as pedocals.
29. Contour farming is a biological method of soil conservation.
30. Vermi composting is done by worm.
31. ASHA: Accredited social health activist. It is a national rural health mission which provide community health care by trained female in every village.

MISCELLANY

1. Firsts in India (Male)

<table>
<thead>
<tr>
<th>First in India</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Governor of Bengal</td>
<td>Lord Clive (1757 - 80)</td>
</tr>
<tr>
<td>Last Governor of Bengal</td>
<td>Warren Hastings (1772 - 74)</td>
</tr>
<tr>
<td>First Governor General of Bengal</td>
<td>Lord William Bentinck (1833 - 35)</td>
</tr>
<tr>
<td>First Governor General and First Viceroy of India</td>
<td>Lord Canning (1856-62)</td>
</tr>
<tr>
<td>First President of Indian National Congress</td>
<td>W.C. Banerjee</td>
</tr>
<tr>
<td>First Indian Governor General of Independent India</td>
<td>C. Rajgopalachari (21.06.1948 - 25.01.1950)</td>
</tr>
<tr>
<td>First Indian to pass ICS</td>
<td>Surendra Nath Banerjee</td>
</tr>
<tr>
<td>First Indian I.C.S. Officer</td>
<td>Satyendra Nath Tagore</td>
</tr>
<tr>
<td>First Indian General of India (after independence)</td>
<td>Lord Louis Mountbatten (15 Aug. 1947 - 20 June, 1948)</td>
</tr>
<tr>
<td>First Indian Cosmonaut (to go into space)</td>
<td>Dr. Sahachida Nand Sinha</td>
</tr>
<tr>
<td>First temporary President of the Constituent Assembly</td>
<td>General K.M. Cariappa</td>
</tr>
<tr>
<td>First Commander-in-Chief of Free India</td>
<td>Rabinendra Nath Tagore</td>
</tr>
<tr>
<td>First Indian Nobel Laureate</td>
<td>Dr. Rajendra Prasad</td>
</tr>
<tr>
<td>First Indian Judge of the International Court of Justice</td>
<td>Dr. S. Radhakrishnan</td>
</tr>
<tr>
<td>First Indian to get Bharat Ratna Award</td>
<td>General S.F.J. Manekshaw</td>
</tr>
<tr>
<td>First Field Marshal</td>
<td>Dr. Rajendra Prasad</td>
</tr>
<tr>
<td>The President of Constituent Assembly</td>
<td>Mihir Sen</td>
</tr>
<tr>
<td>First Indian to swim across the English Channel</td>
<td>G. Shankar Kurup</td>
</tr>
<tr>
<td>First Indian to get Jnanpith Award</td>
<td>Dr. Zakir Hussain</td>
</tr>
<tr>
<td>First Muslim President of Indian Republic</td>
<td>Baiyapanth Nath</td>
</tr>
<tr>
<td>First Indian to win Palk-Strait Ocean Swimming Contest</td>
<td>G.V. Mavlankar (1952-57)</td>
</tr>
<tr>
<td>First Speaker of Lok Sabha</td>
<td>James Hicky</td>
</tr>
<tr>
<td>First person to make Printing Press popular in India</td>
<td>Maulana Abul Kalam Azad</td>
</tr>
<tr>
<td>First Education Minister of Independent India</td>
<td>Dr. Rajendra Prasad</td>
</tr>
<tr>
<td>First President of Indian Republic</td>
<td>Pt. Jawahar Lal Nehru</td>
</tr>
<tr>
<td>First Prime Minister of Indian Republic</td>
<td>Sardar Vallabhbhai Patel</td>
</tr>
<tr>
<td>First Home Minister of Independent India</td>
<td>Dr. S. Radhakrishnan</td>
</tr>
<tr>
<td>First Vice-President of Independent India</td>
<td>Air Marshal Sir Thomas Elmhirst</td>
</tr>
<tr>
<td>First Chief of Air Staff</td>
<td>Air Marshal S. Mukherjee</td>
</tr>
<tr>
<td>First Indian Air Chief of India</td>
<td>General M. Rajendra Singh</td>
</tr>
<tr>
<td>First Chief of Army Staff</td>
<td>Vice-Admiral R.D. Katari</td>
</tr>
<tr>
<td>First Chief of Naval Staff of India</td>
<td>Apsara (1956)</td>
</tr>
</tbody>
</table>
| First large-scale Atomic Reactor of India | }
Miscellany

First Indian to reach the South Pole
First Indian recipient of 'Oscar Award'  
First American President to visit India
First British Prime Minister to visit India
First Indian author to get Anderson Award
First Indian to win World Billiards Trophy
First Indian Space Tourist

2. Firsts in India (Female)

India's first Woman President  
India's first Woman Prime Minister
India's first Woman Governor
India's first Woman ruler (on Delhi's throne)
India's first Woman I.P.S. officer
First Woman Chief Minister of a state
First Woman Union Minister
First Woman President of INC
First Woman Judge of the Supreme Court
First Woman to get Ashok Chakra
First Indian Woman Ambassador at United Nations
First Indian Woman to swim across English Channel
First Indian Woman to get the Nobel Prize
First Indian Woman to climb the Mt. Everest
First Indian Woman to become 'Miss World'
First Indian Woman to climb the 'Mt. Everest' twice
First Indian Woman to become 'Miss Universe'
First Indian Woman to get Bharat Ratna
First Woman to get Jnanpith Award
First Indian Woman to win WTA Title
First Indian Woman Airline Pilot
First Indian Woman to win a Gold in Asian Games
First Indian Woman President of J. N. Congress
First Indian Woman to win the Booker Prize
First Woman Musician to get 'Bharat Ratna'
First Indian Woman to go into space

3. Firsts in the World (Male & Female)

First men to climb Mt. Everest
First man to reach North Pole
First man to reach South Pole
First religion of the world
First country to print books

First to get Paramvir Chakra  
First Atomic Submarine of India
First Indian Scientist to get Nobel Prize
First Indian Submarine
First Scientist of Indian origin, to get Nobel Prize in the field of Medical Science
First Aircraft Carrier Indian Ship
First Chinese pilgrim to visit India
First Medium Range Missile
First e-business News Paper of India
First Scientist of Indian origin to win Nobel Prize in Physics
First Indian Missile
First Indian to win Stalin Award
India's first Nuclear Centre
First Indian to win Magsaysay Award
India's first Open University
India's first Lok Sabha Member to be elected with a record maximum number of votes
India's first minister to resign from Union Cabinet
First British to visit India
First Asian Games organised
India's first Election Commissioner
First Muslim President of Indian National Congress
First Chief Justice of India
First Person to submit the proposal of Indian Independence in a Congress Session
India's first University
First Indian to climb Mt. Everest without Oxygen cylinder
First foreign recipient of Bharat Ratna  
First Indian recipient of Nobel Prize in Economics
First Army Institute of Information Technology founded
First Test Tube Baby of India
First Indian Pilot
First Indian to reach Antarctica
First Post-Office opened in India
First Deputy Prime Minister of India
First Indian Prime Minister to resign from office
First Indian Prime Minister to loose an Election
First President of India to die in office
First Man to climb Mt. Everest twice

First to get Paramvir Chakra  
First Atomic Submarine of India
First Indian Scientist to get Nobel Prize
First Indian Submarine
First Scientist of Indian origin, to get Nobel Prize in the field of Medical Science
First Aircraft Carrier Indian Ship
First Chinese pilgrim to visit India
First Medium Range Missile
First e-business News Paper of India
First Scientist of Indian origin to win Nobel Prize in Physics
First Indian Missile
First Indian to win Stalin Award
India's first Nuclear Centre
First Indian to win Magsaysay Award
India's first Open University
India's first Lok Sabha Member to be elected with a record maximum number of votes
India's first minister to resign from Union Cabinet
First British to visit India
First Asian Games organised
India's first Election Commissioner
First Muslim President of Indian National Congress
First Chief Justice of India
First Person to submit the proposal of Indian Independence in a Congress Session
India's first University
First Indian to climb Mt. Everest without Oxygen cylinder
First foreign recipient of Bharat Ratna  
First Indian recipient of Nobel Prize in Economics
First Army Institute of Information Technology founded
First Test Tube Baby of India
First Indian Pilot
First Indian to reach Antarctica
First Post-Office opened in India
First Deputy Prime Minister of India
First Indian Prime Minister to resign from office
First Indian Prime Minister to loose an Election
First President of India to die in office
First Man to climb Mt. Everest twice

First to get Paramvir Chakra  
First Atomic Submarine of India
First Indian Scientist to get Nobel Prize
First Indian Submarine
First Scientist of Indian origin, to get Nobel Prize in the field of Medical Science
First Aircraft Carrier Indian Ship
First Chinese pilgrim to visit India
First Medium Range Missile
First e-business News Paper of India
First Scientist of Indian origin to win Nobel Prize in Physics
First Indian Missile
First Indian to win Stalin Award
India's first Nuclear Centre
First Indian to win Magsaysay Award
India's first Open University
India's first Lok Sabha Member to be elected with a record maximum number of votes
India's first minister to resign from Union Cabinet
First British to visit India
First Asian Games organised
India's first Election Commissioner
First Muslim President of Indian National Congress
First Chief Justice of India
First Person to submit the proposal of Indian Independence in a Congress Session
India's first University
First Indian to climb Mt. Everest without Oxygen cylinder
First foreign recipient of Bharat Ratna  
First Indian recipient of Nobel Prize in Economics
First Army Institute of Information Technology founded
First Test Tube Baby of India
First Indian Pilot
First Indian to reach Antarctica
First Post-Office opened in India
First Deputy Prime Minister of India
First Indian Prime Minister to resign from office
First Indian Prime Minister to loose an Election
First President of India to die in office
First Man to climb Mt. Everest twice

First to get Paramvir Chakra  
First Atomic Submarine of India
First Indian Scientist to get Nobel Prize
First Indian Submarine
First Scientist of Indian origin, to get Nobel Prize in the field of Medical Science
First Aircraft Carrier Indian Ship
First Chinese pilgrim to visit India
First Medium Range Missile
First e-business News Paper of India
First Scientist of Indian origin to win Nobel Prize in Physics
First Indian Missile
First Indian to win Stalin Award
India's first Nuclear Centre
First Indian to win Magsaysay Award
India's first Open University
India's first Lok Sabha Member to be elected with a record maximum number of votes
India's first minister to resign from Union Cabinet
First British to visit India
First Asian Games organised
India's first Election Commissioner
First Muslim President of Indian National Congress
First Chief Justice of India
First Person to submit the proposal of Indian Independence in a Congress Session
India's first University
First Indian to climb Mt. Everest without Oxygen cylinder
First foreign recipient of Bharat Ratna  
First Indian recipient of Nobel Prize in Economics
First Army Institute of Information Technology founded
First Test Tube Baby of India
First Indian Pilot
First Indian to reach Antarctica
First Post-Office opened in India
First Deputy Prime Minister of India
First Indian Prime Minister to resign from office
First Indian Prime Minister to loose an Election
First President of India to die in office
First Man to climb Mt. Everest twice

First to get Paramvir Chakra  
First Atomic Submarine of India
First Indian Scientist to get Nobel Prize
First Indian Submarine
First Scientist of Indian origin, to get Nobel Prize in the field of Medical Science
First Aircraft Carrier Indian Ship
First Chinese pilgrim to visit India
First Medium Range Missile
First e-business News Paper of India
First Scientist of Indian origin to win Nobel Prize in Physics
First Indian Missile
First Indian to win Stalin Award
India's first Nuclear Centre
First Indian to win Magsaysay Award
India's first Open University
India's first Lok Sabha Member to be elected with a record maximum number of votes
India's first minister to resign from Union Cabinet
First British to visit India
First Asian Games organised
India's first Election Commissioner
First Muslim President of Indian National Congress
First Chief Justice of India
First Person to submit the proposal of Indian Independence in a Congress Session
India's first University
First Indian to climb Mt. Everest without Oxygen cylinder
First foreign recipient of Bharat Ratna  
First Indian recipient of Nobel Prize in Economics
First Army Institute of Information Technology founded
First Test Tube Baby of India
First Indian Pilot
First Indian to reach Antarctica
First Post-Office opened in India
First Deputy Prime Minister of India
First Indian Prime Minister to resign from office
First Indian Prime Minister to loose an Election
First President of India to die in office
First Man to climb Mt. Everest twice
First country to issue paper currency
First country to start Civil Services Competition
First President of United States of America
First Prime Minister of Great Britain
First Secretary General of United Nations
First country to make education compulsory
First country to win the World Cup Football
First country to make a constitution
Pakistan's first Governor General
First summit of NAM was organised in
First European to visit China
First man to fly an aeroplane
First person to sail around the world
First country to send human to Moon
First country to launch satellite into space
First country to host the modern Olympic games
First President of the Republic of China
First city to be attacked with Atom bomb
First Radio Telescope Satellite was launched into space
First Russian (Soviet) Prime Minister to visit India
First University of the world
First man to set foot on the Moon
First man to go into space
First Space Shuttle launched
First Space Ship landed on Mars
First Woman Prime Minister of England
First Woman Prime Minister of any muslim country
First Woman Prime Minister of a country
First Woman cosmonaut in space
First Woman to climb Mt. Everest
First deaf and dumb to cross the Srait of Gibraltar
First Woman President of UN General Assembly
First European Invader of Indian soil
First Woman to reach the North Pole
First Woman to reach Antarctica
First man to draw the map of earth
First man to compile Encyclopædia
The oldest man to climb Mt. Everest
First Asian to win Wimbledon Trophy
First man to win Nobel Prize for Literature
First man to win Nobel Prize for Peace
First man to win Nobel Prize for Physics
First man to win Nobel Prize for Chemistry
First man to win Nobel Prize for Medicine
First man to win Nobel Prize for Economics
First Woman President of a country
First Space Tourist (Male)
First Space Tourist (Female)

4. Superlatives : India
(Biggest, Highest, Largest, Longest, Smallest etc.)

The longest river Bridge
Sonepur (Bihar)
Mahatma Gandhi Setu Patna (5.575 km.)

The largest animal Fair
Mumbai
Sri Sharanmurthi Fair (Mumbai)

The largest Auditorium
Wular Lake (J & K)
Teihi Dam, on Bhagratri river (Uttarakhand)

The largest Lake
Ganges (Delhi)
Thar (Rajasthan)

The highest Dam
Vidyasagar Setu (Kolkata)
Jawahar Dam (Kolkata)

The highest Desert
Kailash Temple (Ekai, Maharashtra)
Jama Masjid (Delhi)

The highest Peak
Sunderbans (W. Bengal)
Godwin Austen/K-2 (8611 m.)

The longest Tunnel
Madhya Pradesh
Jawahar Tunnel, Banhal Pass (J & K)

The longest Road
Annapurna (Karnataka)
Corridor of Rammathswami Temple at Rameswaram (Tamil Nadu)

The highest Waterfall
Sukhnot (Karnataka)
Jog or Gassapara (Karnataka)

The longest River
The Ganges
Jana Masjid (Delhi)

The largest Museum
The Ganges
Indian Museum, Kolkata

The largest Dome
Jama Masjid (Delhi)
Gomateswara (Karnataka)

The tallest Statue
State Bank of India
Statue of Unity (Gujarat)

The largest Public Sector Bank
Indian Institute of Technology (IIT), Roorkee
SBI (State Bank of India)

The biggest cantilever Bridge
Anna Indira Gandhi Bridge/Pamban Bridge (Tamil Nadu)
Indera Gandhi Canal or Rajasthan Canal (Rajasthan)

The longest Canal
Gokulwadi Canal (I.P.), 1355.4 m
Indira Gandhi Canal or Rajasthan Canal (Rajasthan)

The longest Railway platform
Indira Gandhi Canal or Rajasthan Canal (Rajasthan)
Pir Panjal Rly. Tunnel (J & K) 11,215 km

The longest Railway tunnel
Suba Bharat (Salt Lake) Stadium Kolkata
The biggest Stadium
Mumbai (Maharashtra)

The most populous City
Vidarbha (Kolkata)
Anna Indira Gandhi Bridge/Pamban Bridge (Tamil Nadu)

The largest Sea Bridge
Dibrugarh to Kanyakumari
Indira Gandhi Canal or Rajasthan Canal (Rajasthan)
### 5. Superlatives: World
(The Largest, Biggest, Smallest, Longest, Highest etc.)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tallest Animal (on land)</td>
<td>Giraffe</td>
</tr>
<tr>
<td>Biggest Bell</td>
<td>Great Bell at Moscow</td>
</tr>
<tr>
<td>Fastest Bird</td>
<td>Peregrine Falcon (322 km/hr)</td>
</tr>
<tr>
<td>Largest Bird</td>
<td>Ostrich</td>
</tr>
<tr>
<td>Smallest Bird</td>
<td>Humming Bird</td>
</tr>
<tr>
<td>Longest Bridge (Railway)</td>
<td>Lower Zambezi (Africa)</td>
</tr>
<tr>
<td>Tallest Building</td>
<td>Burj Khalifa, Dubai (U.A.E.)</td>
</tr>
<tr>
<td>Tallest Office Building</td>
<td>Petronas Twin Towers Kuala Lumpur (Malaysia)</td>
</tr>
<tr>
<td>Longest Big-ship Canal</td>
<td>Suez Canal (linking Red Sea and Mediterranean)</td>
</tr>
<tr>
<td>Busiest Canal (Ship)</td>
<td>Baltic Sea Canal (152 miles)</td>
</tr>
<tr>
<td>Biggest Cinema (Ship)</td>
<td>Roxy (New York)</td>
</tr>
<tr>
<td>Highest City</td>
<td>Roxy (New York)</td>
</tr>
<tr>
<td>Largest City (in population)</td>
<td>Wen Chuan (Tibet, China) 16,732 ft.</td>
</tr>
<tr>
<td>Biggest City (in area)</td>
<td>Tokyo (3,430,000,000). Est. population in 2011</td>
</tr>
<tr>
<td>Largest City (in area)</td>
<td>Mount Isa, Queensland, Australia (41,225 sq. km.)</td>
</tr>
<tr>
<td>Largest Ocean</td>
<td>Imperial Palace (Gugong), Beijing (China)</td>
</tr>
<tr>
<td>Largest Mountain Range</td>
<td>Andes (S. America) about 7,000 km in length</td>
</tr>
<tr>
<td>Highest Mountain Range</td>
<td>British Museum (London)</td>
</tr>
<tr>
<td>Longest Mountain Range</td>
<td>Qutub Minar, Delhi 238 ft.</td>
</tr>
<tr>
<td>Tallest Minaret (Free standing)</td>
<td>Great Hassan Mosque, Casablanca, Morocco</td>
</tr>
<tr>
<td>Tallest minaret</td>
<td>The Pacific</td>
</tr>
<tr>
<td>Deepest And Biggest Ocean</td>
<td>Atlantic Ocean</td>
</tr>
<tr>
<td>Largest Palace</td>
<td>National Park, Greenland</td>
</tr>
<tr>
<td>Largest Park</td>
<td>Arabia (32,800,000 sq. km.)</td>
</tr>
<tr>
<td>Largest Peninsula</td>
<td>Vostok (Antarctica), Temperature ~89.2°C</td>
</tr>
<tr>
<td>Coldest Place or Region</td>
<td>Atacama Desert (South America)</td>
</tr>
<tr>
<td>Driest Place</td>
<td>Jupiter</td>
</tr>
<tr>
<td>Largest Planet</td>
<td>Venus</td>
</tr>
<tr>
<td>Brightest and Hottest Planet (also nearest to Earth)</td>
<td>1.0 AU (0.98632 AU)</td>
</tr>
</tbody>
</table>
Largest Platform (Railway)  Gorakhpur (U.P) India (1354 m)
Largest Platform (Railway)  Grand Central Terminal, New York (USA)
Largest Port  Europoort Port and Port of Rotterdam (together), Netherlands
Busiest Port  Rotterdam (the Netherlands)
Longest Railway  Trans-Siberian Railway (5,772 miles long)
Longest River  Nile (6600 km), Amazon (6570 km)
Longest River Dam  Hirakud Dam (Odisha), India, 15.8 miles
Largest Sea-bird  Albatross
Largest Sea (inland)  Caspian Sea (143,200 sq. miles)
Brightest Star  Sirius (also called Dog Star)
Tallest Statue  Statue of Liberty, New York (USA), 158 feet high
Tallest Statue (bronze)  Bronze Statue of Lord Buddha, Tokyo (Japan)
Tallest Tower  Tokyo Sky Tree (Japan) 2909 ft
Longest Train nonstop  Flying Scotsman
Longest and Deepest Rail Tunnel  Seikan Tunnel (Japan), 03.85 km.
Longest and Largest Canal Tunnel  Le Rove Tunnel (South of France)
Longest Tunnel (Road)  Lærdal, Norway
Highest Volcano  Ojos del Salado, Andes, Argentina-Chile (6,885 m)
Largest Volcano  Mauna Loa (Hawaii)
Longest Wall  Great Wall of China (1500 miles)
Highest Waterfall  Salto Angel Falls (Venezuela)
Longest Strait  Tartar Straits (Sakhalin Island and the Russian mainland)
Broader Strait  Davis Straits (Greenland and Baffin Island, Canada)
Narrowest Strait  Cheliks - 45 yards (between the Greek mainland and the island of Euboea in the Aegean Sea)
Largest Bay  Hudson Bay, Canada (shore line 7623 miles)
Largest Gulf  Gulf of Mexico, Shoreline 2100 miles
Largest Archipelago  Indonesia (over 3000 islands)
Tallest Active Geyser  Giant (geyser) Yellowstone Park U.S.A. 200 feet high
Longest River Basin  Amazon basin-27,200,000 sq. miles
World's Rainiest spot  Cherrapunji (Mawsynram), India
Largest Gorge  Grand Canyon, on the Colorado river, U.S.A.
Lightest Gas  Hydrogen
Lightest Metal  Lithium
Highest Melting Point  Tungsten, 3410°C
Hardest Substance  Diamond
Longest Animal  Blue whale, (recorded length 106 feet, weight - 195 tons)
Longest Life-span of an Animal  191 to 200 years, (Giant tortoise)

6. Some Important Monuments / Structures of the World

<table>
<thead>
<tr>
<th>Monuments / Structure</th>
<th>Country</th>
<th>Monuments / Structure</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Leaning Tower of Pisa</td>
<td>Italy</td>
<td>Kremlin (Moscow)</td>
<td>Russia</td>
</tr>
<tr>
<td>Imperial Palace (Tokyo)</td>
<td>Japan</td>
<td>Parthenon (Athens)</td>
<td>Greece</td>
</tr>
<tr>
<td>Statue of Liberty (New York)</td>
<td>U.S.A.</td>
<td>Pyramid (Giza)</td>
<td>Egypt</td>
</tr>
<tr>
<td>Opera House (Sydney)</td>
<td>Australia</td>
<td>Wailing Wall</td>
<td>Jerusalem</td>
</tr>
<tr>
<td>Eiffel Tower (Paris)</td>
<td>France</td>
<td>Taj Mahal (Agra)</td>
<td>India</td>
</tr>
<tr>
<td>Great Wall (North China)</td>
<td>China</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. International Boundaries

<table>
<thead>
<tr>
<th>Magninot Line</th>
<th>Germany &amp; France</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mc Mahon Line</td>
<td>India &amp; China</td>
</tr>
<tr>
<td>Radcliffe Line</td>
<td>U.S.A. &amp; Canada</td>
</tr>
<tr>
<td>49th Parallel</td>
<td>Germany &amp; Poland</td>
</tr>
<tr>
<td>Maginot Line (France)</td>
<td>Germany &amp; Poland</td>
</tr>
<tr>
<td>Durand Line (France)</td>
<td>Germany &amp; Poland</td>
</tr>
<tr>
<td>38th Parallel (Germany)</td>
<td>Germany &amp; Poland</td>
</tr>
<tr>
<td>Hindenburg Line (Germany)</td>
<td>Germany &amp; Poland</td>
</tr>
</tbody>
</table>
### 8. National Emblems of some important Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Emblem</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>Lioned Capitol</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Crescent &amp; Star</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Water Lily</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Lion</td>
</tr>
<tr>
<td>U.K.</td>
<td>Rose</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>Golden Rod</td>
</tr>
<tr>
<td>Italy</td>
<td>White Lily</td>
</tr>
<tr>
<td>Australia</td>
<td>Kangaroo</td>
</tr>
</tbody>
</table>

* Jasmin and four main crops of Pakistan

### 9. National Animals of some Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Animal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Kangaroo</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Kiwi</td>
</tr>
<tr>
<td>Canada</td>
<td>Eagle</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Robin redbreast</td>
</tr>
<tr>
<td>Japan</td>
<td>Tiger</td>
</tr>
</tbody>
</table>

### 10. News Agencies of some Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.A.</td>
<td>Associated Press (AP), United Press International (UP)</td>
</tr>
<tr>
<td>U.K.</td>
<td>Reuters</td>
</tr>
<tr>
<td>Russia</td>
<td>Telegraph Agency of the Sovereign States (TASS)</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Malaysian National News Agency (MNNA)</td>
</tr>
<tr>
<td>Italy</td>
<td>Agenzia Nazionale Stampa Associate (ANSA)</td>
</tr>
<tr>
<td>Israel</td>
<td>Associated Israel Press (AIP)</td>
</tr>
<tr>
<td>France</td>
<td>Agence France Presse (A.F.P.)</td>
</tr>
<tr>
<td>India</td>
<td>Press Trust of India (PTI), United News of India (UNI), Samachar Bharti, Univarta</td>
</tr>
<tr>
<td>China</td>
<td>Xin Hua</td>
</tr>
<tr>
<td>Japan</td>
<td>Kyodo</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Antara</td>
</tr>
<tr>
<td>Iran</td>
<td>Islamic Republic News Agency (IRNA)</td>
</tr>
<tr>
<td>Germany</td>
<td>Deutsche Presse Agentur (D.P.A.)</td>
</tr>
<tr>
<td>Palestine</td>
<td>WAFA</td>
</tr>
<tr>
<td>Australia</td>
<td>Australian Associated Press (A.A.P.)</td>
</tr>
<tr>
<td>Russia</td>
<td>Novosti</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Pakistan Press International (PTI), Associated Press of Pakistan (APP)</td>
</tr>
<tr>
<td>Egypt</td>
<td>Middle East News Agency (MENA)</td>
</tr>
</tbody>
</table>

### 11. Map Lines

1. **Isohaline**: An imaginary line drawn on the map to join places of the ocean having equal salinity.

2. **Isobar**: An imaginary line drawn on the map to join places of equal atmospheric pressure.

3. **Isobaths**: An imaginary line drawn on the map to join places of equal depth in the ocean.

4. **Isolines or Contour lines**: An imaginary line drawn on the map to join places of equal height.

5. **Isohyets**: An imaginary line drawn on the map to join places having same amount of rainfall.

6. **Isopleths**: An imaginary line drawn on the map to join places having same value of certain factors viz. isohyete, isotherm etc.

7. **Isohels**: An imaginary line drawn on the map to join places having received equal amount of sunlight.

8. **Isotherm**: An imaginary line drawn on the map to join equal temperature zones.

### 12. Some Important Political Parties of different Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Political Parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.A.</td>
<td>Republican Party, Democratic Party</td>
</tr>
<tr>
<td>Iraq</td>
<td>Bath Party</td>
</tr>
<tr>
<td>Israel</td>
<td>Labour Party, Likud Party, Hamas Party, Shas Party</td>
</tr>
<tr>
<td>France</td>
<td>Socialist Party, National Front, Union for French Democracy</td>
</tr>
<tr>
<td>Australia</td>
<td>Liberal Party, Labour Party</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Bangladesh Nationalist Party, Awami League, Jatiya Party</td>
</tr>
<tr>
<td>Nepal</td>
<td>Nepali Communist Party, Nepali Congress Party</td>
</tr>
<tr>
<td>China</td>
<td>Communist Party of China</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>United National Party, Freedom Party</td>
</tr>
<tr>
<td>South Africa</td>
<td>African National Congress, National Party, Inkatha Freedom Party</td>
</tr>
<tr>
<td>Russia</td>
<td>Communist Party, Liberal Democratic Party, Russia's Choice</td>
</tr>
<tr>
<td>India</td>
<td>Indian National Congress, Bharatiya Janata Party, RJ, CPI, CPM, SP, BSP, LJP, TDP, AAP</td>
</tr>
</tbody>
</table>

### 13. Intelligence / Detective Agencies of the World

<table>
<thead>
<tr>
<th>Country</th>
<th>Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Central External Liaison Department, Australian Security &amp; Intelligence Organisation, K.G.B./G.R.U., Bureau of State Security (B.O.S.S.), Inter Services Intelligence (I.S.I.)</td>
</tr>
<tr>
<td>Australia</td>
<td>Research &amp; Analysis Wing (RAW), Intelligence Bureau (IB)</td>
</tr>
<tr>
<td>Russia</td>
<td>Pakistan</td>
</tr>
<tr>
<td>South Africa</td>
<td>India</td>
</tr>
<tr>
<td>South Africa</td>
<td>Australia, Australia, Russia, South Africa</td>
</tr>
</tbody>
</table>
### 14. Parliaments of different Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Parliament</th>
<th>Country</th>
<th>Parliament</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>Sansad (Lok Sabha and Rajya Sabha)</td>
<td>Nepal</td>
<td>Rashtriya Panchayat</td>
</tr>
<tr>
<td>Pakistan</td>
<td>National Assembly</td>
<td>Denmark</td>
<td>Folketing</td>
</tr>
<tr>
<td>Britain</td>
<td>Parliament (House of Commons and House of Lords)</td>
<td>Russia</td>
<td>Duma and Federal</td>
</tr>
<tr>
<td>Germany</td>
<td>Bundestag (Lower House) and Bundesrat (Upper House)</td>
<td>China</td>
<td>People’s Congress</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Federal Assembly</td>
<td>France</td>
<td>National Assembly</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>Congress (House of Representatives and Senate)</td>
<td>Turkey</td>
<td>Grand National Assembly</td>
</tr>
<tr>
<td>Bhutan</td>
<td>Tshogdu</td>
<td>Iran</td>
<td>Majlis</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Jatiya Sansad</td>
<td>Afghanistan</td>
<td>Shora</td>
</tr>
<tr>
<td>Norway</td>
<td>Storting</td>
<td>Israel</td>
<td>Knesset</td>
</tr>
<tr>
<td>Spain</td>
<td>Cortes Generales</td>
<td>Maldives</td>
<td>Mazzis</td>
</tr>
<tr>
<td>Australia</td>
<td>Federal Parliament</td>
<td>Japan</td>
<td>Diet</td>
</tr>
<tr>
<td>Myanmar</td>
<td>Pyithu Hluttaw (People's Assembly)</td>
<td>Canada</td>
<td>Parliament</td>
</tr>
</tbody>
</table>

### 15. Some Important Signs or Symbols

<table>
<thead>
<tr>
<th>Sign</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pen</td>
<td>Symbol of Culture &amp; Civilization</td>
</tr>
<tr>
<td>Lotus</td>
<td>Culture and Civilization</td>
</tr>
<tr>
<td>Red Cross</td>
<td>Medical Aid &amp; Hospital</td>
</tr>
<tr>
<td>Red Flag</td>
<td>Revolution, also sign of danger</td>
</tr>
<tr>
<td>Black Flag</td>
<td>Symbol of protest</td>
</tr>
<tr>
<td>Yellow Flag</td>
<td>Flown on ships or vehicles carrying patients suffering from infectious diseases</td>
</tr>
<tr>
<td>Flag flown upside down</td>
<td>Symbol of Distress</td>
</tr>
<tr>
<td>Flag flown at half mast</td>
<td>Symbol of National mourning</td>
</tr>
<tr>
<td>White Flag</td>
<td>Symbol of Truce</td>
</tr>
<tr>
<td>Red Tringle</td>
<td>Sign of Family Planning</td>
</tr>
<tr>
<td>Pigeon or Dove</td>
<td>Symbol of Peace</td>
</tr>
<tr>
<td>Red Light</td>
<td>Traffic sign of ‘Stop’, also sign of ‘Danger’ or ‘Emergency’</td>
</tr>
</tbody>
</table>

### 16. Some important Official Books

- **Green Book**: Official reports or publications of Italy & Iran
- **White Book**: The official publications of Portugal, China & Germany
- **Blue Book**: Any official report of the British government
- **Yellow Book**: The report or publication of the French government
- **Orange Book**: Official report of the government of Netherlands
- **White Paper**: The authoritative recital of facts issued by the government stating its views on a particular matter
- **Grey Book**: Report of the government of Belgium and Japan
- **Joint Paper**: The joint report of two or more than two governments

### 17. Newspapers & their place of publication (World)

<table>
<thead>
<tr>
<th>Newspaper</th>
<th>Place</th>
<th>Newspaper</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Times</td>
<td>London</td>
<td>The Guardian</td>
<td>London</td>
</tr>
<tr>
<td>Daily Mirror</td>
<td>London</td>
<td>Daily Mail</td>
<td>Paris</td>
</tr>
<tr>
<td>La Figaro</td>
<td>Paris</td>
<td>Le Monde</td>
<td>Moscow</td>
</tr>
<tr>
<td>Ezvestia</td>
<td>Moscow</td>
<td>Pravda</td>
<td>Dubai</td>
</tr>
<tr>
<td>The Island</td>
<td>Colombo</td>
<td>Khalij Times</td>
<td>Tokyo</td>
</tr>
<tr>
<td>Eastern Sun</td>
<td>Singapore</td>
<td>Mainichi Shimbun</td>
<td>Beijing</td>
</tr>
<tr>
<td>Star</td>
<td>Cairo</td>
<td>People’s Daily</td>
<td>Rome</td>
</tr>
<tr>
<td>Al Ahram</td>
<td>Jakarta</td>
<td>La Republica</td>
<td>Cairo</td>
</tr>
<tr>
<td>Maricika</td>
<td>Washington</td>
<td>Daily News</td>
<td>Daily</td>
</tr>
<tr>
<td>The Times of India</td>
<td>Johannesburg</td>
<td>The Hindu</td>
<td>Chennai</td>
</tr>
<tr>
<td>The Sun</td>
<td>India</td>
<td>Daily Telegraph</td>
<td>U.K.</td>
</tr>
<tr>
<td>The New Statesman</td>
<td>U.K.</td>
<td>China Times</td>
<td>Taiwan</td>
</tr>
<tr>
<td>Red Flag</td>
<td>China</td>
<td>Toronto Star</td>
<td>Canada</td>
</tr>
<tr>
<td>Bangladesh Observer</td>
<td>Dhaka</td>
<td>Dawn</td>
<td>Karachi</td>
</tr>
</tbody>
</table>
## 18. United Nations

- The name ‘United Nations’ was adopted by the suggestion of the then US President F.D. Roosevelt.
- To prepare the format of the UN, a meeting of representatives of prominent countries held from 21st August to 7th October, 1944 at Dumbarton Ox building in Washington.
- The UNO was formed on 24th October 1945.
- The constitution of the UN was signed on 26th June, 1945 by representatives of 50 nations, though the number of founder member countries was 51 who attended the San Francisco Conference. Later on Poland signed the Charter and become the 51st founder member.
- At present 193 countries are members of the UN. South Sudan is the latest (193rd) member.
- The UN Charter came into force on October 24, 1945, when the Governments of China, France, the U.K., the Soviet Union and the U.S.A. and a majority of other countries had ratified it.
- The Preamble to the Charter was the work of Field Marshal Smuts.
- The Head Quarter of the UN is situated in New York (USA).
- John D Rockefeller had donated 17 acres of land in Manhattan island, on which a 39 storeyed secretariat building of the UN has been constructed.
- The main office of the UN was built in 1952, where the first meeting of the General Assembly was held in 1952.
- The UN Charter is the Constitution of the UN. It contains the aim and objectives of the UN and the rules and regulations for achieving these aims and purposes.
- Flag of the UN: White UN emblem (two bent olive branches open at the top and in between them is world map) on a light blue background.
- Languages of the UN: The official languages of the UN are: (a) English (b) French (c) Chinese (d) Russian (e) Arabic and (f) Spanish. But the working Languages are English and French only.
- Major Organs of the UN: (1) General Assembly (GA) 2. Security Council (SC) (3) Economic and Social Council (ECOSOC) (4) Trusteeship Council (TC) (5) International Court of Justice (6) The Secretariat.
- International Court of Justice sits at The Hague (Netherlands), while all other organs of the UN are situated in New York (USA).
- The Security Council consists of 15 members, each of which has one representative and one vote.
- There are 5 permanent and 10 non-permanent members of the SC. The non-permanent members are elected for a 2 year term by two thirds majority of the GA.
- The five permanent members are—USA, Russia, UK, France and China.
- The proverb ‘Policeman of the World’ is used for the Security Council.
- Only the permanent members have the right to ‘veto’.

## 19. World Organisations and their Headquarters

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Headquarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>GATT (General Agreement on Tariffs &amp; Trade)</td>
<td>Geneva</td>
</tr>
<tr>
<td>Asian Development Bank (ADB)</td>
<td>London (England)</td>
</tr>
<tr>
<td>ASEAN (Association of South-East Asian Nations)</td>
<td>Manila (Philippines)</td>
</tr>
<tr>
<td>NATO (North Atlantic Treaty Organisation)</td>
<td>Jakarta (Indonesia)</td>
</tr>
<tr>
<td>African Union (AU)</td>
<td>Brussels (Belgium)</td>
</tr>
<tr>
<td>International Committee of the Red Cross (ICRC)</td>
<td>Addis-Ababa (Ethiopia)</td>
</tr>
<tr>
<td>SAARC (South Asian Association for Regional Co-operation)</td>
<td>Geneva (Switzerland)</td>
</tr>
<tr>
<td>United Nations Environment Programme (UNEP)</td>
<td>Kathmandu (Nepal)</td>
</tr>
<tr>
<td>INTERPOLE (International Police)</td>
<td>Nairobi (Kenya)</td>
</tr>
<tr>
<td>World Trade Organisation (WTO)</td>
<td>Lyons (France)</td>
</tr>
<tr>
<td>League of Arab States</td>
<td>Geneva</td>
</tr>
<tr>
<td>COMECON</td>
<td>Cairo (Egypt)</td>
</tr>
<tr>
<td>World Council of Churches (WCC)</td>
<td>Minsk (Belarus)</td>
</tr>
<tr>
<td>European Energy Commission (EEC)</td>
<td>Geneva</td>
</tr>
<tr>
<td>Economic Commission of Africa (ECA)</td>
<td>Geneva</td>
</tr>
<tr>
<td>Economic Commission of West Asia (ECWA)</td>
<td>Addis-Ababa</td>
</tr>
<tr>
<td>United Nations High Commission for Refugees (UNHCR)</td>
<td>Baghdad</td>
</tr>
<tr>
<td>International Atomic Energy Agency (IAEA)</td>
<td>Geneva</td>
</tr>
<tr>
<td>United Nations Industrial Development Organisation (UNIDO)</td>
<td>Vienna (Austria)</td>
</tr>
<tr>
<td>UNCTAD (United Nations Conference on Trade and Development)</td>
<td>Geneva</td>
</tr>
<tr>
<td>WWF (World Wildlife Fund)</td>
<td>Gland (Switzerland)</td>
</tr>
<tr>
<td>International Olympic Committee (IOC)</td>
<td>Kuala Lumpur (Malaysia)</td>
</tr>
<tr>
<td>European Common Market (ECM)</td>
<td>Genoa (Italy)</td>
</tr>
<tr>
<td>CHOCEM (Commonwealth Heads of Governments Meet)</td>
<td>London</td>
</tr>
<tr>
<td>OPEC (Organisation of Petroleum Exporting Countries)</td>
<td>Vienna</td>
</tr>
<tr>
<td>OECD (Organisation for Economic Co-operation and Development)</td>
<td>Paris</td>
</tr>
<tr>
<td>CENTO (Central Treaty Organisation)</td>
<td>Ankara (Turkey)</td>
</tr>
<tr>
<td>Commonwealth</td>
<td>London</td>
</tr>
<tr>
<td>European Economic Community (EEC)</td>
<td>Brussels</td>
</tr>
<tr>
<td>Council of European</td>
<td>Strasbourg</td>
</tr>
<tr>
<td>European Space Research Organization (ESRO)</td>
<td>Paris</td>
</tr>
<tr>
<td>BENELUX Economic Union</td>
<td>Brussels</td>
</tr>
<tr>
<td>Economic and Social Commission for Asia and the Pacific (ESCAP)</td>
<td>Bangkok (Thailand)</td>
</tr>
<tr>
<td>Economic Commission for Europe (ECE)</td>
<td>Geneva</td>
</tr>
<tr>
<td>Economic Commission for Latin America and the Caribbean (ECLAC)</td>
<td>Santiago (Chile)</td>
</tr>
<tr>
<td>Economic and Social Commission for Western Asia (ESWA)</td>
<td>Jordan (Amman)</td>
</tr>
<tr>
<td>ANZUS Council</td>
<td>Canberra (Australia)</td>
</tr>
</tbody>
</table>
20. Secretary Generals of UNO and their Tenure

<table>
<thead>
<tr>
<th>Name</th>
<th>Country</th>
<th>Tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trygve Lie</td>
<td>Norway</td>
<td>1946 - 1952</td>
</tr>
<tr>
<td>Dag Hammarskjold</td>
<td>Sweden</td>
<td>1953 - 1961</td>
</tr>
<tr>
<td>U - Thant</td>
<td>Myanmar (Burma)</td>
<td>1961 - 1971</td>
</tr>
<tr>
<td>Kurt - Waldheim</td>
<td>Austria</td>
<td>1972 - 1982</td>
</tr>
<tr>
<td>Kofi Annan</td>
<td>Ghana</td>
<td>1997 - 2006</td>
</tr>
<tr>
<td>Ban Ki - moon</td>
<td>S. Korea</td>
<td>2007 -</td>
</tr>
</tbody>
</table>

21. UN International Decades

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015-2024</td>
<td>International Decade for People of African Descent</td>
</tr>
<tr>
<td>2014-2024</td>
<td>United Nations Decade of Sustainable Energy for All</td>
</tr>
<tr>
<td>2013-2022</td>
<td>International Decade for the Rapprochement of Cultures (UNESCO)</td>
</tr>
<tr>
<td>2011-2020</td>
<td>Third International Decade for the Eradication of Colonialism, UN Decade on Biodiversity, Decade of Action for Road Safety</td>
</tr>
<tr>
<td>2010-2020</td>
<td>UN Decade for Deserts and the Fight against Desertification</td>
</tr>
</tbody>
</table>

22. International Years

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2016</td>
<td>Decade of Recovery and Sustainable Development of the Affected Regions</td>
</tr>
<tr>
<td>2005-2014</td>
<td>UN Nations Decade of Education for Sustainable Development</td>
</tr>
<tr>
<td>2003-2012</td>
<td>Second International Decade of the World’s Indigenous People</td>
</tr>
<tr>
<td>2001-2010</td>
<td>United Nations Literacy Decade : Education For All</td>
</tr>
<tr>
<td>2001-2000</td>
<td>Second UN Decade for the Eradication of Colonialism, International Decade for Peace and Non Violence for the Children of the World</td>
</tr>
</tbody>
</table>

UNESCO participates in the celebration of the following International Decades proclaimed by the General Assembly of the United Nations.

23. Designated SAARC Years

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>Year of Combating Drug Abuse and Drug Trafficking</td>
</tr>
<tr>
<td>1996</td>
<td>Year of Literacy</td>
</tr>
<tr>
<td>1990</td>
<td>Year of Girl Child</td>
</tr>
<tr>
<td>1997</td>
<td>Year of Participatory Governance</td>
</tr>
<tr>
<td>1991</td>
<td>Year of Shelter</td>
</tr>
<tr>
<td>1999</td>
<td>Year of Biodiversity</td>
</tr>
<tr>
<td>2002-2003</td>
<td>Year of Contribution of Youth to Environment</td>
</tr>
<tr>
<td>2004</td>
<td>Year of TB and HIV/AIDS</td>
</tr>
<tr>
<td>2005</td>
<td>Year of South Asian Tourism</td>
</tr>
<tr>
<td>2007</td>
<td>Year of Green South Asia</td>
</tr>
</tbody>
</table>

24. International U.N. Weeks

<table>
<thead>
<tr>
<th>Week</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 1st Week</td>
<td>World Interfaith Harmony Week</td>
</tr>
<tr>
<td>March 21 to 28</td>
<td>International Week of Solidarity with the people struggling against Racism and Racial Discrimination</td>
</tr>
<tr>
<td>October 4 to 10</td>
<td>World Space Week</td>
</tr>
<tr>
<td>October 24 to 30</td>
<td>International Disarmament Week</td>
</tr>
</tbody>
</table>
## 25. Important (India and World) Days

### January
- Louis Braille Day
- National Youth Day (Birthday of Swami Vivekanand)
- Army Day (India)
- Tourism Day (India)
- Republic Day (India)
- International Day of Commemoration in Memory of the Victims of the Holocaust
- Martyrs' Day (India)
- Leprosy Prevention Day
- Sarvodaya Day (India)

### February
- World Radio Day
- Valentine Day
- World Day of Social Justice
- International Mother Language Day
- Central Excise Tax Day
- National Science Day

### March
- National Safety Day (Security of Industrial Institutions)
- International Women's Day, UN Day for Women's Rights & International Peace
- World Kidney Day
- Central Industrial Security Force (CISF) Foundation Day
- World Consumer Rights Day
- Ordnance Manufacturing Day
- World Disabled Day, International Day of Happiness
- World Water Day, International Day for the Elimination of Racial Discrimination
- World Meteorological Day
- Ram Manohar Lohia's Birth Day (Anniversary)
- Bhagat Singh, Sukhdev and Rajguru's Martyrdom Day
- World TB (Tuberculosis) Day
- Rural Postal Life Insurance Day
- Sacrifice Day of Ganesha Shankar Vidyarthi
- National Day of Bangladesh
- World Theatre Day

### April
- World Autism Awareness Day
- 2nd April
- 3rd Sunday of June
- 4th June
- 5th June
- 8th June
- 17th June
- 23rd April
- 3rd Sunday of June
- 5th June
- 23rd April
- 22nd April
- 17th April
- 14th April
- 14th April
- 12th January
- 15th January
- 25th January
- 26th January
- 27th January
- 30th January
- 13th February
- 20th February
- 21st February
- 24th February
- 28th February
- 4th March
- 8th March
- 9th March
- 12th March
- 15th March
- 18th March
- 20th March
- 21st March
- 22nd March
- 23rd March
- 24th March
- 26th March
- 4th April
- 5th April
- 7th April
- 10th April
- 14th April
- 14th April
- 17th April
- 18th April
- 21st April
- 22nd April
- 23rd April
- 24th April
- 1st May
- 1st Tuesday of May
- 3rd May
- 4th May
- 2nd Sunday of May
- 8th May
- 8th May
- 11th May
- 13th May
- 15th May
- 17th May
- 21st May
- 22nd May
- 24th May
- 27th May
- 29th May
- 31st May
- 4th June
- 5th June
- 3rd Sunday of June
- 15th June
- 17th June
- International Day for Mine Awareness and Assistance in Mine Action
- National Maritime Day
- Special Protection Group (SPG) Foundation Day
- World Health Day
- World Homeopathy Day (Birth day of Samuel Hanimen)
- World Aeronautics and Cosmololgy Day
- Ambedkar’s Birth Anniversary
- World Haemophilia Day
- World Heritage Day
- Indian Civil Service Day
- International Mother Earth Day
- World Books and Copyright Day
- Panchayat Divas
- International Labour Day (Worker’s Day or May Day)
- World Asthma Day
- World Press Freedom Day
- World Red Cross Day
- World Laughter Day
- Mother’s Day
- World Migratory Birds Day
- International Phyliesemia Day
- National Technological Day
- International Nurse Day
- International Family Day
- World Telecommunication/Information Society Day
- Anti-Terrorism Day, World Day for Cultural Diversity for Dialogue & Development
- International Day for Biological Diversity
- Commonwealth Day
- Death Anniversary of Jawahar Lal Nehru
- International Day of UN Peacekeepers
- World No-Tobacco/No-smoking Day
- June
- International Day of Innocent Children Victims of Agression
- World Environment Day
- World Oceans Day
- Father’s Day (in many countries)
- World Elder Abuse Awareness Day
- World Day to Combat Desertification & Drought
<table>
<thead>
<tr>
<th>Month</th>
<th>Day</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>World Refugee Day</td>
<td>20th June</td>
</tr>
<tr>
<td></td>
<td>International Day of Yoga</td>
<td>21st June (w.e.f. 2015)</td>
</tr>
<tr>
<td></td>
<td>UN Public Service Day</td>
<td>23rd June</td>
</tr>
<tr>
<td></td>
<td>International Day (UN) against Drug Abuse and Illicit Trafficking, Int. Day in Support of Victims of Torture</td>
<td>26th June</td>
</tr>
<tr>
<td>July</td>
<td>Doctor’s Day (Birthday of Dr. Bidhan Chandra Roy)</td>
<td>1st July</td>
</tr>
<tr>
<td></td>
<td>State Bank of India Foundation Day</td>
<td>1st July</td>
</tr>
<tr>
<td></td>
<td>International Day of Cooperatives</td>
<td>1st Saturday of July</td>
</tr>
<tr>
<td></td>
<td>World Population Day</td>
<td>11th July</td>
</tr>
<tr>
<td></td>
<td>International Nelson Mandela Day</td>
<td>18th July</td>
</tr>
<tr>
<td></td>
<td>Kargil Memorial Day (India)</td>
<td>26th July</td>
</tr>
<tr>
<td></td>
<td>International Day of Friendship</td>
<td>30th July</td>
</tr>
<tr>
<td>August</td>
<td>World Breast Feeding Day</td>
<td>1st August</td>
</tr>
<tr>
<td></td>
<td>World Peace Day, Hiroshima Day</td>
<td>6th August</td>
</tr>
<tr>
<td></td>
<td>Quit India Day (India), Nagasaki Day, International Day of the World’s Indigenous People</td>
<td>9th August</td>
</tr>
<tr>
<td></td>
<td>International Youth Day</td>
<td>12th August</td>
</tr>
<tr>
<td></td>
<td>Independence Day (India)</td>
<td>15th August</td>
</tr>
<tr>
<td></td>
<td>World Humanitarian Day</td>
<td>19th August</td>
</tr>
<tr>
<td></td>
<td>National Sports Day (Birth Day of Dhyanchand)</td>
<td>29th August</td>
</tr>
<tr>
<td></td>
<td>International Day against Nuclear Tests</td>
<td>29th August</td>
</tr>
<tr>
<td>September</td>
<td>Teacher’s Day (Birth Day of S. Radhakrishnan)</td>
<td>5th September</td>
</tr>
<tr>
<td></td>
<td>International Literacy Day</td>
<td>8th September</td>
</tr>
<tr>
<td></td>
<td>World Fraternity and Apology Day</td>
<td>14th September</td>
</tr>
<tr>
<td></td>
<td>Hindi Divas (Day)</td>
<td>14th September</td>
</tr>
<tr>
<td></td>
<td>International Day of Democracy</td>
<td>15th September</td>
</tr>
<tr>
<td></td>
<td>Engineer’s Day (Birth Day of M. Vishweshwaraiya)</td>
<td>15th September</td>
</tr>
<tr>
<td></td>
<td>World Ozone Day</td>
<td>16th September</td>
</tr>
<tr>
<td></td>
<td>Railway Police Force (RPF) Foundation Day</td>
<td>20th September</td>
</tr>
<tr>
<td></td>
<td>International Day of Peace, Alzheimer’s Day</td>
<td>21st September</td>
</tr>
<tr>
<td></td>
<td>World Deaf Day and World Heart Day</td>
<td>24th September</td>
</tr>
<tr>
<td></td>
<td>World Tourism Day</td>
<td>27th September</td>
</tr>
<tr>
<td>October</td>
<td>International Day for Older Persons</td>
<td>1st October</td>
</tr>
<tr>
<td></td>
<td>Mahatma Gandhi’s Birth Day (International Day of Non-Violence)</td>
<td>1st October</td>
</tr>
<tr>
<td></td>
<td>Birth Day of Lal Bahadur Shastri</td>
<td>2nd October</td>
</tr>
<tr>
<td></td>
<td>World Habitat Day</td>
<td>1st Monday of October</td>
</tr>
<tr>
<td>November</td>
<td>World Animal Welfare Day</td>
<td>4th October</td>
</tr>
<tr>
<td></td>
<td>World Teacher’s Day</td>
<td>5th October</td>
</tr>
<tr>
<td></td>
<td>World Wild Animal Day</td>
<td>6th October</td>
</tr>
<tr>
<td></td>
<td>Indian Air Force Day</td>
<td>8th October</td>
</tr>
<tr>
<td></td>
<td>World Post Day</td>
<td>9th October</td>
</tr>
<tr>
<td></td>
<td>International Day of the Girl Child</td>
<td>11th October</td>
</tr>
<tr>
<td></td>
<td>Birth of Loknayak Jay Prakash Narayan</td>
<td>11th October</td>
</tr>
<tr>
<td></td>
<td>UN International Day for Natural Disaster Reduction</td>
<td>2nd Wednesday of October</td>
</tr>
<tr>
<td></td>
<td>World Standards Day</td>
<td>14th October</td>
</tr>
<tr>
<td></td>
<td>World Food Day</td>
<td>16th October</td>
</tr>
<tr>
<td></td>
<td>World Allergy Awareness Day</td>
<td>16th October</td>
</tr>
<tr>
<td></td>
<td>International Day for the Eradication of Poverty</td>
<td>17th October</td>
</tr>
<tr>
<td></td>
<td>World Iodine Shortage Day</td>
<td>21st October</td>
</tr>
<tr>
<td></td>
<td>U N Day, World Development Information Day</td>
<td>24th October</td>
</tr>
<tr>
<td></td>
<td>World Thrift Day</td>
<td>30th October</td>
</tr>
<tr>
<td></td>
<td>Death Anniversary of Indira Gandhi</td>
<td>31st October</td>
</tr>
<tr>
<td>December</td>
<td>International Day for Preventing the Exploitation of the Environment in War &amp; Armed Conflict</td>
<td>6th November</td>
</tr>
<tr>
<td></td>
<td>World Service Day</td>
<td>9th November</td>
</tr>
<tr>
<td></td>
<td>National Education Day (Birth Day of Maulana Azad)</td>
<td>14th November</td>
</tr>
<tr>
<td></td>
<td>Children’s Day (Birth anniversary of Jawaharlal Nehru)</td>
<td>14th November</td>
</tr>
<tr>
<td></td>
<td>World Diabetes Day</td>
<td>16th November</td>
</tr>
<tr>
<td></td>
<td>International Day for Tolerance</td>
<td>16th November</td>
</tr>
<tr>
<td></td>
<td>National Press Day</td>
<td>17th November</td>
</tr>
<tr>
<td></td>
<td>World Students Day, World Epilepsy Day</td>
<td>3rd Sunday of November</td>
</tr>
<tr>
<td></td>
<td>World Day of Remembrance for Road Traffic Victims</td>
<td>17th November</td>
</tr>
<tr>
<td></td>
<td>National Journalism Day</td>
<td>18th November</td>
</tr>
<tr>
<td></td>
<td>World Adult Day</td>
<td>19th November</td>
</tr>
<tr>
<td></td>
<td>World Citizen Day</td>
<td>20th November</td>
</tr>
<tr>
<td></td>
<td>Universal Children’s Day, Africa Industrialization Day</td>
<td>21st November</td>
</tr>
<tr>
<td></td>
<td>World Television Day</td>
<td>25th November</td>
</tr>
<tr>
<td></td>
<td>International Day for the Elimination of Violence Against Women,</td>
<td>26th November</td>
</tr>
<tr>
<td></td>
<td>World Non-veg Prevention Day</td>
<td>26th November</td>
</tr>
<tr>
<td></td>
<td>World Environment Protection Day</td>
<td>26th November</td>
</tr>
<tr>
<td></td>
<td>National Law Day</td>
<td>29th November</td>
</tr>
<tr>
<td></td>
<td>International Day of Solidarity with the Palestinian People</td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td></td>
</tr>
<tr>
<td></td>
<td>World AIDS Day</td>
<td>1st December</td>
</tr>
</tbody>
</table>
### India’s World Heritage Sites (included in UNESCO’s list)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Site</th>
<th>Year of Inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ajanta Caves (Maharashtra)</td>
<td>1983</td>
</tr>
<tr>
<td>2</td>
<td>Ellora Caves (Maharashtra)</td>
<td>1983</td>
</tr>
<tr>
<td>3</td>
<td>Agra Fort (U.P.)</td>
<td>1983</td>
</tr>
<tr>
<td>4</td>
<td>Taj Mahal (U.P.)</td>
<td>1983</td>
</tr>
<tr>
<td>5</td>
<td>Sun Temple, Konark (Odisha)</td>
<td>1984</td>
</tr>
<tr>
<td>6</td>
<td>Mahabalipuram Temples (TN)</td>
<td>1984</td>
</tr>
<tr>
<td>7</td>
<td>Kaziranga National Park (Assam)</td>
<td>1985</td>
</tr>
<tr>
<td>8</td>
<td>Manas Wildlife Sanctuary (Assam)</td>
<td>1985</td>
</tr>
<tr>
<td>9</td>
<td>Keoladeo National Park (Rajasthan)</td>
<td>1985</td>
</tr>
<tr>
<td>10</td>
<td>Churches and Convents of Goa</td>
<td>1985</td>
</tr>
<tr>
<td>11</td>
<td>Khajuraho Temples (MP)</td>
<td>1986</td>
</tr>
<tr>
<td>12</td>
<td>Monuments at Hampi (Karnataka)</td>
<td>1986</td>
</tr>
<tr>
<td>13</td>
<td>Fatehpur Sikri (UP)</td>
<td>1986</td>
</tr>
<tr>
<td>14</td>
<td>Pattadakal Temples (Karnataka)</td>
<td>1986</td>
</tr>
<tr>
<td>15</td>
<td>Elephanta Caves</td>
<td>1986</td>
</tr>
<tr>
<td>16</td>
<td>Sundarbans National Park (W.B)</td>
<td>1987</td>
</tr>
<tr>
<td>18</td>
<td>Nanda Devi and Valley of Flowers National Parks</td>
<td>1988-2005</td>
</tr>
<tr>
<td>19</td>
<td>Sanchi Stupa (MP)</td>
<td>1999</td>
</tr>
<tr>
<td>20</td>
<td>Humayun’s Tomb (Delhi)</td>
<td>1993</td>
</tr>
<tr>
<td>21</td>
<td>Qutub Minar and its Monuments (Delhi)</td>
<td>1993</td>
</tr>
<tr>
<td>23</td>
<td>Mahabodhi Temple, Bodh Gaya (Bihar)</td>
<td>2002</td>
</tr>
<tr>
<td>24</td>
<td>Rock Shelters of Bhimbetka (MP)</td>
<td>2003</td>
</tr>
<tr>
<td>25</td>
<td>Champaner - Pavagadh Park (Gujarat)</td>
<td>2004</td>
</tr>
<tr>
<td>26</td>
<td>Chhatrapati Shivaji Terminus (CST), Mumbai</td>
<td>2007</td>
</tr>
<tr>
<td>27</td>
<td>Red Fort (Lai Quila) Complex, Delhi</td>
<td>2010</td>
</tr>
<tr>
<td>28</td>
<td>Jantar Mantar of Jaipur (Rajasthan)</td>
<td>2012</td>
</tr>
<tr>
<td>29</td>
<td>Western Ghats</td>
<td>2013</td>
</tr>
<tr>
<td>30</td>
<td>Hill Forts of Rajasthan (6 majestic forts) (Chittorgarh, Kumbhalgarh, Sawai Madhopur, Jaisalmer, Jaipur and Jaisalmer Fort)</td>
<td>2014</td>
</tr>
<tr>
<td>31</td>
<td>Rani-ki-Vav (the Queen’s Stepwell) at Patan, Gujarat</td>
<td>2014</td>
</tr>
<tr>
<td>32</td>
<td>Great Himalayan National Park Conservation Area</td>
<td>2014</td>
</tr>
</tbody>
</table>

1. First inhabited World Heritage Monument (constructed in 1156).

### 27. Famous Tourist Spots of India

<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
<th>Founder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanheri Caves</td>
<td>Mumbai</td>
<td>Buddhists</td>
</tr>
<tr>
<td>Elephanta Caves</td>
<td>Mumbai</td>
<td>Rishtrakutas</td>
</tr>
<tr>
<td>Ajanta Caves</td>
<td>Aurangabad</td>
<td>Gupta Rulers</td>
</tr>
<tr>
<td>Ellora Caves</td>
<td>Aurangabad</td>
<td>Buddhists</td>
</tr>
<tr>
<td>Kandhari Mahadev</td>
<td>Jabalpur</td>
<td>Chandela Kings</td>
</tr>
<tr>
<td>Madan Palace</td>
<td>Gwalior</td>
<td>Raja Man Singh Tomar</td>
</tr>
<tr>
<td>Mrignanay Palace</td>
<td>Dhar</td>
<td>Mohammad Bin Tughlaq</td>
</tr>
<tr>
<td>Dhar Fort</td>
<td>Hyderabad</td>
<td>Qutubshahi</td>
</tr>
<tr>
<td>Golconda Fort</td>
<td>Kerala</td>
<td>Portuguese</td>
</tr>
<tr>
<td>Cochin Fort</td>
<td>Chittorgarh (Raj)</td>
<td>Rana Kumbha</td>
</tr>
<tr>
<td>Vijay Stambh</td>
<td>Delhi</td>
<td>Qutub-ud-din Alibk</td>
</tr>
<tr>
<td>Qutub Minar</td>
<td>Ajmer (Raj)</td>
<td>Qutub-ud-din Alibk</td>
</tr>
<tr>
<td>Adhai Din Ka Jhoppda</td>
<td>Delhi</td>
<td>Alauddin Khilji</td>
</tr>
<tr>
<td>Hauz Khas</td>
<td>Delhi</td>
<td>Ghiyasuddin Tughlaq</td>
</tr>
<tr>
<td>Tughlakabad</td>
<td>Delhi</td>
<td>Firoz Shah Tughlaq</td>
</tr>
<tr>
<td>Firoz Shah Kotla</td>
<td>Delhi</td>
<td>Raja Nagar Singh</td>
</tr>
<tr>
<td>Bundi Fort</td>
<td>Udaipur</td>
<td>—</td>
</tr>
<tr>
<td>Pichola Lake</td>
<td>Ahmedabad</td>
<td>Sultan Qutub ud din</td>
</tr>
<tr>
<td>Kailasa Lake</td>
<td>Jodhpur (Raj)</td>
<td>Rao Jodha Ji</td>
</tr>
<tr>
<td>Jodhpur Fort</td>
<td>Udaipur (Raj)</td>
<td>Maharana Fatesh Singh</td>
</tr>
<tr>
<td>Fateh Sagar</td>
<td>Deog (Raj)</td>
<td>Raja Badan Singh</td>
</tr>
<tr>
<td>Deog Palace</td>
<td>Bundi (Raj)</td>
<td>Rani Nathvati</td>
</tr>
</tbody>
</table>
28. Defence of India

- The defence policy of India aims at promoting and sustaining durable peace in the subcontinent and equipping the defence forces adequately.

- The supreme commander of the Indian Armed Forces is the President of India. The responsibility for national defence, however, rests with the union cabinet. The Defence Minister is responsible to the Parliament for all matters concerning the defence of the country. Administrative and operational control of the armed force is exercised by the Ministry of Defence and the three Service Headquarters.

- The Defence Ministry consists of 4 departments: (i) Department of Defence (ii) Department of Defence Production (iii) Department of Defence Research and Development (iv) Department of Ex-Servicemen Welfare.

- In 2002, the Defence Ministry given a new name—“Integrated Headquarters, Ministry of Defence”. Indian Armed Forces are divided into three Services of the armed force. The three services function under their respective Army, Navy and Air Force. The three services are: Army, Navy, and Air Force.

- In the contemporary world, India has the fourth largest army in the world, the fifth largest air force and the seventh largest navy.

Indian Armed Forces are divided into three services:

- **Army**: The Chief is ‘Chief of Army Staff’. Its headquarters is in New Delhi. The army is organised into the following seven commands:
### Command

<table>
<thead>
<tr>
<th>Command</th>
<th>Headquarters</th>
<th>Command</th>
<th>Headquarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Command</td>
<td>Chandigarh</td>
<td>Eastern Comm.</td>
<td>Kolkata</td>
</tr>
<tr>
<td>Northern Command</td>
<td>Udhampur</td>
<td>Southern Comm.</td>
<td>Pune</td>
</tr>
<tr>
<td>Army Training Comm.</td>
<td>Shimla</td>
<td>Central Comm.</td>
<td>Lucknow</td>
</tr>
<tr>
<td>South Western Comm.</td>
<td>Jaipur</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Each Command of the Indian Army is commanded by a General Officer Commanding-in-Chief of the rank of Lieutenant General.

2. **Navy:** The Chief is an Admiral ranked "Chief of the Naval Staff". The headquarters is in New Delhi. The Navy has three Naval Commands, commanded by Flag Officers Commanding-in-Chief of the rank of Vice-Admiral. They are:

<table>
<thead>
<tr>
<th>Command</th>
<th>Headquarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Command</td>
<td>Visakhapatnam</td>
</tr>
<tr>
<td>Western Command</td>
<td>Mumbai</td>
</tr>
</tbody>
</table>

3. **Air Force:** The Chief is an Air Chief Marshal ranked 'Chief of the Air Staff'. Its headquarters is in New Delhi. The Air force is organized into seven commands (five Operational and two Functional Commands):

<table>
<thead>
<tr>
<th>Command</th>
<th>Headquarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Air Comd.</td>
<td>Shillong</td>
</tr>
<tr>
<td>South-Western Air Comd.</td>
<td>Gandhinagar</td>
</tr>
<tr>
<td>Southern Air Comd.</td>
<td>Tiruvananthapuram</td>
</tr>
<tr>
<td>Maintenance Comd.</td>
<td>Nagpur</td>
</tr>
<tr>
<td>Training Comd.</td>
<td>Bangalore</td>
</tr>
</tbody>
</table>

4. **Commissioned Ranks**

<table>
<thead>
<tr>
<th>Army</th>
<th>Air Force</th>
<th>Navy</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Air Chief Marshal</td>
<td>Admiral</td>
</tr>
<tr>
<td>Lieutenant General</td>
<td>Air Marshal</td>
<td>Vice-Admiral</td>
</tr>
<tr>
<td>Major General</td>
<td>Air Vice-Marshalc</td>
<td>Rear Admiral</td>
</tr>
<tr>
<td>Brigadier</td>
<td>Air Commodore</td>
<td>Commodore</td>
</tr>
<tr>
<td>Colonel</td>
<td>Group Captain</td>
<td>Captain</td>
</tr>
<tr>
<td>Lieutenant Colonel</td>
<td>Wing Commander</td>
<td>Commander</td>
</tr>
<tr>
<td>Major</td>
<td>Squadron Leader</td>
<td>Captain</td>
</tr>
<tr>
<td>Captain</td>
<td>Flight Lieutenant</td>
<td>Commander</td>
</tr>
<tr>
<td>Lieutenant</td>
<td>Flying Officer</td>
<td>Lieutenant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sub Lieutenant</td>
</tr>
</tbody>
</table>

### 29. Internal Security of India

<table>
<thead>
<tr>
<th>Organization</th>
<th>Year</th>
<th>Headquarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assam Rifles (AR)(former Catchar Levy)</td>
<td>1835</td>
<td>Shillong</td>
</tr>
<tr>
<td>Central Reserve Police Force (CRPF)</td>
<td>1939</td>
<td>New Delhi</td>
</tr>
<tr>
<td>National Cadet Corps (NCC)</td>
<td>1948</td>
<td>New Delhi</td>
</tr>
<tr>
<td>Territorial Army (TA)</td>
<td>1949</td>
<td>In different states</td>
</tr>
<tr>
<td>Indo-Tibetan Border Police (ITBP)</td>
<td>1962</td>
<td>New Delhi</td>
</tr>
</tbody>
</table>

### 30. Defence Training Institutions of India

**Army**
- National Defence Academy (NDA), Khadakwasla (near Pune)
- National Defence College (NDC), New Delhi
- College of Defence Management (CDM), Secunderabad (A.P).
- College of Military Engineering (CME), Pune (Maharashtra)
- Rashtra Indian Military College (RIMC), Dehradun
- Armed Forces Medical College (AFMC), Pune
- Officer’s Training School (OTS), Chennai
- High Altitude Warfare School Gulmarg (J&K)
- Counter Insurgency and Jungle Warfare School, Vairengte
- Infantry Schools, Mhow and Belgaum
- Armoured Corps Centre and School, Ahmednagar (Maharashtra)
- School of Artillery, Deolali

**Air Force**
- Air Force School, Sambra (Belgaum)
- Flying Instructors’ School, Tambaram,
- Helicopter Training School, Avadi
- College of Air Warfare, Secunderabad
- Air Force Administrative College, Coimbatore
- Air Force Academy, Hyderabad
- Air Force Technical College, Jalalahli (Bangalore)
- Elementary Flying School, Bidar
- Paratroopers Training School, Agra (UP)
- Institute of Aviation Medicine, Bangalore

**Navy**
- I.N.S. Chilka, Bhubaneswar (Orissa)
- I.N.S. Hansa, Goa
- Navy Shipwright School, Visakhapatnam
- I.N.S. Satavahana, Visakhapatnam (AP)
- I.N.S., Garuda, Kochi (Cochin)
- I.N.S., Shivaji, Lonavala
- I.N.S. Valsura, Jamnagar (Gujarat)
- I.N.S. Hamla, Mumbai
- I.N.S. Kunjai, Mumbai
- I.N.S. Ashwini (INM), Mumbai
- I.N.S. Agrani, Coimbatore
- I.N.S. Naval Academy, Goa
### 31. Foundation Day of Some States

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 1</td>
<td>Nagaland Day</td>
</tr>
<tr>
<td>Jan 21</td>
<td>Maniur, Meghalaya and Tripura Day</td>
</tr>
<tr>
<td>Feb 6</td>
<td>Jammu-Kashmir Day</td>
</tr>
<tr>
<td>Feb 20</td>
<td>Mizoram and Arunachal Pradesh Day</td>
</tr>
<tr>
<td>Mar 11</td>
<td>Andaman &amp; Nicobar Islands Day</td>
</tr>
<tr>
<td>Mar 22</td>
<td>Bihar Day (Bihar Diwas)</td>
</tr>
<tr>
<td>Mar 30</td>
<td>Rajasthan Day</td>
</tr>
<tr>
<td>Apr 1</td>
<td>Utkal (Orissa), Day</td>
</tr>
<tr>
<td>Apr 14</td>
<td>Tamil Nadu Day</td>
</tr>
<tr>
<td>Apr 15</td>
<td>Himachal Pradesh Day</td>
</tr>
<tr>
<td>May 1</td>
<td>Gujarat and Maharashtra Day</td>
</tr>
<tr>
<td>May 16</td>
<td>Sikkim Day</td>
</tr>
<tr>
<td>Nov 1</td>
<td>Chhattisgarh, Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Karnataka, Kerala &amp; Andhra Pradesh Day</td>
</tr>
<tr>
<td>Nov 9</td>
<td>Uttaranchal (Now Uttarakhand) Day</td>
</tr>
<tr>
<td>Nov 15</td>
<td>Jharkhand Day (Jharkhand Diwas)</td>
</tr>
<tr>
<td>Dec 19</td>
<td>Goa Day</td>
</tr>
</tbody>
</table>

### 32. Research Centres of India

1. Indian Agricultural Research Institute  
2. Central Rice Research Institute  
3. Central Sugarcane Research Institute  
4. Central Potato Research Institute  
5. Central Tobacco Research Institute  
6. Central Forest Research Institute  
7. National Sugar Research Institute  
8. Indian Lac Research Institute  
9. National Dairy Research Institute  
10. Central Fuel Research Institute  
11. Central Leather Research Institute  
12. Central Mining Research Institute  
13. Central Drug Research Institute  
14. Indian Meteorological Observatory  
15. Raman Research Centre  
16. Central Scientific Instruments Organisation  
17. National Metallurgical Laboratory  
18. Central Salt & Marine Chemical Research Institute  
19. Archaeological Survey of India, India Museum  
20. Central Jute Technological Research Institute  
21. Central Coconut Technological Research Institute  
22. Textile Research Institute  
23. All India Institute of Medical Sciences (AIIMS)  
24. National Aeronautical Laboratory  
25. National Institute of Oceanography  
26. National Geophysics Research Institute  
27. Indian Institute of Petroleum  
28. Central Building Research Institute  
29. Central Road Research Institute  
30. Tata Institute of Fundamental Research  
31. High Altitude Research Laboratory  
32. National Botanical Research Institute  
33. Central Food Technological Research Institute  
34. Central Glass and Ceramic Research Institute  
35. National Environmental Engineering Research Institute  
36. Central Electro - Chemical Research Institute  
37. Indian Institute of Chemical Biology  
38. Industrial Toxicology Research Centre  
39. Central Mechanical Engineering Research Institute  
40. Centre for Cellular and Molecular Biology

### 33. Nuclear And Space Research Centres in India

1. India Rare Earths Limited  
2. Uranium Corporation of India  
3. Atomic Energy Commission (AEC)  
4. Electronics Corporation of India  
5. Bhabha Atomic Research Centre (BARC)  
6. Radio Astronomy Centre  
7. Tata Institute of Fundamental Research  
8. Saha Institute of Nuclear Physics  
9. Nuclear Fuel Complex  
10. Nuclear Power Complex  
11. Centre of Earth Science's studies  
12. Physical Research Laboratory  
13. Space Commission  
14. Vikram Sarabhai Space Centre  
15. Indian Space Research Organisation (ISRO)  
16. Space Application Centre  
17. Thumba Equatorial Rocket Launching Station  
18. Indian Scientific Satellite Project  
19. College of Satellite Communication Technology  
20. Saha Institute of Nuclear Physics

### 34. Health and Medicinal Research Centres in India

- All India Malaria Research Institute  
- National Tuberculosis Institute  
- New Delhi  
- Bangalore
37. Famous Musical Instruments and their Exponents

Sitar
- Pt. Ravi Shankar, Nikhil Banerjee, Ustad Vilayat Khan, Shujaat Khan, Jaya Biswas, Debou Choudhary, Nishaat Khan, Bande Hasan, Shahid Parvez, Uma Shankar Mishra, Buddhadiya Mukherjee, Anushka Shankar, etc.

Tabla
- Ustad Shafat Ahmed Khan, Sapan Choudhary, Zakir Hussain, Latif Khan, Allah Raaka Khan, Gudai Maharaj, Kishan Maharaj, Fayaz Khan, Sukhbinder Singh, etc.

Flute
- Pandit Malhar Gosh, Hari Prasad Chaurasia, Raghunath Seth, B.Kunjamani, N. Neela, Rajendra Prasanna, Rajendra Kulkarni, Prakash Saxena, etc.

Sarod
- Ustad Amjad Ali Khan, Ustad Ali Akbar Khan, Ustad Alauddin Khan, Hafliz Khan, Zarir Daruwalla, Mukesh Sharma, Chandan Rai, Biswajit Roy Chaudhury, Sharar Rani, etc.

Shehnai
- Ustad Bismillah Khan, Daya Shankar, Jagannath, Hari Singh, Shailesh Bhat, Ali Ahmad, Husain Khan, etc.

Violin
- Dr. Smt. N. Rajan, Vishnu Gobind (VG) Jog, L. Subramaniam, Sangitha Rajan, Kunakadi Baidyanathan, Shishir Choudhary, Lalgudi Jayaraman, R.P. Shastri, Suryadev Pawan, Govind Swami Pillai, T.N. Krishnan, etc.

Veena

Santoor
- Pt. Shiv Kumar Sharma, Tarun Bhattacharya, Bhajan Sopori, etc.

Pakhawaj
- Ustad Rehman Khan, Gopal Das, Chhatrapati Singh, Ramakant Pathak, Arun Satwai, etc.

Rudra Veena

Mridang
- Thakur Bilkham Singh, Palghat Raju, Dr. Jagdish Singh, T.K. Moorthy, U.K. Shivaram, K.R. Mani, etc.

Surangi
- Ustad Bendu Khan, Pt.Ramnarayanji, Aruna Kale, Santosh Mishra, Indralal, Ashiq Ali Khan, etc.

Nadaswaram

Simphoni
- Zubin Mehta

Guitar

Mandolin
- U. Srinivas, Khagen Dey, Nagen Dey, etc.

Vichitra Veena
- Ahmed Raza Khan, Abdul Aziz Khan, et al.

Piano
- V. Balsara

Ghatam
- T.H. Vinayakaram

Harmonium

Jal Tarang

Surbhar
- Imrat Khan, Anapurna Devi, et al.

Istaj
- Alauddin Khan

Mohan Veena
- Pt. Vishwa Mohan Bhatt

38. States and their Folk Dances

Jharkhand
- Chhau, Sarahul, Jat-Jatin, Karma, Danga, Bidesia, Sohrai.

Uttarakhand
- Gadhwal, Kumaun, Kajari, Jhola, Rassa, Chappeli.

Chhattisgarh
- Goudi, Karma, Jhumar, Dogla, Pali, Tapali, Navratri, Diwari, Mundari.
### 40. Crematorium of Famous Persons

<table>
<thead>
<tr>
<th>Place</th>
<th>Person</th>
<th>Place</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raj Ghat</td>
<td>Mahatma Gandhi</td>
<td>Shanti Van</td>
<td>Jawahar Lal Nehru</td>
</tr>
<tr>
<td>Vijay Ghat</td>
<td>Lal Bahadur Shastri</td>
<td>Shakti Sthal</td>
<td>Indira Gandhi</td>
</tr>
<tr>
<td>Kishan Ghat</td>
<td>Ch. Charan Singh</td>
<td>Abhay Ghat</td>
<td>Morarji Desai</td>
</tr>
<tr>
<td>Veer Bhumi</td>
<td>Rajiv Gandhi</td>
<td>Samata Asthal</td>
<td>Jaggeeven Ram</td>
</tr>
<tr>
<td>Ekta Asthal</td>
<td>Giani Zail Singh</td>
<td>Karma Bhumí</td>
<td>Dr. Shankar Dayal Sharma</td>
</tr>
<tr>
<td>Uday Bhoomi</td>
<td>K.R. Narayanan</td>
<td>Mahaprayan Ghat</td>
<td>Dr. Rajendra Prasad</td>
</tr>
</tbody>
</table>

### 41. Famous Nicknames of Eminent Persons

<table>
<thead>
<tr>
<th>Nickname</th>
<th>Person</th>
<th>Nickname</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Father of the Nation; Bapu</td>
<td>Mahatma Gandhi</td>
<td>Grand Old Man of India</td>
<td>Sardar Vallabhbhai Patel</td>
</tr>
<tr>
<td>Frontier Gandhi; Badshah Khan</td>
<td>Khan Abdul Gaffar Khan</td>
<td>Dhundiraj Govind Phalke</td>
<td>Dadabhao Naoroji</td>
</tr>
<tr>
<td>Strong (Iron) Man</td>
<td>Mahamanana</td>
<td>Pt. Madan Mohan Malaviya</td>
<td>T. Prakasam</td>
</tr>
<tr>
<td>Sher-e-Kashmir</td>
<td>Sheikh Abdullah</td>
<td>Andhra Kesari</td>
<td>T. Prakasam</td>
</tr>
<tr>
<td>Napoleon of India</td>
<td>Samudra Gupta</td>
<td>Sahib-e-Azam</td>
<td>Bhagat Singh</td>
</tr>
<tr>
<td>Shakespeare of India</td>
<td>Mahakavi Kalidas</td>
<td>Deenbandhu</td>
<td>Chitta Ranjan Das</td>
</tr>
<tr>
<td>Machiaveli of India</td>
<td>Chakrata</td>
<td>Deenbandhu</td>
<td>C.F. Andrews</td>
</tr>
<tr>
<td>Akbar of Kashmir</td>
<td>Sardar Vallabhbhai Patel</td>
<td>Loknayak</td>
<td>Bal Gangadhar Tilak</td>
</tr>
<tr>
<td>Vishwa Kavi; Kaviraj, Gurudev</td>
<td>Tagore</td>
<td>Loknayak</td>
<td>Jayapraoksha Narayan</td>
</tr>
<tr>
<td>Rajjí / C.R.</td>
<td>Chakravarti</td>
<td>Bangabandhu</td>
<td>Sheikh Mujibur Rahman</td>
</tr>
<tr>
<td>Bhar Kesari</td>
<td>Rajagopalachari</td>
<td>Chacha</td>
<td>Jawaharlal Nehru</td>
</tr>
<tr>
<td>Bengal Kesari</td>
<td>Dr. Srikrishna Singh</td>
<td>Man of Peace</td>
<td>Lal Bahadur Shastri</td>
</tr>
<tr>
<td>Punjab Kesari</td>
<td>Ashutosh Mukherji</td>
<td>Gurují</td>
<td>M.S. Golwalkar</td>
</tr>
<tr>
<td>Desh Raja; Ajatshatru</td>
<td>Lala Lajpat Rai</td>
<td>Sparrow</td>
<td>Major General Rajinder Singh</td>
</tr>
<tr>
<td>Father of Gujarát</td>
<td>Dr. Rajendra Prasad</td>
<td></td>
<td>Lata Mangeshkar</td>
</tr>
<tr>
<td>Tau</td>
<td>Ravi Shankar Maharaj</td>
<td>Swar Kokila</td>
<td>P.T. Usha</td>
</tr>
<tr>
<td>King Maker</td>
<td>Chaudhury Devi Lal</td>
<td>Udnapari</td>
<td>Mother Teresa</td>
</tr>
<tr>
<td>Nightingale of India</td>
<td>Earl of Warwick</td>
<td>Mother</td>
<td>Vallabhahadi Patel</td>
</tr>
<tr>
<td>Lady with the lamp</td>
<td>Sarojini Naidu</td>
<td>Sardar</td>
<td>Chandra Shekhar</td>
</tr>
<tr>
<td>Lal, Bal, Pal</td>
<td>Florence Nightingale</td>
<td>Young Turk</td>
<td>George Bernard Shaw</td>
</tr>
<tr>
<td></td>
<td>Lala Lajpat Rai, Bal Gangadhar Tilak and Bipin Chandra Pal</td>
<td>G.B.S.</td>
<td></td>
</tr>
</tbody>
</table>
### 42. Some Great Works associated with Famous Persons

<table>
<thead>
<tr>
<th>Nickname</th>
<th>Person</th>
<th>Nickname</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bharat Vibhuti</td>
<td>Dr. Anugrah Narayan Singh</td>
<td>Deshpriya</td>
<td>Yatindra Sengupta</td>
</tr>
<tr>
<td>Babuji</td>
<td>Jagjeet Ram</td>
<td>Kavempu</td>
<td>K.V. Putappa</td>
</tr>
<tr>
<td>Morning Star of India Renaissance</td>
<td>Raja Ram Mohan Roy</td>
<td>Little Corporal Man of Destiny</td>
<td>Napoleon Bonaparte</td>
</tr>
<tr>
<td>King Maker of Indian History</td>
<td>Sayyed Bandhu</td>
<td>Father of English Poetry</td>
<td>Geoffrey Chaucer</td>
</tr>
<tr>
<td>Rajesheche</td>
<td>Prabhallan Das Tunduji</td>
<td>Netaji</td>
<td>Subhash Chandra Bose</td>
</tr>
<tr>
<td>Haryana Hurricane</td>
<td>Kapil Dev</td>
<td>Uncle Ho</td>
<td>Ho Chi Minh</td>
</tr>
<tr>
<td>Magic of Hockey</td>
<td>Dhyanchand</td>
<td>Li-Kwan</td>
<td>Pearl Buck</td>
</tr>
<tr>
<td>Karna Nayak</td>
<td>Karupuri Thakur</td>
<td>Great Old Man of Britain</td>
<td>William E. Gladstone</td>
</tr>
<tr>
<td>Duce</td>
<td>Benito Mussolini</td>
<td>Desert Fox</td>
<td>Gen. Ervin Rommel</td>
</tr>
<tr>
<td>Maiden Queen</td>
<td>Queen Elizabeth I</td>
<td>Little Master</td>
<td>Sunil Gavaskar</td>
</tr>
<tr>
<td>Maid of Orleans</td>
<td>Joan of Arc</td>
<td>Anna</td>
<td>C.N. Annadurai</td>
</tr>
<tr>
<td>Man of Blood and Iron</td>
<td>Otto Van Bismark</td>
<td>Bard of Avon</td>
<td>William Shakespeare</td>
</tr>
<tr>
<td>Fuerther</td>
<td>Adolf Hitler</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 43. Awards and Honours

<table>
<thead>
<tr>
<th>Prize</th>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nobel Prize</td>
<td>Peace, Literature, Medicine, Physics, Chemistry, Economics (From 1901 and 1969)</td>
</tr>
<tr>
<td>Pulitzer Prize</td>
<td>Journalism (From 1917)</td>
</tr>
<tr>
<td>Academy (Oscar) Awards</td>
<td>Film (From 1929)</td>
</tr>
</tbody>
</table>

### 44. National and Padma Awards

**Republic Day Awards**: Bharat Ratna, Padma Vibhushan and Padma Shree are given for exceptional service towards the advancement of Art, Literature and Science and in recognition of public service of a high (or the highest) order.

**Param Vir Chakra**: It is the highest Gallantry Award. It is given for extraordinary act of bravery in the field of Naval, Air and Army.

**Mahavir Chakra**: It is the second highest Gallantry Award.

**Vir Chakra**: It is the third highest Gallantry Award.

**Bharat Ratna**: The highest civilian award is given for exceptional service the advancement of art, literature and science, and in recognition of public service of the highest order.

- The decoration is in the form of a *peepal leaf*, about 5.8 cm long, 4.7 cm wide and 3.1 mm thick. It is of toned bronze. On its obverse is embossed a replica of the sun, 1.6 cm in diameter, below which the words "Bharat Ratna" are embossed in Hindi. On the reverse are State emblem and the motto, also in Hindi. The emblem, the sun and the rim are of platinum. The inscriptions are in burnished bronze.

- The first three recipients of Bharat Ratna were C. Rajagopalachari, Dr. S. Radhakrishnan and Dr. C.V. Raman in 1954 while Khan Abdul Ghafrar Khan was the first foreigner to be honoured with this award in 1987.
It has the same design as the "Padma Vibhushan". On its obverse the word "Padma" appears above and the word "Bhushan" below the lotus flower. The inscription "Padma Bhushan" on the obverse, the geometrical pattern on either side and the border around periphery are in burnished bronze. All embossing either side of the decoration is in standard gold.

**Padma Shri**: The award is given for distinguished service in any field including service rendered by government servants.

- The name of the decoration is embossed in Hindi with the word "Padma" above and the word "Shri" below the lotus flower on the obverse. The inscription "Padam Shri" on the obverse, the geometrical pattern on either side and the border around the periphery are in burnished bronze. All embossing on either side of the decoration is in stainless steel.

### Other National Awards

**Appan Menon Memorial Award**: The award which carries a cash prize of Rs. 1 lakh aims at providing financial assistance to journalists interested in undertaking projects related to international affairs and developmental issues relevant to India and South Asia.

**Aditya Vikram Birla Kalashikhar Puraskar**: The award is conferred on an artiste in the field of visual and performing arts for lifetime achievement carries Rs. 1.5 lakh in cash, a momento and scroll of honour. Previous recipients of the award include Lata Mangeshkar, M. F. Husain, Guru Kelucharan Mohapatra, Pandit Ram Narayan, Pandit Bhimsen Joshi.

### 45. Gallantry Awards

**Param Vir Chakra**: The highest decoration for valor is the Param Vir Chakra which is awarded for the most conspicuous bravery or some daring or pre-eminent act of valor or self-sacrifice in the presence of the enemy, whether on land, at sea or in the air.

- The decoration is made of bronze and is circular in shape. It has, on the obverse, four replicas of "Indra's Vajra" embossed round the State emblem in the centre. On the reverse the words "Param Vir Chakra" are embossed both in Hindi and English with two lotus flowers in the middle.
- The decoration is worn on the left breast with a plain purple coloured ribbon about 3.2 cm in width.

**Mahavir Chakra**: Mahavir Chakra is the second highest decoration and is awarded for acts of conspicuous gallantry in the presence of the enemy, whether on land, at sea or in the air.

- It is made of standard silver and is circular in shape. Embossed on the obverse is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed heraldic star with domed centre-piece bearing the gilded State is a five pointed...
on the obverse is a five pointed heraldic star which has an Ashoka Chakra in the centre. Within this chakra is a domed centre-piece bearing gilded State emblem. On the reverse, words “Vir Chakra” are embossed, both in Hindi and English, with two lotus flowers in the middle. The Chakra is inscribed on the left breast with a half-blue and half-orange riband, about 3.2 cm in width, the orange being nearer the left shoulder.

Ashok Chakra: Ashok Chakra is the country’s highest peacetime gallantry award equivalent to Param Vir Chakra.

> The Chakra is made of gilt gold and is circular in shape. Embossed on the obverse is a replica of Ashok Chakra surrounded by a lotus wreath. Along the edge is pattern of lotus leaves, flowers and buds. On the reverse, the words “Ashok Chakra” are embossed both in Hindi and English, with lotus flowers in the intervening space.

Kirti Chakra: The decoration is awarded for conspicuous gallantry. It is made of standard silver and is circular in shape. The obverse and the reverse are exactly the same as in Ashok Chakra.

> The Chakra is worn on the left breast with a green silk riband, about 3.2 cm in width and divided into two equal segments by an orange vertical line.

Shaurya Chakra: The decoration is awarded for gallantry. It is exactly like Ashok Chakra, except that it is made of bronze.

> The Chakra is worn on the left breast with a green silk riband, about 3.2 cm in width and divided into two equal segments by an orange vertical line.

Param Vishisht Seva Medal (PVSM), Ati Vishisht Seva Medal (AVSM), Vishisht Seva Medal (VSM): The Vishisht Seva Medals are awarded to personnel of all the three services in recognition of distinguished service of the “exceptional”, “exceptional” and “high” order respectively. Param Vishisht Seva Medal is made of gold, Ati Vishisht Seva Medal of standard silver and Vishisht Seva Medal of bronze, all circular in shape and 3.5 cm in diameter. Each medal has on its obverse five pointed stars and on its reverse the Lion Capitols. Its ribbon is golden with one dark-blue stripe down the centre for Param Vishisht Seva Medal, two dark-blue stripes dividing it into three equal parts for Ati Vishisht Seva Medal and three dark-blue stripes dividing it into four equal parts for Vishisht Seva Medal.

46. Recipients of the Bharatiya Jnanpith Award

> The first Jnanpith Award was given in 1965.

> The Jnanpith Award carries a citation, shawl, sriyal, a bronze idol of Vagdevi Saraswati and a cash prize of ₹ 11,00,000

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Year</th>
<th>Recipient</th>
<th>Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>1965</td>
<td>G. Shankar Kurup</td>
<td>Audia Kujai (Malayalam)</td>
</tr>
<tr>
<td>2nd</td>
<td>1966</td>
<td>Tara Shankar Bandyopadhyay</td>
<td>Ganadevata (Bengali)</td>
</tr>
<tr>
<td>3rd</td>
<td>1967</td>
<td>K.V. Putappa, Uma Shankar Joshi</td>
<td>Ramayan Darshanam (Kannada), Nisheeth (Gujarati)</td>
</tr>
<tr>
<td>4th</td>
<td>1968</td>
<td>Sumitra Nandan Pant</td>
<td>Chidambaram (Hindi)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Year</th>
<th>Recipient</th>
<th>Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th</td>
<td>1969</td>
<td>Prof. Raghupati Sahay ‘Firaz Gorakhpur’</td>
<td>Gul-e-Naghma (Urdu)</td>
</tr>
<tr>
<td>6th</td>
<td>1970</td>
<td>Vishwanath Satyanarayanaya</td>
<td>Shreemad Ramayan, Kalpavriksham (Telugu)</td>
</tr>
<tr>
<td>7th</td>
<td>1971</td>
<td>Vishnu Dey</td>
<td>Simriti Setta Bhavishya (Bengali)</td>
</tr>
<tr>
<td>8th</td>
<td>1972</td>
<td>Ramdhari Singh ‘Dinkar’</td>
<td>Urvaashi (Hindi)</td>
</tr>
<tr>
<td>9th</td>
<td>1973</td>
<td>Govind Mohanta, D.R. Bendre</td>
<td>Mati Matal (Oriya) Naku Thantri (Karnataka)</td>
</tr>
<tr>
<td>10th</td>
<td>1974</td>
<td>Vishnu Saktharam Khandekar</td>
<td>Mayati (Marathi)</td>
</tr>
<tr>
<td>11th</td>
<td>1975</td>
<td>S.V. Agilam</td>
<td>Chittirappai (Tamil)</td>
</tr>
<tr>
<td>12th</td>
<td>1976</td>
<td>Smt. Ashapurna Devi</td>
<td>Pratham Pratishrut (Bengali)</td>
</tr>
<tr>
<td>13th</td>
<td>1977</td>
<td>Dr. K. Shrivam Karanth</td>
<td>Mukajjiri Kanasugalu (Karnataka)</td>
</tr>
<tr>
<td>14th</td>
<td>1978</td>
<td>Dr. Sachidananda Hiranand Vatsyayan</td>
<td>Kiti Nawn Mein Kiti Bar (Hindi)</td>
</tr>
<tr>
<td>15th</td>
<td>1979</td>
<td>Dr. Virendra Kumar Bhattacharya</td>
<td>Mrityunjay (Assamese)</td>
</tr>
<tr>
<td>16th</td>
<td>1980</td>
<td>S.K. Pottekat</td>
<td>Oru Dishantith Katha (Malayalam)</td>
</tr>
<tr>
<td>17th</td>
<td>1981</td>
<td>Amrita Pritam</td>
<td>Kagaz te Canvas (Punjabi)</td>
</tr>
<tr>
<td>18th</td>
<td>1982</td>
<td>Mahadevi Verma</td>
<td>Yama (Hindi)</td>
</tr>
<tr>
<td>19th</td>
<td>1983</td>
<td>Masti Venkatesh Iyyengar</td>
<td>Chikaveer Rajendra (Karnataka)</td>
</tr>
<tr>
<td>20th</td>
<td>1984</td>
<td>T. Shiv Shankar Pillai</td>
<td>Kayar (Malayalam)</td>
</tr>
<tr>
<td>21st</td>
<td>1985</td>
<td>Pannalal Patel</td>
<td>Manvini Bhavai (Gujarati)</td>
</tr>
<tr>
<td>22nd</td>
<td>1986</td>
<td>Sachida Nanda Routroy</td>
<td>Oriya Literature</td>
</tr>
<tr>
<td>23rd</td>
<td>1987</td>
<td>Vishnu Vaman Shirwalkar</td>
<td>Marathi Literature</td>
</tr>
<tr>
<td>24th</td>
<td>1988</td>
<td>Dr. C. Narayana Reddy</td>
<td>Telugu Literature</td>
</tr>
<tr>
<td>25th</td>
<td>1989</td>
<td>Qurrutl - ain - Hyde</td>
<td>Urdu Literature</td>
</tr>
<tr>
<td>26th</td>
<td>1990</td>
<td>Prof. Vinayak Krishna Gokak</td>
<td>Kannada Literature</td>
</tr>
<tr>
<td>27th</td>
<td>1991</td>
<td>Subhash Mukhopadhyay</td>
<td>Bengali Literature</td>
</tr>
<tr>
<td>28th</td>
<td>1992</td>
<td>Naresh Mehta</td>
<td>Hindi Literature</td>
</tr>
<tr>
<td>29th</td>
<td>1993</td>
<td>Dr. Sitakant Mahapatra</td>
<td>Oriya Literature</td>
</tr>
<tr>
<td>30th</td>
<td>1994</td>
<td>Prof. U. R. Ananthamurthy</td>
<td>Kannada Literature</td>
</tr>
<tr>
<td>31st</td>
<td>1995</td>
<td>M.T. Vasudevan Nair</td>
<td>Malayalam Literature</td>
</tr>
<tr>
<td>32nd</td>
<td>1996</td>
<td>Mrs. Mahashweta Devi</td>
<td>Bengali Literature</td>
</tr>
<tr>
<td>33rd</td>
<td>1997</td>
<td>Ali Sardar Jafri</td>
<td>Urdu Literature</td>
</tr>
<tr>
<td>34th</td>
<td>1998</td>
<td>Girish Karnad</td>
<td>Kannada Literature</td>
</tr>
<tr>
<td>35th</td>
<td>1999</td>
<td>Nirmal Verma, Gurdayal Singh</td>
<td>Hindi Literature, Punjabi Literature</td>
</tr>
<tr>
<td>36th</td>
<td>2000</td>
<td>Dr. Indira Goswami</td>
<td>Assamese Literature</td>
</tr>
<tr>
<td>37th</td>
<td>2001</td>
<td>Rajendra Keshavlal Shah</td>
<td>Gujarati Literature</td>
</tr>
<tr>
<td>38th</td>
<td>2002</td>
<td>D. Jayakanthan</td>
<td>Tamil Literature</td>
</tr>
<tr>
<td>39th</td>
<td>2003</td>
<td>Vinda Karandikar</td>
<td>Marathi Literature</td>
</tr>
<tr>
<td>40th</td>
<td>2004</td>
<td>Rehman Rahi</td>
<td>Kashmiri</td>
</tr>
<tr>
<td>41st</td>
<td>2005</td>
<td>Kunwar Narayan</td>
<td>Hindi Literature</td>
</tr>
<tr>
<td>42nd</td>
<td>2006</td>
<td>Satyavrat Shastri, Ravindra Kelekar</td>
<td>Sanskrit Literature, Konkani Literature</td>
</tr>
<tr>
<td>43rd</td>
<td>2007</td>
<td>O.N.V. Kurup</td>
<td>Malayalam Literature</td>
</tr>
</tbody>
</table>
47. Recipients of Dada Saheb Falke Award

Phalke award carries a ‘Swarna Kamal’, a shawl and a cash prize of Rs. 2 lakh.

Introduced in 1969, the Dada Saheb Phalke award was first given to actress Devika Rani.

<table>
<thead>
<tr>
<th>Year</th>
<th>Recipient</th>
<th>Year</th>
<th>Recipient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>Devika Rani Roerich</td>
<td>1970</td>
<td>Birendra Nath Sircar</td>
</tr>
<tr>
<td>1971</td>
<td>Prithvi Raj Kapoor (Posthumously)</td>
<td>1972</td>
<td>Pankaj Mallick</td>
</tr>
<tr>
<td>1973</td>
<td>Sulochana (Rubi Myers)</td>
<td>1974</td>
<td>B.N. Reddi</td>
</tr>
<tr>
<td>1975</td>
<td>Dhiren Ganguli</td>
<td>1976</td>
<td>Kanan Devi</td>
</tr>
<tr>
<td>1977</td>
<td>Nitin Bose</td>
<td>1978</td>
<td>Ray Chandra (R.C.) Boral</td>
</tr>
<tr>
<td>1979</td>
<td>Sohrab Modi</td>
<td>1980</td>
<td>P. Jairaj</td>
</tr>
<tr>
<td>1981</td>
<td>Naushad Ali</td>
<td>1982</td>
<td>L.V. Prasad</td>
</tr>
<tr>
<td>1983</td>
<td>Durga Khote</td>
<td>1984</td>
<td>Satyajit Ray</td>
</tr>
<tr>
<td>1985</td>
<td>V. Shantaram</td>
<td>1986</td>
<td>B. Nagi Reddi</td>
</tr>
<tr>
<td>1987</td>
<td>Raj Kapoor</td>
<td>1988</td>
<td>Ashok Kumar</td>
</tr>
<tr>
<td>1989</td>
<td>Lata Mangeshkar</td>
<td>1990</td>
<td>Akkineni Nageshwar Rao</td>
</tr>
<tr>
<td>1991</td>
<td>Bhalji (Balchandra Govind) Pundharkar</td>
<td>1992</td>
<td>Dr. Bhupen Hazarika</td>
</tr>
<tr>
<td>1993</td>
<td>Majrooh Sultanpuri</td>
<td>1994</td>
<td>Dilip Kumar</td>
</tr>
<tr>
<td>1995</td>
<td>Dr. Rajkumar</td>
<td>1996</td>
<td>Sivaji Ganesan</td>
</tr>
<tr>
<td>1997</td>
<td>Kavi Pradeep</td>
<td>1998</td>
<td>B.R. Chopra</td>
</tr>
<tr>
<td>1999</td>
<td>Hrishikesh Mukherjee</td>
<td>2000</td>
<td>Asha Bhonsle</td>
</tr>
<tr>
<td>2001</td>
<td>Yash Chopra</td>
<td>2002</td>
<td>Dev Anand</td>
</tr>
<tr>
<td>2003</td>
<td>Mrinal Sen</td>
<td>2004</td>
<td>Adoor Gopalkrishnan</td>
</tr>
<tr>
<td>2005</td>
<td>Braj Bhushan Chaturvedi</td>
<td>2006</td>
<td>Shyam Benegal</td>
</tr>
<tr>
<td>2007</td>
<td>Manma Dey</td>
<td>2008</td>
<td>V.K. Moorthy</td>
</tr>
<tr>
<td>2009</td>
<td>D. Rama Naidu</td>
<td>2010</td>
<td>K. Balachander</td>
</tr>
<tr>
<td>2011</td>
<td>Soumitra Chatterjee</td>
<td>2012</td>
<td>Praan Krishan Sikand</td>
</tr>
<tr>
<td>2013</td>
<td>Gulzar (Sampooran Singh Kalra)</td>
<td>2014</td>
<td>Shashi Kapoor</td>
</tr>
</tbody>
</table>

48. Important Books and Authors

[A] Indian writers and their books:

<table>
<thead>
<tr>
<th>Writer</th>
<th>Books</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt. Vishnu Sharma</td>
<td>Panchatantra</td>
</tr>
<tr>
<td>Vishakhadatta</td>
<td>Mudra Rakshas</td>
</tr>
<tr>
<td>Raskhan</td>
<td>Prem Vatika</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Writer</th>
<th>Books</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panini</td>
<td>Ashadhyayi</td>
</tr>
<tr>
<td>Shuddhak</td>
<td>Mrichhakatakam</td>
</tr>
<tr>
<td>Kalidasa</td>
<td>Raghuvansham, Kumarsambhavam, Meghadutaam</td>
</tr>
<tr>
<td>Vatsyayana</td>
<td>Kama Sutra</td>
</tr>
<tr>
<td>Vigyaneshwar</td>
<td>Mitakshara</td>
</tr>
<tr>
<td>Jeemootwahan</td>
<td>Daybbag</td>
</tr>
<tr>
<td>Kalhana</td>
<td>Rajarangini</td>
</tr>
<tr>
<td>Shui</td>
<td>Natural History</td>
</tr>
<tr>
<td>Plini</td>
<td>Arthastra</td>
</tr>
<tr>
<td>Kautilya</td>
<td>Avanti Sundari, Dashkumaracharitam</td>
</tr>
<tr>
<td>Dandi</td>
<td>Bhagwat Gita, Mahabharata</td>
</tr>
<tr>
<td>Ved Vyas</td>
<td>Buddha Charitam</td>
</tr>
<tr>
<td>Ashwagosh</td>
<td>Geet Govind</td>
</tr>
<tr>
<td>Jayadev</td>
<td>Kadambari</td>
</tr>
<tr>
<td>Bana Bhatt</td>
<td>Matri Madhav</td>
</tr>
<tr>
<td>Bhavabhuti</td>
<td>Amar Singh</td>
</tr>
<tr>
<td>Bharihari</td>
<td>Niti-Shatak, Shringar Shatak, Vairagya Shatak</td>
</tr>
<tr>
<td>Firdausi</td>
<td>Shahnama</td>
</tr>
<tr>
<td>Abul Fazal</td>
<td>Iti-hi Akbari, Akabumana</td>
</tr>
<tr>
<td>Surdas</td>
<td>Sahiyalahari, Sursagar</td>
</tr>
<tr>
<td>Kabir</td>
<td>Bijak, Ramayani, Sabar</td>
</tr>
<tr>
<td>Gulbadan Beghum</td>
<td>Humanyunama</td>
</tr>
<tr>
<td>Al Beruni</td>
<td>Kitab-ul-Hind</td>
</tr>
<tr>
<td>Malik Mohammed Jayasi</td>
<td>Coolie, Confession of a Lover, Two leaves and a bud</td>
</tr>
<tr>
<td>Nirad C. Chaudhury</td>
<td>Chitragada, Gitanjali, Gota, Chandalika, Visarjana, Hungry Stones</td>
</tr>
<tr>
<td>Rabindra Nath Tagore</td>
<td>Jyotsana, Yugwani, Chidambaram</td>
</tr>
<tr>
<td>Sumitranandan Pant</td>
<td>The Judgment, Distant Neighbours; India, The Critical Years, In Jail, India after Nehru, Between the Lines</td>
</tr>
<tr>
<td>Kuldip Nayyar</td>
<td>Life Divine, Essays on Gita</td>
</tr>
<tr>
<td>Sri Aurobindo Ghosh</td>
<td>Divine Life</td>
</tr>
<tr>
<td>Swami Shivanand</td>
<td>Death of a City, Kaga to Canvas, Forty Nine Days</td>
</tr>
<tr>
<td>Amrita Pritam</td>
<td>Godan, Gadan, Karmabhumi, Rangbhumi</td>
</tr>
<tr>
<td>Muni Premchand</td>
<td>Indira Gandhi Returns, Indira Gandhi: Badhate Kadam, The Company of Women</td>
</tr>
<tr>
<td>Khushwant Singh</td>
<td>Untold Story, Confrontation with Pakistan</td>
</tr>
<tr>
<td>B. M. Kaul</td>
<td></td>
</tr>
</tbody>
</table>
### Some Important Foreign Writers and their Books

<table>
<thead>
<tr>
<th>Writer</th>
<th>Book</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adam Smith</td>
<td>Wealth of Nations</td>
</tr>
<tr>
<td>Adolf Hitler</td>
<td>Mein Kamp</td>
</tr>
<tr>
<td>Albert Einstein</td>
<td>The World as I See it</td>
</tr>
<tr>
<td>Alexander Solzhenitsyn</td>
<td>August 1914</td>
</tr>
<tr>
<td>A. L. Basham</td>
<td>The Wonder that was India</td>
</tr>
<tr>
<td>Anton Chekhov</td>
<td>Cherry Orchard</td>
</tr>
<tr>
<td>Arthur Hole</td>
<td>Airport</td>
</tr>
<tr>
<td>Aristotle</td>
<td>Politics</td>
</tr>
<tr>
<td>Boris Pasternak</td>
<td>Dr. Zhivago</td>
</tr>
<tr>
<td>David Baldacci</td>
<td>Absolute Power</td>
</tr>
<tr>
<td>Dante</td>
<td>Divine Comedy</td>
</tr>
<tr>
<td>E. M. Forster</td>
<td>A Passage to India, Maurice</td>
</tr>
<tr>
<td>Homer</td>
<td>Odyssey, Illiad</td>
</tr>
<tr>
<td>H. G. Wells</td>
<td>Shape of Things to Come</td>
</tr>
<tr>
<td>Harold Evans</td>
<td>Good Times, Bad Times</td>
</tr>
<tr>
<td>Henry Miller</td>
<td>Tropic of Cancer</td>
</tr>
<tr>
<td>Isaac Newton</td>
<td>Principia</td>
</tr>
<tr>
<td>Katherine Mayo</td>
<td>Mother India</td>
</tr>
<tr>
<td>Machiavelli</td>
<td>The Prince</td>
</tr>
<tr>
<td>Maxim Gorky</td>
<td>Mother</td>
</tr>
<tr>
<td>Plato</td>
<td>Republic</td>
</tr>
<tr>
<td>Jean J. Rousseau</td>
<td>The Social Contract</td>
</tr>
<tr>
<td>John Milton</td>
<td>Paradise Lost, Lycidas</td>
</tr>
<tr>
<td>Winston Churchill</td>
<td>Gathering Storm</td>
</tr>
<tr>
<td>George Orwell</td>
<td>Farm House, Animal Farm</td>
</tr>
<tr>
<td>Charles Darwin</td>
<td>Descent of Man, Origin of Species</td>
</tr>
<tr>
<td>William Shakespeare</td>
<td>Comedy of Errors, As You Like It, A Mid Summer Night's Dream, Merchant of Venice, Hamlet, King Lear, Othello</td>
</tr>
<tr>
<td>George Bernard Shaw</td>
<td>Major Barbara, Man and Superman, Apple Carte, Arms and the Man, Pygmalion, Caesar and Cleopatra, Candida</td>
</tr>
<tr>
<td>Charles Dickens</td>
<td>A Tale of Two Cities, Oliver Twist, David Copperfield</td>
</tr>
<tr>
<td>J. K. Galbraith</td>
<td>Affluent Society, Ambassador's Journal, The Triumph</td>
</tr>
<tr>
<td>Herold Joseph Laski</td>
<td>Grammar of Politics, Dilema of Our Time</td>
</tr>
<tr>
<td>J. M. Barrie</td>
<td>Hindu Civilization, Peter Pan</td>
</tr>
<tr>
<td>Gunnar Myrdal</td>
<td>Against the Stream, Asian Drama</td>
</tr>
<tr>
<td>Leo Tolstoy</td>
<td>War and Peace</td>
</tr>
<tr>
<td>Z. A. Bhutto</td>
<td>Great Tragedy</td>
</tr>
<tr>
<td>Vladimir Nabakov</td>
<td>Lolita</td>
</tr>
<tr>
<td>Mao-tse Tung</td>
<td>On Contradiction</td>
</tr>
</tbody>
</table>

### Some Latest Books and Authors

<table>
<thead>
<tr>
<th>Book</th>
<th>Writer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Playing It My Way</td>
<td>Sachin Tendulkar</td>
</tr>
<tr>
<td>My Journey : Transforming Dreams into Actions</td>
<td>A. P. J. Abdul Kalam</td>
</tr>
<tr>
<td>Fractured Times</td>
<td>Eric Hobsbawm</td>
</tr>
<tr>
<td>Neither a Hawk nor a Dove</td>
<td>Khrushid Mahmood Kasuri</td>
</tr>
<tr>
<td>The Sergeant’s Son</td>
<td>Ashim Choudhury</td>
</tr>
<tr>
<td>The Cuckoo's Calling</td>
<td>Robert Galbraith</td>
</tr>
<tr>
<td>And then one day</td>
<td>Nasiruddin Shah</td>
</tr>
<tr>
<td>Gone Girl</td>
<td>Gillian Flynn</td>
</tr>
<tr>
<td>And The Mountains Echoed</td>
<td>Khaled Hosseini</td>
</tr>
<tr>
<td>The Red Sari (Biography of Sonia Gandhi)</td>
<td>Javier Moro</td>
</tr>
<tr>
<td>This Town</td>
<td>Mark Leibovish</td>
</tr>
<tr>
<td>Happy, Happy, Happy</td>
<td>Phil Robertson, Mark Schlabach</td>
</tr>
</tbody>
</table>
### Olympic Games

The origin of the ancient Olympic Games is lost in the midst of pre-history, but for many centuries they were only a festival of the Greek people. The Games were first held in honour of the Greek god, Zeus in 776 BC in the plain of the kingdom of Elis, nestled in a lush valley between the Alpheus River and Mount Kronion, 15 km from the Ionian Sea. The Olympiad celebrated that year was considered as the first and was used to date subsequent historic events. But religious ceremonies and games were held in Olympia before that time. The oldest sanctuary of Greece was there, the altar of the Great Mother of Gods, Rhea (Earth). On the day of the feast, the priest stood in front of the altar, ready to perform a sacrifice. Women were forbidden to be present and the male contestants were naked. Young men waited at a distance on one stadium (about 200 yds). As soon as a signal was given they ran and the first to arrive at the altar received the torch from the priest’s hand and lit the sacrificial fire.

The old Olympiads were held after every four years and the Greeks measured time in terms of Games started on the first new moon after the summer solstice, around mid-July. The ancient Olympic Games lasted for five days and the events took place in a precise order. On the first day, there were sacrifices and opening ceremonies. On the second day there were special competitions for the “ephebians”. The third day was devoted to events for adult competitors: dromoikos, diaulos, dolichos, pugilism, wrestling, pancratium. On the fourth day, there were equestrian events, pentathlon, race with arms. On the fifth and the final day, there were closing ceremonies and proclamation of the heroes.

During the first six Olympic Games, however, the prize had been a portion of meat or ‘meria’ taken from an animal sacrificed to the gods. It was only after the VII Games that the olive crown was given to the winners and the moral significance of this prize was considerable. Once the prize was awarded, a flock of pigeons was released to carry the names of the champions to all the corners of Greece.

The Games came to a sudden end when the Roman Emperor Theodosius banned the competitions and their attendant sacrificial offerings as pagan manifestations.
From 395 AD onwards the fall of Olympia was very rapid. In that year the temple of Olympian Zeus was destroyed by the Saracens. A year earlier the temple of the Great Mother of the Grecian goddesses was destroyed by the Persians. Following the attacks of the Goths, a fire destroyed the temple of Zeus; earthquakes from 522 to 551 and the most severe fire in 556 brought down whatever had remained standing. Glory had vanished and all that was left were the ruins and the name of Olympia. Sometimes...

Modern Olympic Games

The revival work of the Games was undertaken by Baron Pierre de Coubertin, who was born in 1863. He was a French historian and diplomat of Greek origin. In 1894, he founded the International Olympic Committee and organised the first modern Olympic Games in Athens. The Olympic Games were introduced to the world with a speech by Baron Pierre de Coubertin: "The Olympic Games". He stated that the Games would reunite the world and strengthen the international spirit.

It was at the International Congress for the Study of the Propagation of the Olympic Games held in Athens in 1894 that the delegates led by Baron Pierre de Coubertin and associates unanimously voted to restore the Olympic Games and to create an International Olympic Committee to oversee them. De Coubertin had planned to propose Paris for the site of the first modern Olympic Games in 1900 but the enthusiasm and zeal of the delegates was so great that they insisted on the first Games being held in Athens in 1896. Athens was, therefore, the venue for the 1896 Games. Since then these Games are held every four years.

Olympic Symbol: It comprises five rings or circles, linked together to represent the sporting friendship of all people. The rings also symbolise the continents: Europe, Asia, Africa, Australia and America. Each ring is of a different colour, i.e., blue, yellow, black, green and red. The rings are meant to represent five continents viz., Africa (black), America (red), Asia (yellow), Australia (green) and Europe (Blue).

Olympic Flag: The Olympic flag, created in 1913 at the suggestion of Baron Pierre de Coubertin, was solemnly inaugurated in Paris in June 1914 but it was raised over an Olympic stadium for the first time at the Antwerp Games (Belgium) in 1920. There is also a second Olympic flag, which is used for the Winter Games. These flags are made of white silk and contain above mentioned five intertwined rings. From left to right the rings are blue, yellow, black, green and red.

Olympic Flame: It was lit at the Amsterdam Games in 1928 for the first time an Olympic flame was ceremonially lighted and burned in a giant torch at the entrance of the stadium. The modern version of the flame was adopted in 1936 at the Berlin Games. The Olympic flame symbolises the continuity of the ancient and modern Games. The torch, used to kindle the flame, is first lit by the sun's rays at Olympia, Greece, and then carried to the site of the Games by relay of runners. Ships and planes are used when necessary. On July 15, 1976, space age technology was used to transport the flame from one continent to another.

Olympic Motto: The Olympic motto is "Citius, Altius, Fortius" (faster, higher, stronger). Rev. Father Didon (1840-1900), headmaster of a school near Paris and a great promoter of sports in the French Catholic colleges, first used the motto and had it embroidered on the pennants of his school clubs. This succinct definition of the philosophy of sport appealed to Father Didon's friend, Baron Pierre de Coubertin, who was responsible for the revival of the Olympic Games nearly 1,500 years after the last of the ancient Games. It was adopted at his suggestion at the International congress for the “Study and Propagation of the Principles of Amateurism” on June 23, 1894, the same year on which the restoration of the Olympic Games and the creation of the International Olympic Committee were also decided.

Olympic Prizes, Medals and Certificates: While in ancient times the Olympic heroes received a crown of olive branches for their exploits, modern Olympic champions are rewarded with medals and certificates. The winning athlete now receives a Gold medal, the athlete in the second place is awarded a Silver medal and the third placed athlete wins a Bronze medal. In addition, all athletes ranking from first to sixth receive a certificate. Each medal is 60 mm in diameter and 3 mm thick. The first and second place medals are made of 92.5% pure silver and the medals for the first winner are then plated with 6 gram of fine gold. Thus this medal is not of full gold. The third place medal is of bronze.

- Olympic games were started in 776 B.C. on Mount Olympus in the honour of Greek God ‘Zeus’.
- The modern Olympic games started in Athens, the capital of Greece on 1864 with great efforts made by Pierre de Coubertin of France.
- The Olympic games are organised every four years.
- In the flag of Olympics, there is a symbol of five coloured circles joining each other.
- The flag of Olympic Games was recognised in the year 1913 and was hoisted first time in the Antwerp Olympic Games in 1920.
- The tradition to lit the Olympic flame was started in Amsterdam Olympic Games in 1928.
- The Head Office of International Olympic Committee is in Lusanne (Switzerland).
- Participation of women in the Olympic games started in the Second Olympic Games in 1900.
- First Indian player who participated in the Olympic games was an Anglo Indian ‘Norman Prichard’, who took part in the Second Olympic Games in 1900 and won two Silver medals in Athletics.
- Marrie Lila Ro is 1st Indian woman participant in the Olympic games.
- International Olympic Committee was founded in 1894 at “Chakhon”.
- Generally, in the inaugural ceremony of Olympic games the team of Greece got first place and host team is placed in the last in March Past parade. The teams of other places are placed in the alphabetical order of English alphabets.
- The first woman referee in the football was a Canadian lady Sonia Denancolm in (Atlanta Olympics).
- The maximum no. of gold medal winner sports woman is Larina Lavyana.
- She won 18 medals including 9 gold medals.
- The maximum gold medal winner sports woman is Christina Otti. She got 6 gold medals in swimming in Seoul Olympic of 1986.
London Olympics 2012

Mascot: Wenlock and Mandeville

- India ranked 55th in the medals tally with a total of 6 medals (2 Silver and 4 Bronze).
- The London Olympic Games were inaugurated by Queen Elizabeth II on July 27, 2012 in the Olympic Stadium, London.
- London is the first city in the world to stage Olympic Games thrice, after the 1908 and 1948 Summer Olympics. Entitled Isles of Wonder, the opening ceremony was devised by Oscar Award-winning director Daniel Boyle of Slumdog Millionaire fame with music directors Rick Smith and Karl Hyde of the electronic music duo Underworld.
- The inaugural ceremony of the London Olympics 2012 also had an Indian flavour in the form of music composers Ilayaraja and A. R. Rahman.
- The theme for the night, Isles of Wonder was inspired by William Shakespeare's play 'The Tempest'.
- The 2012 Olympic programme featured 26 sports disciplines. For the first time, women's boxing is included in the programme. In tennis, mixed doubles event returns to the Olympic programme for the first time since 1924.
- Under the slogan "Inspire a Generation", the 30th edition of the Olympic Games will also be recorded as the first in which all participating delegations have female athletes. Brunei, Qatar and Saudi Arabia have included women for the first time, and Qatar named the female shooter, Bahiya-al-Hamad, as its flag-bearer.

Yi Siling of China took the honour of claiming the first Gold Medal of the London Olympics when she won the women's 10 metre Air Rifle event on July 28, 2012.

Wrestler Sushil Kumar led the Indian contingent holding the Indian tricolour in the opening ceremony, while female boxer M. C. Mary Kom was the flag bearer in the closing ceremony.

The Indian Olympic Association (IOA) had sent a total of 83 athletes to compete in 13 sports, making it the largest contingent India has ever sent to the Olympic Games.

In London Olympics, India bagged a total of 6 medals with 1 Silver of Vijay Kumar in Shooting (Men's 25m Rapid Fire Pistol) and the second Silver medal of Sushil Kumar in Wrestling (Men's 66kg Freestyle), along with one Bronze each of Gagan Narang in Shooting (Men's 10m Air Rifle), Yogeshwar Dutt in Wrestling (Men's 60kg Freestyle), Saina Nehwal in Badminton (Women's Singles) and M. C. Mary Kom in Boxing (Women's Fly, 51 kg).

Sushil Kumar's historic feat of winning back-to-back Olympic medals on the very last day of London Olympics 2012 turned out to be the high point of country's campaign. His Silver was India's fourth Wrestling medal in the Olympics and second in London after Yogeshwar Dutt, who won a Bronze in the 60 kg Freestyle event.

Medals Tally (Top Ten Nations and India) of London Olympics, 2012

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Country</th>
<th>Gold</th>
<th>Silver</th>
<th>Bronze</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>46</td>
<td>29</td>
<td>29</td>
<td>104</td>
</tr>
<tr>
<td>2</td>
<td>China</td>
<td>38</td>
<td>27</td>
<td>23</td>
<td>88</td>
</tr>
<tr>
<td>3</td>
<td>Britain</td>
<td>29</td>
<td>17</td>
<td>19</td>
<td>65</td>
</tr>
<tr>
<td>4</td>
<td>Russia</td>
<td>24</td>
<td>17</td>
<td>32</td>
<td>82</td>
</tr>
<tr>
<td>5</td>
<td>S. Korea</td>
<td>13</td>
<td>8</td>
<td>07</td>
<td>28</td>
</tr>
<tr>
<td>6</td>
<td>Germany</td>
<td>11</td>
<td>11</td>
<td>14</td>
<td>34</td>
</tr>
<tr>
<td>7</td>
<td>France</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>34</td>
</tr>
<tr>
<td>8</td>
<td>Italy</td>
<td>08</td>
<td>04</td>
<td>05</td>
<td>17</td>
</tr>
<tr>
<td>9</td>
<td>Hungary</td>
<td>08</td>
<td>04</td>
<td>05</td>
<td>17</td>
</tr>
<tr>
<td>10</td>
<td>Australia</td>
<td>07</td>
<td>02</td>
<td>04</td>
<td>13</td>
</tr>
</tbody>
</table>

The sports that India participated in were:

- Hockey
- Football
- Volleyball
- Basketball
- Water Polo

Some important results of Team events in London Olympics

<table>
<thead>
<tr>
<th>Sport</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hockey</td>
<td>Netherlands</td>
<td>Argentina</td>
</tr>
<tr>
<td>Football</td>
<td>Mexico</td>
<td>Brazil</td>
</tr>
<tr>
<td>Volleyball</td>
<td>Russia</td>
<td>Brazil</td>
</tr>
<tr>
<td>Basketball</td>
<td>U.S.A.</td>
<td>Spain</td>
</tr>
<tr>
<td>Water Polo</td>
<td>Croatia</td>
<td>Italy</td>
</tr>
</tbody>
</table>

Journey of Olympics (Since 1896)

First Olympics

- Year - 1896
- Date - April 4 to 15
- Place - Athens (Greece)
- Participating Countries - 13
- Players - 311 (all males)
- Game Competitions - 42
- India's position - Not participated

Second Olympics

- Year - 1900
- Date - May 20 to October 28
- Place - Paris (France)
- Participating Countries - 22
- Players - 1330 (11 females)
- Competitions - 60
- India's position - 2 Silver medals (Won by Norman Pritchard - Athletics)
**Third Olympics**
- Year: 1904
- Date: July 1 to November 23
- Place: St. Louis (America)
- Participating Countries: 12
- Players: 625 (8 females)
- Competitions: 67
- India’s position: Did not win any medal

**Fourth Olympics**
- Year: 1908
- Date: April 27 to October 31
- Place: London (Britain)
- Participating Countries: 22
- Players: 2035 (36 females)
- Competitions: 104
- India’s position: Not participated

**Fifth Olympics**
- Year: 1912
- Date: May 5 to July 22
- Place: Stockholm (Sweden)
- Participating Countries: 28
- Players: 2547 (57 females)
- Competitions: 106
- India’s position: Not participated

**Sixth Olympics**
- Year: 1916
- Date: Canceled due to World War I
- Place: Berlin (Germany)

**Seventh Olympics**
- Year: 1920
- Date: April 20 to Sept. 12
- Place: Antwerp (Belgium)
- Participating Countries: 29
- Players: 2607 (64 females)
- Competitions: 104
- India’s position: Did not win any medal

**Eighth Olympics**
- Year: 1924
- Date: May 4 to July 27

**Ninth Olympics**
- Year: 1928
- Date: May 17 to August 12
- Place: Amsterdam (Holland)
- Participating Countries: 46
- Players: 3014 (290 females)
- Competitions: 109
- India’s position: 1 Gold medal (in hockey)

**Tenth Olympics**
- Year: 1932
- Date: July 30 to August 14
- Place: Los Angeles (USA)
- Participating Countries: 37
- Players: 1408 (127 females)
- Competitions: 117
- India’s position: 1 Gold medal (in hockey)

**Eleventh Olympics**
- Year: 1936
- Date: August 1 to 16
- Place: Berlin (Germany)
- Participating Countries: 49
- Players: 4066 (328 females)
- Competitions: 129
- India’s position: 1 Gold medal (in hockey)

**Twelfth Olympics**
- Year: 1940
- Canceled due to World War II
- Place: Tokyo, later on Helsinki

**Thirteenth Olympics**
- Year: 1944
- Canceled due to World War II
- Place: London (Britain)

**Fourteenth Olympics**
- Year: 1948
- Date: July 29 to August 14
- Place: London (Britain)
- Participating Countries: 59
- Players: 4099 (385 females)
- Competitions: 136
- India’s position: 1 Bronze medal (in hockey)

**Fifteenth Olympics**
- Year: 1952
- Date: July 19 to August 3
- Place: Helsinki (Finland)
- Participating Countries: 69
- Players: 4925 (518 females)
- Competitions: 149
- India’s position: 1 Gold medal (in hockey) and 1 Bronze medal (in wrestling)

**Sixteenth Olympics**
- Year: 1956
- Date: Nov. 22 to Dec. 8
- Place: Melbourne (Australia)
- Participating Countries: 71
- Players: 3342 (384 females)
- Competitions: 145
- India’s position: 1 Gold medal (in hockey)

**Seventeenth Olympics**
- Year: 1960
- Date: August 25 to September 11
- Place: Rome (Italy)
- Participating Countries: 83
- Players: 5348 (61 females)
- Competitions: 150
- India’s position: 1 Silver medal (in hockey)

**Eighteenth Olympics**
- Year: 1964
- Date: October 10 to 24
- Place: Tokyo (Japan)
- Participating Countries: 93
- Players: 5140 (683 females)
- Competitions: 163
- India’s position: 1 Gold medal (in hockey)

**Nineteenth Olympics**
- Year: 1968
- Date: October 12 to 27
- Place: Mexico City (Mexico)
- Participating Countries: 112
- Players: 5531 (781 females)
- Competitions: 182
- India’s position: 1 Bronze medal (in hockey)

**Twentieth Olympics**
- Year: 1972
- Date: August 26 to Sept. 10
- Place: Munich (W. Germany)
- Participating Countries: 122
- Players: 7147 (1070 females)
- Competitions: 195
- India’s position: 1 Bronze medal (in hockey)

**Twenty First Olympics**
- Year: 1976
- Date: July 17 to August 1
- Place: Montreal (Canada)
- Participating Countries: 92
- Players: 6152 (1261 females)
- Competitions: 198
- India’s position: Did not win any medal, were at position 7th in hockey

**Twenty Second Olympics**
- Year: 1980
- Date: July 19 to August 3
- Place: Moscow (Soviet Union)
- Participating Countries: 81
- Players: 5326 (1088 females)
- Competitions: 203
- India’s position: 1 Gold medal (in hockey)

**Twenty Third Olympics**
- Year: 1984
- Date: July 28 to August 12
- Place: Los Angeles (U.S.A.)
- Participating Countries: 140
- Players: 7078 (1620 females)
- Competitions: 221
- India’s position: Did not win any medal, 5th position in hockey
Twenty Fourth Olympics
- **Year** - 1988
- **Date** - September 17 to October 2
- **Place** - Seoul (S. Korea)
- **Participating Countries** - 159
- **Players** - 8,465
- **Competitions** - 237
- **India's position** - Did not win any medal, ranked sixth in hockey

Twenty Fifth Olympics
- **Year** - 1992
- **Date** - July 25 to August 9
- **Place** - Barcelona (Spain)
- **Participating Countries** - 169
- **Players** - 9,367
- **Competitions** - 257
- **India's position** - Did not win any medal

Twenty Sixth Olympics
- **Year** - 1996
- **Date** - July 19 to August 4
- **Place** - Atlanta (U.S.A.)
- **Participating Countries** - 197
- **Players** - 10,310
- **Competitions** - 271
- **India's position** - Leander Paes won a Bronze medal (in Lawn Tennis).

Twenty Seventh Olympics
- **Year** - 2000
- **Date** - Sept. 15 to Oct. 1
- **Place** - Sydney (Australia)
- **Participating Countries** - 200
- **Number of players** - 10,321
- **Competitions** - 300
- **India's position** - Karnam Malleshwari won a Bronze medal

Thirty-first Olympics
- **Year** - 2016 (Aug. 05 - Sep. 21)
- **Place** - (Proposed) - Rio de Janeiro (Brazil)

Thirty-second Olympics
- **Year** - 2020
- **Place** - (Proposed) - Tokyo (Japan)

**Paralympics and Winter Olympics**
- **London Paralympics 2012 (Aug. 29-Sept. 9, 2012)**: London, the host city welcomed the 14th Paralympic Games with a spectacular Opening Ceremony, held in the Olympic Stadium. A total of 4,294 athletes from 164 countries participated in the Games. China won the most medals - 231 (95 Gold, 71 Silver, 56 Bronze) followed by Russian Federation - 132 (46 Gold, 88 Silver, 4 Bronze) and Great Britain - 120 (34 Gold, 43 Silver, 43 Bronze).

**In London Paralympics 2012**: Girisha H. Nagarajegowdwa (Karnataka) clinched the only medal after bagging the Silver in the Men's High Jump event.
- **First Ever Gold for India**: India's Devendra created history by winning the first ever gold for the country in Athens Paralympics 2004. He claimed gold in Javelin throw.
- **First Games for disabled athletes**: were held in 1948 in Stoke Mandeville, England. On the day of the Opening Ceremony of the 1948 Olympic Games in London, the Stoke Mandeville Games were also launched and the first competition for wheelchair-bound athletes was organized.
- **Olympic style Games**: for athletes with disability were organized for the first time in Rome in 1960, immediately after the Olympic Games. They are considered the first Paralympic Games.
- **Since then**, Paralympic Games have been organized almost every four years. The Paralympic Games have always been held in the same year as the Olympic Games.
- **Other Paralympic events** were added in Toronto (Canada) in 1976 and the idea of merging together different Paralympic Games for international sports competitions, was conceived. In the same year, the first Paralympic Winter Games took place in Sweden.
- **The next Paralympic Games will be held in 2016 in Rio de Janeiro.**

**Winter Olympic Games**: The Winter Olympic Games started in 1924 AD when the first Games were held at Chamonix, France followed by St. Moritz, Switzerland (1928 & 1948); Lake Placid, New York (1932 & 1980); Garmisch-Partenkirchen, Germany (1936); Oslo, Norway (1952); Cortina d'Ampezzo, Italy (1956); Squaw Valley, California (1960); Innsbruck, Austria (1964 & 1976); Grenoble, France (1968); Sapporo, Japan (1972); Sarajevo, Yugoslavia (1984); Calgary, Canada (1988) and Albertville, France (1992). The XVII Winter Olympic Games were held in Lillehammer (Norway) in February 1994. Incidentally, the 1994 Games were the first in accordance with the International Olympic Committee's new cycle of having Winter Games and Summer Games two years apart, instead of in the same year, as had been the tradition since the commencement of these Games in 1924.

- **The XIX Winter Games** were held in Salt Lake City (USA) from February 9 to 24, 2002. Germany topped in the Medals Tally winning 33 medals (including 12 Golds) while Norway finished as runner-up bagging 24 medals (11 Golds).
- **The XX Winter Olympics** were held in Turin (Italy) from February 10-26, 2006. Germany once again topped the medals tally, after the 2002 Salt Lake Winter Games.
- **XXI Winter Olympics 2010 (February 12-28, 2010)**: The 21st Winter Olympic Games were held in Vancouver, Canada from February 12 to 28, 2010. Total 2700 players of 82 countries participated in this 17 days sports festival.
- **XXII Winter Olympics 2014 (February 7-23, 2014)**: The 22nd Winter Olympic Games were held in Sochi (Russia), the 17-day costliest Olympics ever ($51 billion of sport-driven global unity concluded on February 23, 2014.
Sites of Winter Olympic Games

<table>
<thead>
<tr>
<th>Year</th>
<th>Place</th>
<th>Year</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>1924</td>
<td>Chamonix, France</td>
<td>1928</td>
<td>St. Moritz, Switzerland</td>
</tr>
<tr>
<td>1932</td>
<td>Lake Placid, New York</td>
<td>1936</td>
<td>Garmisch-Partenkirchen, Germany</td>
</tr>
<tr>
<td>1948</td>
<td>St. Moritz, Switzerland</td>
<td>1952</td>
<td>Oslo, Norway</td>
</tr>
<tr>
<td>1956</td>
<td>Cortina d'Ampezzo, Italy</td>
<td>1960</td>
<td>Squaw Valley, California</td>
</tr>
<tr>
<td>1964</td>
<td>Innsbruck, Austria</td>
<td>1968</td>
<td>Grenoble, France</td>
</tr>
<tr>
<td>1972</td>
<td>Sapporo, Japan</td>
<td>1976</td>
<td>Innsbruck, Austria</td>
</tr>
<tr>
<td>1980</td>
<td>Lake Placid, New York</td>
<td>1984</td>
<td>Sarajevo, Yugoslavia</td>
</tr>
<tr>
<td>1988</td>
<td>Calgary, Alberta</td>
<td>1992</td>
<td>Albertville, France</td>
</tr>
<tr>
<td>1994</td>
<td>Lillehammer, Norway</td>
<td>1998</td>
<td>Nagano, Japan</td>
</tr>
<tr>
<td>2002</td>
<td>Salt Lake City, USA</td>
<td>2006</td>
<td>Turin, Italy</td>
</tr>
<tr>
<td>2010</td>
<td>Vancouver, Canada</td>
<td>2014</td>
<td>Sochi, Russia</td>
</tr>
<tr>
<td>2018</td>
<td>Pyeongchang, S. Korea (Scheduled)</td>
<td>2018</td>
<td>Pyeongchang, S. Korea</td>
</tr>
</tbody>
</table>

Commonwealth Games

After Olympics, Commonwealth Games is the second largest sports festival in the world. The Games are held once in four years but only in between the Olympic years. The Games were originally known as the British Empire Games.

- The 1st Commonwealth Games were held in 1930 at Hamilton, Canada.
- The 10th Commonwealth Games were held at Christchurch, New Zealand in 1974 and the 15th in Victoria (Canada) in 1994, where about 3,350 athletes from 64 nations (including South Africa, which joined the family of Commonwealth athletes after 36 years) participated.
- Namibia also, which gained its independence in 1990, made its debut while Hong Kong made its final appearance in the Games before being ceded to China in 1997.
- India, for the first time, participated in the second Commonwealth games held in London in 1934.

Commonwealth Games: At a Glance

<table>
<thead>
<tr>
<th>Year</th>
<th>Places</th>
<th>Countries</th>
<th>Events</th>
<th>First</th>
<th>India's Medals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>Hamilton (Canada)</td>
<td>11</td>
<td>6</td>
<td>England</td>
<td>N. P.</td>
</tr>
<tr>
<td>1934</td>
<td>London (England)</td>
<td>16</td>
<td>6</td>
<td>England</td>
<td>B-1</td>
</tr>
<tr>
<td>1938</td>
<td>Sydney (Australia)</td>
<td>15</td>
<td>7</td>
<td>Australia</td>
<td>No medal</td>
</tr>
<tr>
<td>1950</td>
<td>Auckland (New Zealand)</td>
<td>12</td>
<td>7</td>
<td>Australia</td>
<td>N. P.</td>
</tr>
<tr>
<td>1954</td>
<td>Vancouver (Canada)</td>
<td>24</td>
<td>9</td>
<td>Australia</td>
<td>No medal</td>
</tr>
<tr>
<td>1958</td>
<td>Cardiff (Britain)</td>
<td>35</td>
<td>9</td>
<td>England</td>
<td>G-2, S-1</td>
</tr>
<tr>
<td>1962</td>
<td>Perth (Australia)</td>
<td>35</td>
<td>9</td>
<td>Australia</td>
<td>N. P.</td>
</tr>
</tbody>
</table>

Medals Tally of Top Five Countries in the 22nd Winter Olympics 2014

<table>
<thead>
<tr>
<th>Country</th>
<th>Gold</th>
<th>Silver</th>
<th>Bronze</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>13</td>
<td>11</td>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td>Norway</td>
<td>11</td>
<td>5</td>
<td>10</td>
<td>26</td>
</tr>
<tr>
<td>Canada</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>USA</td>
<td>9</td>
<td>7</td>
<td>12</td>
<td>28</td>
</tr>
<tr>
<td>Netherlands</td>
<td>6</td>
<td>6</td>
<td>12</td>
<td>24</td>
</tr>
</tbody>
</table>

XX Commonwealth Games (July 23 to August 3, 2014)

- The XIX Commonwealth Games were held in Glasgow (Scotland) from July 23 to August 3, 2014. Around 4,950 athletes from 71 nations participated in this 11-day sports extravaganza.
- England topped the medals tally with 174 (58 Gold, 59 Silver and 57 Bronze) medals, while Australia finished second with 137 (49 Gold, 42 Silver and 46 Bronze) medals. Canada was placed third with 82 medals (32 Gold, 16 Silver and 34 Bronze).
- The England's Jodie Stimpson won the first gold medal of the XX Commonwealth Games in Glasgow on July 24.
- The thistle man named 'Clyde' (named after the river which flows through the host city, Glasgow), the official mascot of the XX Commonwealth Games, was designed by Beth Gilmour (aged 12 years).

Best Athlete: Canadian gymnast Franky Jones (won 6 medals, including 1 gold in the rhythmic gymnastics events) was honoured with the David Dixon Award after being adjudged the 'Best Athlete of the XX Commonwealth Games'.

- 'Clyde' was the mascot of the 2014 Commonwealth Games.
- No. of Commonwealth countries: 53
- No. of existing teams: 71
- Inauguration: 23rd July, 2014
- Closing: 3rd August, 2014
- Events: 272 events in 21 disciplines
- Officially opened by: Queen Elizabeth II on 23rd July, 2014 at Celtic Park, Glasgow.
- Queen's Baton last runner: Sir Chris Hoy
Asian Games

The first Asian Games began on March 4, 1951 in New Delhi.

The Asian Games Association has chosen shining sun as its symbol.

The AGF (Asian Games Federation) adopted ‘Ever Onward’, given by Pt. Jawaharlal Nehru, as the motto of the Asian Games.

The emblem of Asian Games is a ‘bright full rising sun’ with interlocking rings.

The Maharaja of Patiala presented the Torch and the Flag for the first Asian Games and since then they have been carried from country to country.

Asian Games since 1951

<table>
<thead>
<tr>
<th>Game Serial</th>
<th>Year</th>
<th>Places</th>
<th>Number of countries</th>
<th>Number of sports</th>
<th>Number of players</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>1951</td>
<td>New Delhi (India)</td>
<td>11</td>
<td>6</td>
<td>491</td>
</tr>
<tr>
<td>2nd</td>
<td>1954</td>
<td>Manila (Philippines)</td>
<td>18</td>
<td>8</td>
<td>1021</td>
</tr>
<tr>
<td>3rd</td>
<td>1958</td>
<td>Tokyo (Japan)</td>
<td>20</td>
<td>13</td>
<td>1422</td>
</tr>
<tr>
<td>4th</td>
<td>1962</td>
<td>Jakarta (Indonesia)</td>
<td>16</td>
<td>13</td>
<td>1345</td>
</tr>
<tr>
<td>5th</td>
<td>1966</td>
<td>Bangkok (Thailand)</td>
<td>18</td>
<td>14</td>
<td>1943</td>
</tr>
<tr>
<td>6th</td>
<td>1970</td>
<td>Bangkok (Thailand)</td>
<td>18</td>
<td>13</td>
<td>1752</td>
</tr>
<tr>
<td>7th</td>
<td>1974</td>
<td>Tehran (Iran)</td>
<td>25</td>
<td>16</td>
<td>2969</td>
</tr>
<tr>
<td>8th</td>
<td>1978</td>
<td>Bangkok (Thailand)</td>
<td>25</td>
<td>19</td>
<td>3000</td>
</tr>
<tr>
<td>9th</td>
<td>1982</td>
<td>New Delhi (India)</td>
<td>33</td>
<td>21</td>
<td>3447</td>
</tr>
<tr>
<td>10th</td>
<td>1986</td>
<td>Seoul (S. Korea)</td>
<td>27</td>
<td>25</td>
<td>3883</td>
</tr>
<tr>
<td>11th</td>
<td>1990</td>
<td>Beijing (China)</td>
<td>37</td>
<td>27</td>
<td>4500</td>
</tr>
<tr>
<td>12th</td>
<td>1994</td>
<td>Hiroshima (Japan)</td>
<td>42</td>
<td>34</td>
<td>7300</td>
</tr>
<tr>
<td>13th</td>
<td>1998</td>
<td>Bangkok (Thailand)</td>
<td>41</td>
<td>38</td>
<td>7000</td>
</tr>
<tr>
<td>14th</td>
<td>2002</td>
<td>Busan (S. Korea)</td>
<td>44</td>
<td>38</td>
<td>9919</td>
</tr>
<tr>
<td>15th</td>
<td>2006</td>
<td>Doha (Qatar)</td>
<td>45</td>
<td>39</td>
<td>10000+</td>
</tr>
<tr>
<td>16th</td>
<td>2010</td>
<td>Guangzhou (China)</td>
<td>45</td>
<td>42</td>
<td>9794</td>
</tr>
<tr>
<td>17th</td>
<td>2014</td>
<td>Incheon (South Korea)</td>
<td>45</td>
<td>36</td>
<td>9501</td>
</tr>
</tbody>
</table>

Position of India in Asian Games Medal Tally

<table>
<thead>
<tr>
<th>SL</th>
<th>Year</th>
<th>Gold</th>
<th>Silver</th>
<th>Bronze</th>
<th>Total</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1951</td>
<td>15</td>
<td>18</td>
<td>21</td>
<td>54</td>
<td>2nd</td>
</tr>
<tr>
<td>2</td>
<td>1954</td>
<td>5</td>
<td>4</td>
<td>9</td>
<td>18</td>
<td>5th</td>
</tr>
<tr>
<td>3</td>
<td>1958</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>13</td>
<td>7th</td>
</tr>
<tr>
<td>4</td>
<td>1962</td>
<td>13</td>
<td>10</td>
<td>11</td>
<td>34</td>
<td>3rd</td>
</tr>
<tr>
<td>5</td>
<td>1966</td>
<td>7</td>
<td>5</td>
<td>9</td>
<td>23</td>
<td>9th</td>
</tr>
<tr>
<td>6</td>
<td>1970</td>
<td>6</td>
<td>9</td>
<td>10</td>
<td>25</td>
<td>5th</td>
</tr>
<tr>
<td>7</td>
<td>1974</td>
<td>11</td>
<td>12</td>
<td>28</td>
<td>57</td>
<td>8th</td>
</tr>
<tr>
<td>8</td>
<td>1978</td>
<td>11</td>
<td>11</td>
<td>6</td>
<td>28</td>
<td>7th</td>
</tr>
<tr>
<td>9</td>
<td>1982</td>
<td>13</td>
<td>19</td>
<td>25</td>
<td>57</td>
<td>5th</td>
</tr>
<tr>
<td>10</td>
<td>1986</td>
<td>5</td>
<td>9</td>
<td>14</td>
<td>33</td>
<td>11th</td>
</tr>
<tr>
<td>11</td>
<td>1990</td>
<td>1</td>
<td>8</td>
<td>14</td>
<td>23</td>
<td>11th</td>
</tr>
</tbody>
</table>

Asian Games: XVII Asian Games (19 Sept. – 4 Oct. 2014)

17th Asian Games (2014), officially known as the XVII Asiad, was opened by S. Korean President Ms. Park Geun-hye on 19 Sept. 2014 at Incheon Asiad Main Stadium.

India bagged the first gold medal at Incheon, when Jitu Rai won Gold in the men’s 50 m pistol.

China, South Korea and Japan came first, second and third respectively in the 17th Asian Games.

XVII Asiad came to a close on Oct. 14, 2014 with China (151 Gold, 108 Silver and 83 Bronze) topping the overall medals tally.

India won 11 gold, 10 silver and 36 bronze medals and managed to occupy the 8th position.

XVII ASIAN GAMES: General Information

Host city: Incheon, South Korea

Incheon was awarded the right on April 17, 2007, defeating Delhi, India to host the Games. Incheon is the third city in South Korea after Seoul (1986) and Busan (2002) to host the Asian Games.

Motto: Diversity Shines Here

Participating Nations: 45

Athletes participating: 9,501 (5,823 men, 3,678 women)

Events: 439 in 36 sports

Opening ceremony: September 19

Closing ceremony: October 4

Athlete’s Oath: Oh Jin-hyek Nam Hyun-hee

Torch Lighter: Lee Young-ae

Main venue: Incheon Asiad Main Stadium

Total Medals: 1454 [439 (G) + 439 (S) + 576 (B)]

Timekeeper: Swiss watchmaker company Tissot was the official timekeeper of the Games.

Mascots:

The Prototypes for Harbour seals from Baengnyeong island off west coast of the Korean Peninsula, named Vichuon, Barame and Chumuro, were the mascots of the Games.

Three Spotted seal siblings was unveiled on 4 November, 2010 as official mascot of the Games in Songdol Island, Incheon. The three seals, known as “Barame”, “Chumuro” and “Vichuon”, means...
wind, dance and light in Korean language, is in accordance with the theme of main venue.

-The prototype was taken from Baengnyeong Island. According to the organisers, the mascot was chosen as symbolic to the future peace between South Korea and North Korea.

**Emblem:**

-A huge wing consisting of a string of “A”, the first letter of “Asia”, with a shining sun at its upper left, symbolising the Asian people holding hands in the sky was the official emblem. The official emblem also unveiled on same day (4 Nov, 2010).

-China broke the 150-Gold barrier and finished on top with a tally of 342 medals in all. It was followed by South Korea with 79 Gold and Japan with 47 Gold. Kazakhstan, Iran, Thailand and North Korea took 4th, 5th, 6th and 7th spots respectively.

-India signed off with 57 medals—11 Gold, 10 Silver and 36 Bronze, taking the 8th position. The tally dipped considerably compared to the 2010 edition in Guangzhou, China. In 2010, the country had ended sixth with 64 medals—14 Gold, 17 Silver and 34 Bronze.

-The first Gold at the Incheon Games for India was earned by Jitu Rai in men’s 50m pistol.

-Legendary boxer M C Mary Kom became the first Indian woman boxer to clinch Asian Games Gold.

-Yogeshwar Dutt won Gold in 65 kg freestyle wrestling, ending country’s 28-year-old medal drought in that event.

-Seema Punia earned country its first athletics Gold medal in the Asian Games by winning the women’s discus throw event.

-In a nail-biting action, hockey squad led by Sardar Singh defeated Pakistan to win the Asian Games men’s hockey Gold after 16 years.

-Women’s 4 x 400m relay team clinched the record fourth consecutive Gold. Gold medals in other disciplines—bated by compound men’s team archers, men’s squash team spearheaded by Saurav Ghosal, tennis mixed doubles pair of Sania Mirza and Saket Mnmeni, and the kabaddi men’s and women’s teams. Other notable achievement was the women sailing team winning the first medal at the Asian Games.

**Records:**

-The 17th edition of the Asian Games registered 14 new world records and 28 Asian ones. More than half of the new world records were set by weightlifters breaking nine of the preexisting records in the sport of weightlifting.

-Japanese swimmer Hagino Kosuke, who won seven medals, including four Gold, won the Samsung Most Valuable Player of the Games award.

**Other major achievers:**

-Swimmer Dmitry Igorevich Balandin of Kazakhstan won three Golds in 50, 100 and 200 metre breaststroke competitions.

-Korea’s Kim Cheong-yong (17) became the youngest shooter in Asian Games to achieve top honour in 10 metre air pistol, winning two Golds.

-Sorn Seavmey earned Cambodia its first Gold at Asian Games after a 44 years of wait, by winning the Taekwondo, 73-kg event.

-Yao Jinning, the Chinese Gymnast, won four Golds in Team, Individual all-around, Uneven bars and Floor exercise events.

**The Host:** Incheon was the third city in South Korea, after Seoul and Busan, to host the Asian Games.

**The Next Host:** Indonesia will host the next XVIII edition of the Asian Games in Jakarta, in 2018.

**Closing Ceremony:** The closing ceremony was held on Oct. 4, 2014 with the theme “Our Cherished Memories of Incheon”.

-The ceremony also included the segment from next Asian Games host city, Jakarta. It started with “The colours of Jakarta”, featured a Javanese dance known as Ronggeng. It followed by “The spirit of South Sumatra featured Malay dance.

-Participants from 45 countries participated in 439 events in the following 36 sports:

1. Aquatics (Diving, Swimming, Synchronised Swimming, Water Polo)
2. Archery
3. Athletics
4. Badminton
5. Baseball
6. Basketball
7. Bowling
8. Boxing
9. Canoe (Canoe Sprint, Obstacle, Slalom)
10. Cricket
11. Cycling (Track, Road, Mountain Biking, BMX)
12. Equestrian
13. Fencing
14. Football
15. Golf
16. Gymnastics (Artistic, Rhythmic, Trampoline)
17. Handball
18. Hockey
19. Judo
20. Kabaddi
21. Karate
22. Modern Pentathlon
23. Rowing
24. Rugby
25. Sailing
26. Sepak Takraw
27. Shooting
28. Squash
29. Table Tennis
30. Taekwondo
31. Tennis (Tennis, Soft Tennis)
32. Triathlon
33. Volleyball (Beach Volleyball, Volleyball)
34. Weightlifting
35. Wrestling
36. Wushu

**SAF Games**

The South Asian Federation Games (SAF Games) is a sport festival of South Asian countries. The South Asian Sports Federation comprising India, Pakistan, Sri Lanka, Bangladesh, Nepal, Bhutan and Maldives was formed in New Delhi on November 26, 1982.


-The Eighth SAF Games (September 25-October 4, 1999) were held in Kathmandu.

-As hitherto, India notched the top position winning 197 medals including 102 Gold. Nepal with 65 medals including 31 Golds and Sri Lanka 119 medals (16 Gold, Nepal with 65 medals including 31 Golds and Sri Lanka 119 medals (16 Golds) finished on the second and third places, respectively.

-The 10th South Asian Federation Games (18-28 August, 2006) were held in Sri Lanka and India retained the crown, with 118 Gold, 69 Silver and 47 Bronze. Sri Lanka and India retained the crown, with 118 Gold, 69 Silver and 47 Bronze. Sri Lanka and India retained the crown, with 118 Gold, 69 Silver and 47 Bronze. Sri Lanka and India retained the crown, with 118 Gold, 69 Silver and 47 Bronze.
Flag and Motto of the SAF Games: The SAF Games flag includes a dove suggesting the desire for peace in the area. The motto of the SAF Games is 'Peace, Prosperity and Progress'.

New Name for SAF Games: The SAF Games have been rechristened as South Asian Games, according to a decision taken by the South Asian Sports Federation at its 32nd meeting held in Islamabad (Pakistan) on April 2, 2004.

11th South Asian Games
- India retained the crown at the 11th SA Games (January 29 - February 09, 2010) played in Dhaaka, Bangladesh.
- It finished on top of the medals tally with 90 gold, 55 silver and 30 bronze medals.
- Pakistan came second and the hosts Bangladesh third.
- India dominated the events in badminton, swimming, T.T. and shooting.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Country</th>
<th>Gold</th>
<th>Silver</th>
<th>Bronze</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>India</td>
<td>90</td>
<td>55</td>
<td>30</td>
<td>175</td>
</tr>
<tr>
<td>2.</td>
<td>Pakistan</td>
<td>19</td>
<td>25</td>
<td>36</td>
<td>80</td>
</tr>
<tr>
<td>3.</td>
<td>Bangladesh</td>
<td>18</td>
<td>23</td>
<td>56</td>
<td>97</td>
</tr>
<tr>
<td>4.</td>
<td>Sri Lanka</td>
<td>16</td>
<td>35</td>
<td>54</td>
<td>105</td>
</tr>
<tr>
<td>5.</td>
<td>Nepal</td>
<td>07</td>
<td>09</td>
<td>19</td>
<td>35</td>
</tr>
<tr>
<td>6.</td>
<td>Afghanistan</td>
<td>07</td>
<td>09</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>7.</td>
<td>Bhutan</td>
<td>02</td>
<td>03</td>
<td>05</td>
<td>05</td>
</tr>
<tr>
<td>8.</td>
<td>Maldives</td>
<td>02</td>
<td>03</td>
<td>02</td>
<td>02</td>
</tr>
</tbody>
</table>

12th South Asian Games: India will be the host for the 12th South Asian Games, were rescheduled to be held in 2013, but not held till now.

Some Important Sports And Related Information

Cricket
- It is believed that Cricket was started in England in 1300 A.D.
- It started as a game of shepherds and became popular among other classes in 18th century A.D.
- After some time a club known as "Merylebone Cricket Club" (M.C.C.) was formed at Lords in London.
- Cricket became popular in Australia due to British influence there.
- The first official cricket test match was played in the year 1877 between Australia and England in Melbourne.
- When some other countries started playing Cricket, Imperial Cricket Conference was formed in 1909 which gave birth to International Cricket Conference in 1956.
- The first One Day International cricket match was played in the year 1971 between England and Australia in Melbourne.

The ICC World Test Championship
The ICC World Test Championship is intended to become the premier championship for Test cricket run by the International Cricket Council (ICC).
The first ICC World Test Championship is to be held in 2017 in England.
The original plans to hold the competition in 2013 were abandoned due to financial problems.
It will replace the One-day International competition the ICC Champions Trophy, which was held in 2013 for the last time.

Winners of World Cup Cricket since 1975

<table>
<thead>
<tr>
<th>Year</th>
<th>Place</th>
<th>Winner</th>
<th>Runners up</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975</td>
<td>England</td>
<td>West Indies</td>
<td>Australia</td>
</tr>
<tr>
<td>1979</td>
<td>England</td>
<td>West Indies</td>
<td>England</td>
</tr>
<tr>
<td>1983</td>
<td>England</td>
<td>India</td>
<td>Australia</td>
</tr>
<tr>
<td>1987</td>
<td>India and Pakistan</td>
<td>Pakistan</td>
<td>Australia</td>
</tr>
<tr>
<td>1991</td>
<td>Australia and New Zealand</td>
<td>Sri Lanka</td>
<td>Australia</td>
</tr>
<tr>
<td>1996</td>
<td>India, Pakistan and Sri Lanka</td>
<td>Australia</td>
<td>Pakistan</td>
</tr>
<tr>
<td>1999</td>
<td>England</td>
<td>Australia</td>
<td>India</td>
</tr>
<tr>
<td>2003</td>
<td>South Africa</td>
<td>Australia</td>
<td>Sri Lanka</td>
</tr>
<tr>
<td>2007</td>
<td>West Indies</td>
<td>Australia</td>
<td>India</td>
</tr>
<tr>
<td>2011</td>
<td>India, Sri Lanka &amp; Bangladesh</td>
<td>India</td>
<td>Sri Lanka</td>
</tr>
<tr>
<td>2015</td>
<td>Australia &amp; New Zealand</td>
<td>Australia</td>
<td>Scheduled</td>
</tr>
</tbody>
</table>

Cricket World Cup 2011, 2015 and 2019
- Initially India, Pakistan, Sri Lanka and Bangladesh were to host jointly the 2011 cricket World Cup, which comes to the subcontinent after a gap of 15 years, but after the terrorist attack on Sri Lankan cricket team in Pakistan, Pakistan's name has been canceled from the hosts' list by the ICC.
- India was the main host of World Cup 2011.
In all the five ICC T-20 World Cup held till 2014, M.S. Dhoni was the Captain of Indian team.

4th ICC Women’s World Twenty-20
Two-time defending champion Australia won ICC Women’s World Twenty-20 Championship 2014, defeating England by 6 wickets, in the final at Dhaka (Bangladesh) on April 06, 2014.

Football
It is believed that Football is also of British origin. However, it is said that a game similar to Football was played in 500 B.C. by the Greeks of Sparta and they called this game ‘Harpastum’. The first football club of the world ‘Sheffield Football Club’ was founded in the year 1857 in England. Football was introduced in India by the Britishers in 1848 and the first football club of India was ‘Dalhousie Club’. The Indian Football Association, the oldest football association in the east, was formed in 1878. The apex institution of football is ‘Federation of International de Football Association’ (FIFA), which was formed by seven countries on May 21, 1904. The headquarters of FIFA is in Paris (France). In order to distinguish this game from the carrying cum kicking game i.e. Rugby, it was given the name of “Soccer”. This name was given to this game (Football) by an association named London Football Association which was formed in 1863 in England. The Football World Cup, organized by the FIFA, is the biggest competition.

Football was included as a competitive game in Olympic Games officially in 1908.

India took part in the World Olympic Football Competition in 1948 in London.

Besides Olympic competitions, World Cup Football Championships were planned by two Frenchmen i.e. M. Jules Rimet and Henry Delamany.

Jules Rimet was president of the French Football Federation and remained president of FIFA from 1924 to 1954.

The first World Cup was organised at Monte Video (Uruguay) in 1930.

The trophy for this championship was named as “Jules Rimet Cup”. This trophy became the permanent property of Brazil, as this country had won the world title for the third time (1958, 1962 and 1970).

From 1974 (6th championship of Germany) onwards, the trophy was named as “The FIFA World Cup”. This was a new trophy cast in 18 ct. gold.

In India Indian Football Association (IFA) organises National Football Championship.

The trophy awarded in their competition is called Santosh Trophy, which was donated in the memory of Manmohan Nath Roy Chaudhuri of Santosh (now a part of Bangladesh).

Durand Cup tournament, the oldest football tournament of India and the second oldest tournament of the world was started in 1888.

Durand Cup tournament was first organised at Shimla and is being held in Delhi since 1940.

A new chapter was added to the annals of the country’s (India’s) soccer with the August 13, 2006.

In 2015 World Cup was awarded jointly to Australia and New Zealand, while England will be the host for the 2019 edition of the Cup.

Some important Terminologies of Cricket: Played on, Appeal, Bye, Leg Bye, Power Play, Follow on, Dusara, Beamer, Hooper Shot, Lost Ball, Duck worth, Luis, Retired Hurt, Chinaman, Batsman, Bowler, Wicket Keeper, Fielder, LBW, Catch, Hit wicket, Throw, Maiden over, FOUR, SIX, Wide, Swing, Stroke, Cover, Mid on, Mid Off, MID wicket, Over the wicket, Round the wicket, Leg spinner, Off spinner, Over throw, Over slip, Gully, Cover point, Silly point, Long off, Long on, Third man, Short pitch, Hook, Dead ball, Run out, Popping crease, Pitch, Bouncer (or Bumper), Full Toss, Yorker, Yorked, Googly, Wicket Maiden, Snick, Duck, Hat-Trick, Rubber, The Ashes, Scoring a Ton etc.

ICC Twenty-20 Cricket World Cup

The first ICC Twenty-20 (T-20) World Cup Cricket held in South Africa in September 11-24, 2007. In the final match played at Wanderers stadium in Johannesburg, India thrashed Pakistan by 5 runs and clinched the first T-20 world cup trophy.


In the fourth ICC T-20 World Cup (2012) West Indies defeated the host Sri Lanka in the final at Colombo on Oct. 7, 2012.

The fifth (ICC T-20 World Cup) was hosted by Bangladesh in 2014, from March 16 to April 6. Sri Lanka defeated India in the final by 6 wickets at Sher-e-Bangla Stadium in Dhaka (Bangladesh). Virat Kohli was declared ‘Man of the Series’.

India will host its sixth edition in 2016.

Jumbo (the elephant): The mascot of 2011 World Cup Cricket was unveiled in Colombo on April 02, 2010.

The 2013 World Cup has been awarded jointly to Australia and New Zealand, while England will be the host for the 2019 edition of the Cup.

Some important Terminologies of Cricket: Played on, Appeal, Bye, Leg Bye, Power Play, Follow on, Dusara, Beamer, Hooper Shot, Lost Ball, Duck worth, Luis, Retired Hurt, Chinaman, Batsman, Bowler, Wicket Keeper, Fielder, LBW, Catch, Hit wicket, Throw, Maiden over, Four, Sixer, Wide, Swing, Stroke, Cover, Mid on, Mid Off, Mid wicket, Over the wicket, Round the wicket, Leg spinner, Off spinner, Over throw, Over slip, Gully, Cover point, Silly point, Long off, Long on, Third man, Short pitch, Hook, Dead ball, Run out, Popping crease, Pitch, Bouncer (or Bumper), Full Toss, Yorker, Yorked, Googly, Wicket Maiden, Snick, Duck, Hat- Trick, Rubber, The Ashes, Scoring a Ton etc.

ICC Twenty-20 Cricket World Cup

The first ICC Twenty-20 (T-20) World Cup Cricket held in South Africa in September 11-24, 2007. In the final match played at Wanderers stadium in Johannesburg, India thrashed Pakistan by 5 runs and clinched the first T-20 world cup trophy.


In the fourth ICC T-20 World Cup (2012) West Indies defeated the host Sri Lanka in the final at Colombo on Oct. 7, 2012.

The fifth (ICC T-20 World Cup) was hosted by Bangladesh in 2014, from March 16 to April 6. Sri Lanka defeated India in the final by 6 wickets at Sher-e-Bangla Stadium in Dhaka (Bangladesh). Virat Kohli was declared ‘Man of the Series’.

India will host its sixth edition in 2016.

Jumbo (the elephant): The mascot of 2011 World Cup Cricket was unveiled in Colombo on April 02, 2010.

The 2013 World Cup has been awarded jointly to Australia and New Zealand, while England will be the host for the 2019 edition of the Cup.

Some important Terminologies of Cricket: Played on, Appeal, Bye, Leg Bye, Power Play, Follow on, Dusara, Beamer, Hooper Shot, Lost Ball, Duck worth, Luis, Retired Hurt, Chinaman, Batsman, Bowler, Wicket Keeper, Fielder, LBW, Catch, Hit wicket, Throw, Maiden over, Four, Sixer, Wide, Swing, Stroke, Cover, Mid on, Mid Off, Mid wicket, Over the wicket, Round the wicket, Leg spinner, Off spinner, Over throw, Over slip, Gully, Cover point, Silly point, Long off, Long on, Third man, Short pitch, Hook, Dead ball, Run out, Popping crease, Pitch, Bouncer (or Bumper), Full Toss, Yorker, Yorked, Googly, Wicket Maiden, Snick, Duck, Hat- Trick, Rubber, The Ashes, Scoring a Ton etc.

Downloaded from: shashidhakur23.blogspot.com
> FIFA announced (in April 17, 2007) an assistance of $1 million to Indian football by launching ‘Win in India with India’ project that will initially run for a period of four years.

> FIFA President Joseph S. Blatter (during his visit to India in April, 2007) hinted that India could gain another grant of $400,000 for the third ‘FIFA Goal Project’ as it was entitled to.

> The All India Football Federation (AIFF) has started the ‘Goal Project’ in Manipur and the second was launched in Delhi.

> FIFA and the Asian Football Confederation (AFC) have identified Sikkim as the third site of the project.

> According to Mr. Blatter the new project that the FIFA has specially launched for India will get annual grant of $250,000 for four years.

> FIFA World Cup is played after every four years.

<table>
<thead>
<tr>
<th>Winners of World Cup Football</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year, Place, Mascot</td>
</tr>
<tr>
<td>1930 Uruguay</td>
</tr>
<tr>
<td>1934 Italy</td>
</tr>
<tr>
<td>1938 France</td>
</tr>
<tr>
<td>1942 Cancelled</td>
</tr>
<tr>
<td>1946 (2nd World War)</td>
</tr>
<tr>
<td>1950 Brazil</td>
</tr>
<tr>
<td>1954 Switzerland</td>
</tr>
<tr>
<td>1958 Sweden</td>
</tr>
<tr>
<td>1962 Chile</td>
</tr>
<tr>
<td>1966 England, Willie</td>
</tr>
<tr>
<td>1970 Mexico, Juanito</td>
</tr>
<tr>
<td>1974 West Germany, Tip and Tap</td>
</tr>
<tr>
<td>1978 Argentina, Gauchito</td>
</tr>
<tr>
<td>1982 Spain, Naranjito</td>
</tr>
<tr>
<td>1986 Mexico, Pique</td>
</tr>
<tr>
<td>1990 Italy, Ciao</td>
</tr>
<tr>
<td>1994 U.S.A, Striker</td>
</tr>
<tr>
<td>1998 France, Footix</td>
</tr>
<tr>
<td>2002 Japan and S. Korea, Atto, Kaz &amp; Nik</td>
</tr>
<tr>
<td>2006 Germany, Goleo</td>
</tr>
<tr>
<td>2010 South Africa, Zakamul</td>
</tr>
<tr>
<td>2014 Brazil, Fuleco</td>
</tr>
<tr>
<td>2018 Russia (Scheduled)</td>
</tr>
<tr>
<td>2022 Qatar (Scheduled)</td>
</tr>
</tbody>
</table>

> The measurements of the playground:
Length of the ground (Field)—91 to 120 metres
Width of the ground (Field)—45 to 91 metres
Weight of the ball—396 to 453 grams
Circumference of the ball—68 to 71 cm

Some important Terminologies of Football: Abbey, Dribble, Extra time, Full back, Halfback, Striker, Centre, Forward, Penalty kick, Free kick, Scissor Kick, Goal Kick, Direct Kick, Corner Kick, Referee, Tie breaker, Hat trick, Hand ball, Sweeper, Back, Throw in, Hand-ball (fault), Touch line, Place Kick or Kick off, Direct Free Kick, Indirect Free Kick, Tackle, Off side, Sliding Tackle, Drop Ball, Sudden death, Penalty shoot out etc.

20th FIFA World Cup Football—2014

Official Logo: Juntos num so ritmo (all in one rhythm)

Mascot—Fuleco

Started—June 12, 2014 in Sao Paulo (Brazil)
Final Match held—July 13, 2014 in Maracana, Rio de Janeiro (Brazil)
Winner—Germany
Runners up—Argentina
Third Position—Netherlands
Total—64 matches
Golden Ball Award Winner (for best player)—Lionel Messi (Argentina)
Golden Boot Award Winner (for top scorer)—James Rodriguez (Columbia)
Golden Glove Award Winner (for best goalkeeper)—Manuel Neuer (Germany)

Hockey

‘Blackheath Rugby and Hockey Club’ is the first hockey club in the world which was set up in the year 1861 in England.

London was the first city in England to popularize this game in the 1870s.

In the year 1886, Hockey Association of England was formed in London.

The apex institution of hockey is ‘Federation Internationale de Hockey’, established on January 7, 1924, with headquarters at Vienna (Austria) and later shifted to Paris (France). The first International Hockey Match was played between Wales and Ireland in Rayle on June 26, 1895.

Hockey was introduced in the Olympic games for the first time in 1908 in London.

Indian Hockey Federation (IHF) was formed on the 7th November, 1925 at Gwalior.

Since 1944, National Hockey Championship is organised by the I.H.F. every year.

All India Women’s Hockey Federation was formed in 1947.

India took that part in Olympics for the first time in 1928 (in Amsterdam Olympics).

In Olympics, India has won the hockey title a maximum of 8 times. The first World Cup Hockey was played in Barcelona in 1971.

<table>
<thead>
<tr>
<th>World Cup Hockey</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971 Barcelona, Pakistan, Spain, India</td>
</tr>
<tr>
<td>1972 Amsterdam, Holland, India, Second</td>
</tr>
</tbody>
</table>

Year, Place, Winner, Runners up, India’s position
Volleyball

- **Measurements (Volleyball)**: Length of the court - 18 metre, Width of the court - 9 metre, Weight of the ball - 250 to 260 grams, Circumference of the ball - 65 to 67 cm. Net - 1m (± 3 cm) wide and 9.5 m long. Net’s height - 2.43 m (for men) and 2.24 m (for women).
- **Ball’s internal pressure** - 0.40 - 0.45 Kg/cm².

Basketball

- **Measurements (Basketball)**: Length of the court - 28 metre, Width of the court - 15 metre, Height of the basket from ground - 3.05 metre, Weight of the ball - 600 to 650 grams.

Badminton

- **Measurements (Badminton)**: Length of the court - 44 feet, Width - 20 feet (for Doubles) and 17 feet (for Singles), Height of the net - 5 feet, Weight of the
Shuttle cock = 4.74 to 5.50 gram, Overall length of the Racket — 680 mm (23 ft.) maximum, Overall width of the Racket — 230 mm (9 inches) maximum, Overall length of the racket head — 290 mm (11.5 inches) maximum, Weight of the racket — between 85 to 140 grams.

**Terminology (Badminton)**: Badminton Court, End, Trans Lines, Back gallery, Service Court, Let, Forward Stroke, Backward Stroke, Toss or Lob, Clear, Smash, Net strokes, Rally, Setting, First hand or Second hand, Side out, Base of operation, Rotation, Long service, Net fault, Double fault, Foot Fault, Service break, Match point, Set point, High service, Cross shot, Service change, Drive, Drop shot, Duce, Advance etc.

**Lawn Tennis**

- Tennis was introduced by Major Wingfield in Wales in 1870.
- All England Championship (popularly known as Wimbledon Championship) started in 1877 for men only. Tennis competitions for women in Wimbledon Championship were introduced in 1884.

**Measurements (Tennis)**: Length of the court — 78 feet or 23.77 m (singles), Width of the court — 27 feet or 8.23 m (singles), 36 feet or 10.97 m (doubles), Height of the net — 3 feet (0.914 m), Weight of the ball — 56.0 to 59.4 gram, Maximum length of the frame of the racket — 32 inches (81.28 cm), Colour of the ball — white or yellow.


**Polo**

- Measurements (Polo): Length of the field — 300 yards, Width of the field — 150 yards, Distance between the goals — 250 yards, Distance between the goal posts — 8 yards.
- Terminology: Bunker, Chuker, Mallet etc.

**Wrestling**

- Measurements (Wrestling): In International Competitions there is a circular area with 9 metre diameter with circle in the centre of 1 metre diameter. Competitions played on a mattress, the mattress is 1:1 metre diameter high.
- Terminology: Heave, Half, Nelson, Rebutts, Hold sager etc.

**Chess**

- The number of squares on a chessboard: 64, Colour of the squares — White and black, Number of same colour Chess - 16
- Terminology: Bishop, Gambit, Checkmate, Stalemate, Pawn, Grandmaster etc.

**Golf**

- Diameter of the hole: 4 inches
- Terminology: Bogie, Fore some, Stymie, T, Put hole, Nib lick, Caddy, Limns, Iron, Putting, The green, Bunker etc.

**Water Polo**

- The length and width of the field: 30 X 20 yards
- Terminology: 2 metre line, 4 metre line, Goal line, Caps, Personal, Fault, Ball under etc.

---

**Baseball**

- The distance of each base is 90 feet, The distance of the base along with its hypotenuse — 127 feet
- Terminology: Home, Diamond, Pitcher, Put out, Home run, Strike, Ant rubber etc.

**Billiards**

- Terminology: Cue, Jigger, Pot, Break Pot, In luck, In off, Cans, Bolting, Hazard, Long etc.

**Rifle Shooting**

- Terminology: Target, Bulls eye, Muzzle flub etc.

**Kho-Kho**

- Terminology: Chasers, Active Chaser, Runners, Diving, Taking a direction, To recede, Tapping, Trapping, Dupe turn, Late Kho, Giving Kho, Fake Kho etc.

**Swimming**

- Terminology: Crawl, Breast Stroke, Spring Board, Twist, Butterfly.

**Boxing**

- Length and width of the ring: Minimum 4.9X4.9 m² and maximum 6.10X6.10 m²
- Terminology: Punch, Upper cut, Round, Jab, Hook, Knock down, Knock out, Hitting willow, Ring, Break, Bell, Belt, Blow, Bounce, Bout.

**Marathon**

- The distance of the marathon run: 26 mile 385 yards or 42.195 km.

---

**Cups and Trophies (Associated with Sports/Games)**

<table>
<thead>
<tr>
<th>Sport</th>
<th>Cups and Trophies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hockey</strong></td>
<td>Aga Khan Cup, Begum Rasul Trophy (women's), Maharaja Ranjit Singh Gold Cup, Lady Ratan Tata Trophy (women's), Gurunanak Championship (women's), Dhyan Chand Trophy, Nehru Trophy, Sindia Gold Cup, Murugappa Gold Cup, Wellington Cup etc.</td>
</tr>
<tr>
<td><strong>Football</strong></td>
<td>Beghum Hazarat Malah Cup, BILT Cup, Bordoloi Trophy, Colombo Cup, Confederation Cup, D C M Trophy, Durand Cup, Rovers Cup, B.C. Rai Trophy (National Championship), FIFA World Cup, Jules Rimet Trophy, Kalinga Cup, Santosh Trophy (National Championship), IFA Shield, Scissor Cup, Subroto Mukerjee Cup, Sir Ashutosh Mukerjee Trophy, Toda Memorial Trophy, Vittal Trophy, etc.</td>
</tr>
</tbody>
</table>
| **Cricket**| Anthony D'Mellow Trophy, Ashes, Asia Cup, Benson and Hedges Cup, Bose Trophy, Champions Trophy, Charminar Challenger Cup, C.K. Naidu Trophy, Coch - Behar Trophy, Doedtman Trophy, Duleep Trophy, Gavaskar - Border Trophy, G.D. Birla Trophy, Gillette Cup, Ghalam Ahmed Trophy, Hakumat Rai Trophy, ICC World Cup, Irani Trophy, Interface Cup, Jawaharlal Nehru Cup, Lomboard World Challenge Cup, Mc Dowells Challenge Cup, Merchant Cup, Moin - ud - Dowla Cup, Nat West Trophy, Prudential Cup, Rotmans Cup, Sahara Cup, Sharjah Cup, Sheesh Mahal Trophy, Sheffield Shield, Singer Cup, Sir Frank Worrell Trophy, Texaco Cup, Titan Cup, Vijay Shield, Singer Cup, Sir Frank Worrell Trophy, Texaco Cup, Titan Cup, Vijay Shield, Singer Cup, Sir Frank Worrell Trophy, Texaco Cup, Titan Cup, Vijay Shield, Singer Cup, Sir Frank Worrell Trophy, Texaco Cup, Titan Cup, Vijay Shield, Singer Cup, Sir Frank Worrell Trophy, Texaco Cup, Titan Cup, Vijay
**Cups and Trophies**

**Table Tennis**
Bena Bellack Cup (men), Corbillion Cup (women), Jai Laxmi Cup (women), Rajkumar Challenge Cup (women junior), Ramjam Trophy (men junior), Travancore Cup (women), Swathilingam Cup (men etc).

**Badminton**
Agarwal Cup, Amit-Diwan Cup, Asia Cup, Australasia Cup, Chaddha Cup, European Cup, Harilela Cup, Ibrahim Rahmatullah Challenge Cup, Konica Cup, Narang Cup, S.R. Rasi Cup, Sophia Cup, Kittakara Cup, Thomas Cup, Tunku Abdulrahman Cup, Uber Cup, World Cup, Yonex Cup etc.

**Basketball**
Balashah Jha Trophy, B.C. Gupta Trophy, Federation Cup, S.M. Arjuna Raja Trophy, Todd Memorial Trophy, William Jones Cup, Bangalore Blues Challenge Cup, Nehru Cup, Federation Cup.

**Bridge**
Balashah Jha Trophy, Holkar Trophy, Ruia Gold Cup, Singshonia Trophy etc.

**Polo**
Eria Cup, Gold Cup, King's Cup, Prithi Pratim Singh Cup, Radha Mohan Cup, Winchester Cup etc.

**Athletics**
Charminar Trophy, Federation Cup etc.

**Air Racing**
Jawaharlal Challenge Trophy, King's Cup, Schneider Cup

**Billiards**
Arthur Walker Trophy, Thomas Cup etc.

**Boxing**
Aspy Adhia Trophy, Federation Cup, Val Baker Trophy etc.

**Golf**
Canada Cup, Eisenhower Trophy, Muthiah Gold Cup, Nomura Trophy, President's Trophy, Prince of Wales Cup, Ryder Cup, Solomon Cup, Topolino Trophy, Walker Cup, World Cup etc.

**Chess**
Naidu Trophy, Khaitan Trophy, Lin Aec City Trophy, World Cup etc.

**Horse Racing**
Beresford Cup, Blue Riband Cup, Derby, Grand National Cup etc.

**Netball**
Ananta Pawan Trophy etc.

**Rugby Football**
Bledowl Cyp, Calcutta Cup, Webb Ellis Trophy etc.

**Squash**
North Wales Cup, Welsh Grand Prix etc.

**Volleyball**
Centennial Cup, Federation Cup, Indira Pradhan Trophy, Shivanthi Gold Cup etc.

**Yachting**
America Cup etc.

Famous Stadia and Sports

> Government of India has recently constituted “National Playing Fields Association of India (NPFAI)” under an ambitious scheme of “Kendriya Yuva Karya Evam Khel Mantralay” to cater to the development of Games & Sports and the players as well.

**National Games and Sports of Some Countries**

<table>
<thead>
<tr>
<th>Country</th>
<th>Sports</th>
<th>Country</th>
<th>Sports</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States of America</td>
<td>Baseball</td>
<td>England</td>
<td>Cricket</td>
</tr>
<tr>
<td>Spain</td>
<td>Ice Hockey</td>
<td>Australia</td>
<td>Cricket</td>
</tr>
<tr>
<td>Canada</td>
<td>Hockey</td>
<td>Pakistan</td>
<td>Hockey</td>
</tr>
<tr>
<td>India</td>
<td>Chess</td>
<td>China</td>
<td>Table Tennis</td>
</tr>
<tr>
<td>Russia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scotland</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Court, Campus or Field Associated with Sports**

<table>
<thead>
<tr>
<th>Court/Campus/Field</th>
<th>Games / Sports</th>
<th>Court/Campus/Field</th>
<th>Games / Sports</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>Indoor Games</td>
<td>Diamond</td>
<td>Baseball</td>
</tr>
<tr>
<td>Jawaharlal Nehru Stadium</td>
<td>Athletics</td>
<td>Athletics</td>
<td>Athletics</td>
</tr>
<tr>
<td>Ferozeshah Kotla</td>
<td>Cricket</td>
<td>Track</td>
<td>Athletics</td>
</tr>
<tr>
<td>Jindarashtra Stadium</td>
<td>Football</td>
<td>Pitch</td>
<td>Cricket</td>
</tr>
<tr>
<td>Ambedkar Stadium</td>
<td>Hockey</td>
<td>Greens</td>
<td>Bowls</td>
</tr>
<tr>
<td>Shivaji Stadium</td>
<td>Hockey</td>
<td>Curling, Ice Hockey</td>
<td></td>
</tr>
<tr>
<td>National Stadium</td>
<td>Hockey &amp; others</td>
<td>Shooting, Archery</td>
<td></td>
</tr>
<tr>
<td>National Stadium</td>
<td>Cricket</td>
<td>Cycling</td>
<td></td>
</tr>
<tr>
<td>Wankhede Stadium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mumbai</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Number of Players in Some Popular Sports/Games

<table>
<thead>
<tr>
<th>Sports</th>
<th>Number of Players (on each side or in each team)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseball</td>
<td>9</td>
</tr>
<tr>
<td>Rugby football</td>
<td>15</td>
</tr>
<tr>
<td>Polo</td>
<td>4</td>
</tr>
<tr>
<td>Water polo</td>
<td>7</td>
</tr>
<tr>
<td>Kho Kho</td>
<td>9</td>
</tr>
<tr>
<td>Kabaddi</td>
<td>7</td>
</tr>
<tr>
<td>Hockey, Football and Cricket</td>
<td>11</td>
</tr>
<tr>
<td>Netball</td>
<td>7</td>
</tr>
<tr>
<td>Volleyball</td>
<td>6</td>
</tr>
<tr>
<td>Badminton, Tennis and Table tennis</td>
<td>1 or 2 (Singles &amp; Doubles respectively)</td>
</tr>
<tr>
<td>Basketball</td>
<td>5</td>
</tr>
<tr>
<td>Gymnastics</td>
<td>Several individuals compete simultaneously</td>
</tr>
<tr>
<td>Billiards / Snooker</td>
<td>1</td>
</tr>
<tr>
<td>Boxing / Chess</td>
<td>1</td>
</tr>
<tr>
<td>Bridge</td>
<td>2</td>
</tr>
<tr>
<td>Croquet</td>
<td>13 or 15</td>
</tr>
<tr>
<td>Golf</td>
<td>Several individuals compete simultaneously</td>
</tr>
<tr>
<td>Lacrosse</td>
<td>12</td>
</tr>
</tbody>
</table>

### 50. National Parks (Established after, 1998)

<table>
<thead>
<tr>
<th>Name</th>
<th>State</th>
<th>Estd. Year</th>
<th>Popular Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balphakram National Park</td>
<td>Meghalaya</td>
<td>2013</td>
<td>Wild water buffalo, Red panda, Elephant and eight cat species, Tiger and Marbled cat</td>
</tr>
<tr>
<td>Chandoli National Park</td>
<td>Maharashtra</td>
<td>2004</td>
<td>Bengal Tiger, Indian leopard, Indian bison, Sloth bear, Indian giant squirrels, Barking deer</td>
</tr>
<tr>
<td>Jaldapara National Park</td>
<td>West Bengal</td>
<td>2012</td>
<td>Indian one horned Rhinoceros, Leopard, Hog deer, Wild pigs, Bison, Sambhar, Barking deer</td>
</tr>
<tr>
<td>Kalesar National Park</td>
<td>Haryana</td>
<td>2003</td>
<td>Wildboar, Sambhar, Hare, Red jungle Fowl, Chital, Parcupine</td>
</tr>
<tr>
<td>Mathikettan Shola National Park</td>
<td>Kerala</td>
<td>2003</td>
<td>Elephant</td>
</tr>
<tr>
<td>Mukurthi National Park</td>
<td>Tamil Nadu</td>
<td>2001</td>
<td>Nilgiri tahr, Indian Elephant, Bengal Tiger, Nilgiri Langur</td>
</tr>
<tr>
<td>Orang National Park</td>
<td>Assam</td>
<td>1999</td>
<td>Royal Bengal Tiger, One horned rhinoceros, Asiatic Elephant, Pygmydog, Wild bear, Hog deer</td>
</tr>
<tr>
<td>Papikonda National Park</td>
<td>Andhra Pradesh</td>
<td>2008</td>
<td>Tiger, Leopard, Sambhar, Spotted deer, Bison</td>
</tr>
</tbody>
</table>

### COMPUTER

**Introduction**

- The era of 20th and 21st century has witnessed rapid developments in science and technology influencing every aspect of human life. One of the greatest things that man has ever created is, perhaps, 'the Computer'. The computer is truly an amazing machine. Computer is being used in areas of administration, medicine, education, sports, defense, shops, home, markets and many more. Computer and Information Technology (IT), in recent years, has become an integral part of our life. We can see it almost everywhere.

- A computer is an electronic machine that helps to process data. It is used to solve problems relating to almost all fields such as education, home, medicine, science and technology, research, designing, publishing, communication etc.

- A computer is an information-processing and information-accessing tool. This means that a computer accepts some information or data from the outside world. It processes it to produce a new information.

- Information processing is the essence of computing.

- Meaning of Computer: The word computer has derived from an English word 'Compute', which means 'to calculate'.

- Computer is an electronic device which processes the input informations according to the given set of instructions, called program.

- Blaise Pascal had developed the first mechanical calculator in 1642 AD, which is called 'Pascaline'.

- British scientist Charles Babbage was the first person to conceive an automatic calculator or a computer in 1833. He is called the 'Father of modern computer'.

- The credit of developing first computer program goes to Ada Ada Augusta, a student of Babbage.

- Herman Hollerith prepared an electronic tabulating machine in 1890, which was automatically functional with the help of Punch Card.

- Howard Ekin developed the first Mechanical Computer 'Mark - I' in 1937.

- J.P. Eckert and John Moschley invented world's first electronic computer 'ENIAC-I' in 1946 and paved the way for first revolution in the field of calculating machine or computer. Electronic Valve or Vacuum Tube was used as a switch in the computer.

- John Van Newman invented EDVAC (Electronic Discrete Variable Computer) in 1951, in which he used Stored Program. The credit of using Binary System in computers also goes to him. Indeed Mr. Newman contributed most in the development of computer and thus gave a right direction to the Computer Revolution (Second Revolution).

### Five Generations of Computer

<table>
<thead>
<tr>
<th>Generation</th>
<th>Period</th>
<th>Main Electronic components</th>
<th>Main Computers</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1940-52</td>
<td>Electronic Valve Vacuum Tube</td>
<td>EDAC, EDVAC, UNIVAC</td>
</tr>
<tr>
<td>II</td>
<td>1952-64</td>
<td>Transistor</td>
<td>IBM-700, IBM-1401, IBM-1620, CDC-1604, CDC-3600, ATLAS, ICL-1901</td>
</tr>
</tbody>
</table>
Some Important Facts related to Computers

- December 2 is observed as Computer Literacy Day.
- India has announced New Computer Policy in 1984.
- First computer (made in India) is ‘Siddharth’, which was manufactured by Electronics Corporation of India.
- First computer in India was installed in the Main Post Office of Bangalore on August 16, 1986.
- First Pollution Free Computerized Petrol Pump of India is in Mumbai.
- First Computer University (in Private Sector) in India is Rajeev Gandhi Computer University.
- Bangalore (now Bengaluru) is also known as the Silicon Valley of India.
- First Indian News Paper to be available on Internet is ‘The Hindu’.
- First Indian magazine to be available on Internet is ‘India Today’.

Programming Languages of different generations

<table>
<thead>
<tr>
<th>Generation</th>
<th>Languages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Generation</td>
<td>FORTRAN - i</td>
</tr>
<tr>
<td>2nd Generation</td>
<td>FORTRAN-II, ALGOL - 60, COBOL, LISP</td>
</tr>
<tr>
<td>3rd Generation</td>
<td>PL/I, ALGOL - W, ALGOL - 68, SIMULA - 67, APL, SNOBOL, 4 BASIC, C</td>
</tr>
<tr>
<td>4th Generation</td>
<td>CLUE, ALFARD, UCILID, Reformed Pascal, MODULA, EDA, ORACLE</td>
</tr>
<tr>
<td>5th Generation</td>
<td>Artificial Intelligence Languages</td>
</tr>
</tbody>
</table>

Super Computers developed in India

<table>
<thead>
<tr>
<th>Name</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLO SOLVER</td>
<td>NAL, Bangalore</td>
</tr>
<tr>
<td>PACE</td>
<td>DRDO</td>
</tr>
<tr>
<td>PARAM-10000</td>
<td>C - DAC, Pune</td>
</tr>
<tr>
<td>CHIP-16</td>
<td>C-Dot, Bangalore</td>
</tr>
<tr>
<td>MULTIMICRO</td>
<td>IIS, Bangalore</td>
</tr>
<tr>
<td>MACH</td>
<td>IIT, Bombay</td>
</tr>
</tbody>
</table>

First Indian political party which has created its website on internet is ‘Bharatiya Janata Party (BJP)’.
Mainly there are three types of Computer, Digital, Analog and Hybrid.
First Super Computer of the world is CRAY K-1-S, developed by Cray K Company of U.S.A.
‘Deep Blue’ is a Super Computer which had defeated World Chess Champion Garry Kasparov. This Super Computer is able to do the work equivalent to the work of 32 computers and can think 30 crore steps of chess in 1 second.
First Electronic Digital Computer of the world is ‘ENIAC’.
Most popular Operating System in the world is WINDOWS.
First book on Personal Computer was written by Ted Nelson.
The first magazine on Computer is ‘Computer and Automation’.
The first home Computer is Comodor VIC / 20.
The first Practical Digital computer is UNIVAC.
FORTRAN is the first Programming Language.
PROLOG is the language of the fifth generation of computer.
J.S. Kilbi developed the IC chips.
A computer error is known as Bug.
C-DAC (Centre for Development and Advanced Computing) was established in Pune in 1988.
Super computer PARAM - 10000, having the capacity of 1 billion calculations per second, was made by the scientists of C - DAC of Pune on March 28, 1998. The main credit for the development of the PARAM-10000 goes to Dr. Vijay P. Bhaskar, Executive Director of C-DAC, Pune.
National Aeronautics Laboratories, Bangalore was the first in India to develop a Super Computer named FLO SOLVER.
Laser Printers are the fastest printers.
IBM (International Business Machine) is an American computer company.
Computer virus is a man made digital parasite, which corrupts (infests) the file and known as ‘File corrupter’.
Modem is a device which connects the computer and works based on telephone lines.
Y-2K was a technical problem, associated with the calendar (Date, Month and Year) known as ‘Millenium Bug’.
The development of computer started in India since 1955.
Indian Institute of Science, Bangalore has developed ‘Simputer’, which is a small palm sized touch screen computer.
A computer is organized into three basic units:

1. The Central Processing Unit (CPU) generates the AND, OR, and NOT logic gates. The CPU is made up of two or more logic gates. Logic gates are components that can perform logical operations on bits and can serve as basic units of information processing. The CPU is responsible for executing instructions and performing calculations.

2. The Memory Unit (MU) is the part of the computer that stores data and program instructions. Memory is typically organized into smaller units called bytes, with each byte containing 8 bits. The memory unit is essential for storing both data and software programs.

3. The Input/Output Unit (I/O) manages the flow of data between the computer and the outside world. It includes devices such as keyboards, monitors, and printers. The I/O unit is responsible for converting data from the computer's internal format to the format expected by devices or users.

The internal circuits of a computer are organized into logic gates, which are the basic building blocks of digital electronics. Logic gates are used to perform basic logical operations such as AND, OR, and NOT. By combining these gates, complex operations can be performed, allowing the computer to process data and instructions.

Binary numbers are used in digital electronics to represent data and instructions. A binary number is a number expressed in base 2, which uses only two symbols: 0 and 1. These symbols correspond to the two states of a logic gate: ON (1) and OFF (0). By using combinations of these states, computers can represent and process information.

Silicon is an essential material for the construction of digital electronics. It is used to create the components that make up logic gates and other electronic devices. The semiconductor properties of silicon allow it to be used as the basis for manufacturing transistors and other components that are crucial to the operation of computers.

Units of Data Measurement:

- **Bit**: The basic unit of information, representing a single binary digit (0 or 1).
- **Byte**: A group of 8 bits, used to represent a single character or small piece of data.
- **Kilobyte (KB)**: 1024 bytes.
- **Megabyte (MB)**: 1024 kilobytes.
- **Gigabyte (GB)**: 1024 megabytes.
- **Terabyte (TB)**: 1024 gigabytes.

The power of two closest to a kilobyte (1000 bytes) is 1024 bytes, which is called 1 kilobyte (KB). A gigabyte refers to 1024 megabytes, or approximately 1000 kilobytes.
1. Central Processing Unit (CPU)

The CPU is the heart of a computer that performs the main function of information processing. The memory unit stores data. The computer supplies processed information back to the users using special output devices.

- The Central Processing Unit or CPU is the most important part of the computer. It is called the brain of the computer. It makes all the required calculations and processes data.
- The CPU can be divided into three main components: (a) ALU, (b) CU and (c) Registers.

(a) The Arithmetic and Logic Unit (ALU): ALU performs all the mathematical and logical operations on the information supplied to the CPU.

(b) Control Unit (CU): This unit directs the working of the CPU. It fetches instructions (Programs) from the memory and according to the instructions, controls the flow of data between the ALU and other parts of the computer.

(c) Registers: Registers are storage locations that hold instructions or data while the CPU is using them. The registers consist of flip-flops and the registers used by the CPU are the fastest memory elements in the computer. In contrast, the memory unit holds instructions and data before or after the CPU processes these.

Main attributes of CPU

(a) Data Width: It refers to the number of bits of data that can be manipulated within the CPU at one given time.
- The data width of a computer is also called its word size.
- Computers have data widths ranging from 8 to 64 bits.
- A higher data width means the CPU is capable of processing data faster. A CPU with a higher data width is more powerful.

(b) Address Range: Address range refers to the amount of memory that can be directly read or written by the CPU.

(c) Clock Speed: The speed of CPU is known as Clock Speed. The computer is essentially composed of tiny devices that can be put on or off to indicate 1 or 0.
- At any moment several thousand such devices change their state. To synchronize the change of all these components the CPU uses an internal clock.
- With every tick of this clock all switches that need to change their position do so in perfect harmony.
- The larger the number of ticks per second the faster is the speed of the CPU.
- The ticks per second of the internal clock are measured in megahertz and gigahertz.
- Hertz is a unit of frequency.
- 1 MHz = 1 million 'ticks' per second, 1 GHz = 1000 MHz
- Higher the clock-speed, faster the computer.

2. Memory Unit (MU)

The memory unit stores all instructions and data for the CPU. Memory Unit is an important part of the computer system. The storage device of a computer system is known as memory. Memory Unit can receive data, hold it and deliver according to the instructions from the control unit.

- Memory is of two kinds: (a) Primary and (b) Secondary.

(a) Primary Memory: It is often referred to as the working memory or the main memory of a computer system. It is capable of sending and receiving data at a very high speed. It is temporary in nature i.e., Data stored in primary memory are lost when the computer is switched off. So it is also called volatile memory. Example of primary memory is RAM.

- Primary memory is directly accessible to the CPU. It must be able to provide data very quickly.
- The two basic kinds of primary memory are the Random Access Memory (RAM) and the Read Only Memory (ROM).

- The RAM is a read/write memory.
- The CPU can change the contents of the RAM at any time. In addition, RAM is volatile.
- The RAM capacity greatly influences the computing ability of the computer. Capacity is usually measured in kilobytes and megabytes.
- The ROM can not be altered.
- Informations are stored on the ROM at the time of its manufacture. The information might be in the form of crucial instructions that govern the working of the computer.
- The ROM is non-volatile and retains its information even after the power is turned off.
- The PROM (Programmable Read Only Memory), however, has the option of being programmed, i.e., the manufacturer of the computer may choose to load a program designed by his company into this PROM, and then the computer would use this PROM like any other ROM.

(b) Secondary Memory: It is used to store data for a long term. It operates at a much slower rate than primary memory. Secondary memory is permanent in nature, so it is also called non-volatile. It is also cheaper than primary memory. Examples of secondary memory are floppy disks, hard disks, magnetic tapes etc.

- Primary memory is fast but expensive. To reduce storage costs, computers also use secondary memory.
- It is not directly accessible to the CPU. Information is moved from the secondary memory to the primary memory first and then to the CPU.

- Common examples of secondary memory are floppy diskettes, hard (fixed) discs and magnetic tapes.
- A floppy diskette is a plastic disk coated with magnetic material.
- Special devices known as disk drives are capable of reading from and writing to floppies using special magnetic 'head'.
- Any piece of information stored on a floppy diskette can be directly accessed.
- Magnetic tapes are long plastic tapes coated with magnetic material.
Bar codes are often imprinted on products in merchandise stores. A bar code consists of several parallel vertical lines of different thickness that represent the binary digits.

The bits form a code that can be used to identify the object on which the bar code is imprinted. A bar code reader is used to read the bar codes by detecting the bars by using light.

The bar code can represent information like the price of the product or its date of expiry etc.

Menu-driven programs, where the user sees the host of on-screen choices, sometimes use another input devices called the mouse.

The mouse is a pointing device. It can be gripped in the palm of the hand and moved over a horizontal surface. The motion of the mouse can be monitored by the computer in different ways.

The movement is measured and transmitted to the computer. This generates a corresponding movement of an on-screen marker called a cursor from one option to another.

To select an option, the user presses one of the mouse’s buttons.

Another, input device is a digital camera. A digital camera has a circuit that is sensitive to light.

The two most common devices are the Visual Display Unit (VDU) and the printer.

A Visual Display Unit (VDU) uses a cathode ray tube to display informations.

To represent any character, VDU illuminates a particular pattern of these dots. These dots are also known as pixels, a short form for picture - elements.

Printers print characters on paper or other similar medium.

Printers come in three popular versions : dot matrix printers, ink-jet printers and laser printers.

Dot matrix printers print characters in the form of combinations of very tiny dots. The printing head aligns its 'pins' to match a particular pattern of dots.

Ink-jet printers spray jets of ink on to the paper to print any character. The characters are absolutely smooth as ink is sprayed in a continuous flow.

Laser printer, uses a laser beam to actually 'burn' the characters on to the paper.

We need to issue the computer a detailed sequence of instructions that it needs to follow to operate upon any data. Such a sequence is called a program.

A program may directly be written to the RAM or may be stored in some form of secondary memory.

It may be transferred from the secondary memory to the RAM as and when required.

Execution of a program means that data is moved around in the CPU according to a well-detailed sequence by the programme.

Computer programs are written using special languages called programming languages.

There are several programming languages. Each language has its own 'grammar' called its syntax.
Types of Programming Languages

- Machine language and the assembly language are examples of low-level languages.
- A special program called Assembler converts all instructions into the binary format.
- Because all such instructions must finally be converted to the binary form, all high-level languages have their own translation programs called compilers or interpreters.
- Examples of popular high-level languages are C, C++, JAVA, Pascal, Fortran etc.

Software

- Software relates to the set of programs. The software controls the computer hardware parts and makes them operational. In other words, it governs the operations of a computer system.
- Software is a general term used for all computer programs. This distinguishes programs from the physical components of the computer, which are collectively called the hardware.
- Software is generally divided into two kinds of programs: Application programs and System’s programs.
- Application programs are programs that permit the computer to be used as a tool for some specific tasks.
- A common term used for special text editors is word processors.
- Another popular type of application programs is the Database Management Systems (DBMS).
- The most important system’s program is an operating system.
- Operating systems help users interact with the computer.
- Unix, MS - DOS, Linux, Windows, Mac OS are some of the most popular operating systems used by contemporary computers.

<table>
<thead>
<tr>
<th>Short Cut Keys</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ctrl + A</td>
<td>Select All</td>
</tr>
<tr>
<td>Ctrl + B</td>
<td>Bold</td>
</tr>
<tr>
<td>Ctrl + C</td>
<td>Copy</td>
</tr>
<tr>
<td>Ctrl + D</td>
<td>Font Dialogue Box</td>
</tr>
<tr>
<td>Ctrl + E</td>
<td>Centre Alignment</td>
</tr>
<tr>
<td>Ctrl + I</td>
<td>Italics</td>
</tr>
<tr>
<td>Ctrl + J</td>
<td>Justified Alignment</td>
</tr>
<tr>
<td>Ctrl + L</td>
<td>Left Alignment</td>
</tr>
<tr>
<td>Ctrl + N</td>
<td>Opens New blank document</td>
</tr>
<tr>
<td>Ctrl + O</td>
<td>Opens existing document</td>
</tr>
<tr>
<td>Ctrl + R</td>
<td>Right Alignment</td>
</tr>
<tr>
<td>PrtScn</td>
<td>Print screen/ Take a screen shot</td>
</tr>
<tr>
<td>Alt + Tab</td>
<td>Switch to next opened program</td>
</tr>
</tbody>
</table>

Important Keyboard Shortcuts (Commands)

<table>
<thead>
<tr>
<th>Short Cut Keys</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ctrl + Y</td>
<td>Redo</td>
</tr>
<tr>
<td>Ctrl + Z</td>
<td>Undo</td>
</tr>
<tr>
<td>Ctrl + W</td>
<td>Close File</td>
</tr>
<tr>
<td>Ctrl + X</td>
<td>Cut</td>
</tr>
<tr>
<td>Ctrl + F2</td>
<td>Print Preview</td>
</tr>
<tr>
<td>F1</td>
<td>Help</td>
</tr>
<tr>
<td>F2</td>
<td>Edit/Rename</td>
</tr>
<tr>
<td>F4</td>
<td>Properties</td>
</tr>
<tr>
<td>F5</td>
<td>Go to</td>
</tr>
<tr>
<td>F7</td>
<td>Spell Check</td>
</tr>
<tr>
<td>F12</td>
<td>Save As</td>
</tr>
<tr>
<td>ESC</td>
<td>Escape</td>
</tr>
<tr>
<td>Ctrl + S</td>
<td>Save</td>
</tr>
</tbody>
</table>

Glossary

- Active Cell: The cell in MS Excel with dark boundary is called the active cell.
- ALU: It stands for Arithmetic Logic Unit. All calculations in computer are done here.
- Application Software: It is designed to perform some specific applications such as payroll, word processing, graphics etc.
- Batch Processing: Data are processed in a batch.
- BIOS: It stands for Basic Input Output System. This program is stored in ROM.
- Bit: It is the short form of Binary Digit.
- Boot Loader: It reads the main portion of the operating system from secondary memory.
- Byte: One byte is a collection of 8 bits.
- Cell: Cells are boxes created by the intersection of rows and columns.
- Cell Pointer: The boundary of active cell is called cell pointer.
- Copyright: It means the material and information are the personal property of the owner or producer.
- Counterfeiting: It is a process of making and distributing illegal copies of software packages.
- Cracker: A cracker is a person who breaks into a computer system to steal the information as programs for unauthorized use.
- CU: It stands for Control Unit. It controls the computer system.
- Data: Data are raw facts and figures.
- Database: It is a collection of files. Data remains in an organized form in a database.
- Data Capture: It is a process of collecting or capturing data from a site or a source.
- Data Manipulation: Captured data are manipulated to produce information.
- Data processing: It is the process to get meaningful information from data.
- DBMS: It stands for Database Management System. It is a software package to manage database.
- DHTML: It stands for Dynamic Hyper Text Markup Language. It is used to create dynamic content on web pages.
- Dial Up Networking: It is the method by which a computer is connected to the Internet using telephone.
- DOS: It stands for Disk Operating System. It is an operating system.
- Ethics: Ethics are rules and beliefs.
- Fields: A field in database is a collection of bytes that contain data about an item.
Some Memorable Facts

- A computer is a data processing machine.
- It has two main parts: hardware and software.
- Hardware comprises of the physical units of a computer system.
- Software is a set of programs.
- Both hardware and software together make a computer system functional.
- Data are raw facts and figures.
- An operating system is an interface between the user and the computer hardware.
- An operating system manages computer resources.
- An operating system performs different functions.
- An operating system is responsible for process management, file management, etc.
- There are many kinds of operating systems.
- Some popular operating systems are DOS, UNIX, Windows, LINUX, Mac OS, etc.
- The Windows Explorer program is more efficient for viewing folders in Windows.
- Windows Explorer is divided vertically into two parts or two panes.
- The left side pane displays disk drives and folders in a hierarchical order.
- The right pane displays the contents of the folder/drive that is selected on the left side pane.
- The process of linking text values in a series within a formula is called 'concatenation'.
- The computer is a data processing machine.
- Data processing involves some activities like data computing, data manipulation, and information management.
- A database is a collection of interrelated data.
- Computers are very useful for maintaining databases.
- A relational database is a collection of data items organized as a set of formally described tables from which data can be accessed or reassembled in many different ways without having to reorganize the database tables.
- MS Access is a powerful program to create and manage our databases.
- A table is a collection of data about a specific topic.
- A form is a graphical representation of a table.
- A report is a presentation of data in a printed format.
- We can create mailing labels for your database using MS Access.
- Internet is the network of computer networks with millions of computers attached to it.
- Websites are files in servers, which are powerful computers.
- Websites contain pages called Web Pages.
- The collection of all websites is called World Wide Web or WWW.
- Hyper text was first coined by Ted Nelson in 1960s.
HTML is a markup language. It is used to create Web Pages. It uses commands called Tags.

Text editors are used to compose HTML documents. HTML documents are viewed in Web browsers.

In the Photoshop toolbox, the tools are grouped by type.

Some of the tool icons have a tiny black triangle in the lower - right corner of their icons. This means that there are more tools of the same general kind available on a pop-up menu.

Most Popular Mobile Operating System is Android, followed by iOS & Windows.

Versions of Android (old to now) are:
Cupcake → Donut → Eclairs → Froyo → Ginger Bread → Ice Cream Sandwich → Jelly Beam → Kit-kat → Lollipop.

Abbreviations associated with Computer

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDAC</td>
<td>Centre for Development of Advanced Parallel Computing</td>
</tr>
<tr>
<td>C-DOT</td>
<td>Centre for Development Of Telematics</td>
</tr>
<tr>
<td>HTTP</td>
<td>Hyper Text Transfer Protocol</td>
</tr>
<tr>
<td>ROM</td>
<td>Read Only Memory</td>
</tr>
<tr>
<td>RAM</td>
<td>Random Access Memory</td>
</tr>
<tr>
<td>BIOS</td>
<td>Basic Input-Output System</td>
</tr>
<tr>
<td>MODEM</td>
<td>Modulation-Demodulation</td>
</tr>
<tr>
<td>CAD</td>
<td>Computer Aided Design</td>
</tr>
<tr>
<td>PSTN</td>
<td>Public Switched Telephone Network</td>
</tr>
<tr>
<td>PSPDN</td>
<td>Packet Switched Public Data Network</td>
</tr>
<tr>
<td>RABMN</td>
<td>Remote Area Business Message Network</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
</tr>
<tr>
<td>WAN</td>
<td>Wide Area Network</td>
</tr>
<tr>
<td>MAN</td>
<td>Metropolitan Area Network</td>
</tr>
<tr>
<td>CDMA</td>
<td>Code Division Multiple Access</td>
</tr>
<tr>
<td>GAIS</td>
<td>Gateway Internet Access Service</td>
</tr>
<tr>
<td>E-Mail</td>
<td>Electronic Mail</td>
</tr>
<tr>
<td>CD</td>
<td>Compact Disc</td>
</tr>
<tr>
<td>LDU</td>
<td>Liquid Display Unit</td>
</tr>
<tr>
<td>CPU</td>
<td>Central Processing Unit</td>
</tr>
<tr>
<td>CAM</td>
<td>Computer Aided Manufacturing</td>
</tr>
<tr>
<td>CATScan</td>
<td>Computerised Axial Tomography Scan</td>
</tr>
<tr>
<td>COBOL</td>
<td>Common Business Oriented Language</td>
</tr>
<tr>
<td>COMAL</td>
<td>Common Algorithmic Language</td>
</tr>
<tr>
<td>DOS</td>
<td>Disc Operating System</td>
</tr>
<tr>
<td>DT5</td>
<td>Desk Top System</td>
</tr>
<tr>
<td>DTP</td>
<td>Desk Top Publishing</td>
</tr>
</tbody>
</table>

Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDAC</td>
<td>Centre for Development of Advanced Parallel Computing</td>
</tr>
<tr>
<td>C-DOT</td>
<td>Centre for Development Of Telematics</td>
</tr>
<tr>
<td>HTTP</td>
<td>Hyper Text Transfer Protocol</td>
</tr>
<tr>
<td>ROM</td>
<td>Read Only Memory</td>
</tr>
<tr>
<td>RAM</td>
<td>Random Access Memory</td>
</tr>
<tr>
<td>BIOS</td>
<td>Basic Input-Output System</td>
</tr>
<tr>
<td>MODEM</td>
<td>Modulation-Demodulation</td>
</tr>
<tr>
<td>CAD</td>
<td>Computer Aided Design</td>
</tr>
<tr>
<td>PSTN</td>
<td>Public Switched Telephone Network</td>
</tr>
<tr>
<td>PSPDN</td>
<td>Packet Switched Public Data Network</td>
</tr>
<tr>
<td>RABMN</td>
<td>Remote Area Business Message Network</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
</tr>
<tr>
<td>WAN</td>
<td>Wide Area Network</td>
</tr>
<tr>
<td>MAN</td>
<td>Metropolitan Area Network</td>
</tr>
<tr>
<td>CDMA</td>
<td>Code Division Multiple Access</td>
</tr>
<tr>
<td>GAIS</td>
<td>Gateway Internet Access Service</td>
</tr>
<tr>
<td>E-Mail</td>
<td>Electronic Mail</td>
</tr>
<tr>
<td>CD</td>
<td>Compact Disc</td>
</tr>
<tr>
<td>LDU</td>
<td>Liquid Display Unit</td>
</tr>
<tr>
<td>CPU</td>
<td>Central Processing Unit</td>
</tr>
<tr>
<td>CAM</td>
<td>Computer Aided Manufacturing</td>
</tr>
<tr>
<td>CATScan</td>
<td>Computerised Axial Tomography Scan</td>
</tr>
<tr>
<td>COBOL</td>
<td>Common Business Oriented Language</td>
</tr>
<tr>
<td>COMAL</td>
<td>Common Algorithmic Language</td>
</tr>
<tr>
<td>DOS</td>
<td>Disc Operating System</td>
</tr>
<tr>
<td>DT5</td>
<td>Desk Top System</td>
</tr>
<tr>
<td>DTP</td>
<td>Desk Top Publishing</td>
</tr>
<tr>
<td>F-Commerce</td>
<td>Electronic Commerce</td>
</tr>
<tr>
<td>ENIAC</td>
<td>Electronic Numerical Integrator And Calculator</td>
</tr>
<tr>
<td>FAX</td>
<td>Facsimile Automated Xerox</td>
</tr>
<tr>
<td>FLOPS</td>
<td>Floating Operations Per Second</td>
</tr>
<tr>
<td>FORTRAN</td>
<td>Formula Translation</td>
</tr>
<tr>
<td>HLL</td>
<td>High Level Language</td>
</tr>
<tr>
<td>HTML</td>
<td>Hyper Text Markup Language</td>
</tr>
<tr>
<td>IBM</td>
<td>International Business Machine</td>
</tr>
<tr>
<td>IC</td>
<td>Integrated Circuit</td>
</tr>
<tr>
<td>ISH</td>
<td>International Super Highway</td>
</tr>
<tr>
<td>LISP</td>
<td>List Processing</td>
</tr>
<tr>
<td>LLL</td>
<td>Low Level Language</td>
</tr>
<tr>
<td>MICR</td>
<td>Magnetic Ink Character Recognition/Reader</td>
</tr>
<tr>
<td>MIPS</td>
<td>Million Instructions Per Second</td>
</tr>
<tr>
<td>MOPS</td>
<td>Million Operations Per Second</td>
</tr>
<tr>
<td>MPU</td>
<td>Micro Processor Unit</td>
</tr>
<tr>
<td>NICNET</td>
<td>National Informatics Centre Network</td>
</tr>
<tr>
<td>OMR</td>
<td>Optical Mark Reader/Recognition</td>
</tr>
<tr>
<td>PC-DOS</td>
<td>Personal Computer Disk Operating System</td>
</tr>
<tr>
<td>PROM</td>
<td>Programmable Read Only Memory</td>
</tr>
<tr>
<td>SNOBOL</td>
<td>String Oriented symbolic Language</td>
</tr>
<tr>
<td>UPS</td>
<td>Uninterruptable Power Supply</td>
</tr>
<tr>
<td>VDU</td>
<td>Visual Display Unit</td>
</tr>
<tr>
<td>VLSI</td>
<td>Very Large Scale Integration</td>
</tr>
<tr>
<td>WWW</td>
<td>World Wide Web</td>
</tr>
</tbody>
</table>

Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVES</td>
<td>Acute Viral Encephalitic Syndrome</td>
</tr>
<tr>
<td>BCTT</td>
<td>Bank Cash Transaction Tax</td>
</tr>
<tr>
<td>BCSBI</td>
<td>Banking Codes and Standard Board of India</td>
</tr>
<tr>
<td>CIC</td>
<td>Central Information Commission</td>
</tr>
<tr>
<td>CSTO</td>
<td>Collective Security Treaty Organization</td>
</tr>
<tr>
<td>CNLU</td>
<td>Chanakya National Law University</td>
</tr>
<tr>
<td>DII</td>
<td>Direct to Home</td>
</tr>
<tr>
<td>DTH</td>
<td>Direct to Home</td>
</tr>
<tr>
<td>ECGC</td>
<td>Export Credit Guarantee Corporation</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
<tr>
<td>FII</td>
<td>Foreign Institutional Investor</td>
</tr>
<tr>
<td>GANDHI</td>
<td>Green Action for National Dandi Heritage Initiative</td>
</tr>
<tr>
<td>GUAM</td>
<td>Georgia, Ukraine, Azerbaijan and Moldova</td>
</tr>
<tr>
<td>GAGAN</td>
<td>GPS Aided Geo-Augmented Navigation</td>
</tr>
</tbody>
</table>
## Census of India 2011: Figures At A Glance

(Revised as per Final Population Totals)

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2011</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of States/UTs</td>
<td>35</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>No. of Districts</td>
<td>593</td>
<td>640</td>
<td></td>
</tr>
<tr>
<td>No. of Sub-Districts</td>
<td>5,463</td>
<td>5,924</td>
<td></td>
</tr>
<tr>
<td>No. of Towns</td>
<td>5,161</td>
<td>7,933</td>
<td></td>
</tr>
<tr>
<td>No. of Statutory Towns</td>
<td>3,799</td>
<td>4,041</td>
<td></td>
</tr>
<tr>
<td>No. of Census Towns</td>
<td>1,362</td>
<td>3,892</td>
<td></td>
</tr>
<tr>
<td>No. of Villages</td>
<td>6,38,588</td>
<td>6,40,930</td>
<td>2,342</td>
</tr>
</tbody>
</table>

### Total Population

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2011</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons</td>
<td>1,21,06,54,977</td>
<td>3,37,48,8852</td>
<td>37,16,06,125</td>
</tr>
<tr>
<td>Males</td>
<td>62,32,70,258</td>
<td>42,77,81,058</td>
<td>19,54,89,200</td>
</tr>
<tr>
<td>Females</td>
<td>58,75,84,719</td>
<td>4,59,67,794</td>
<td>18,16,16,925</td>
</tr>
</tbody>
</table>

### Decadal change 2001–2011

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2011</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons</td>
<td>18,19,59,458</td>
<td>9,09,73,022</td>
<td>9,09,86,436</td>
</tr>
<tr>
<td>Males</td>
<td>9,09,65,182</td>
<td>4,60,30,080</td>
<td>4,49,93,102</td>
</tr>
<tr>
<td>Females</td>
<td>9,09,94,276</td>
<td>4,49,42,942</td>
<td>4,60,51,334</td>
</tr>
</tbody>
</table>

### Sex Ratio

- Males: 943
- Females: 949

### Child Population in the Age Group 0-6 years

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2011</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons</td>
<td>16,45,15,253</td>
<td>12,13,22,865</td>
<td>4,31,92,388</td>
</tr>
<tr>
<td>Males</td>
<td>8,57,52,254</td>
<td>6,30,84,449</td>
<td>2,26,67,805</td>
</tr>
<tr>
<td>Females</td>
<td>7,87,62,999</td>
<td>5,82,38,416</td>
<td>2,05,24,583</td>
</tr>
</tbody>
</table>

### Literates

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2011</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons</td>
<td>76,36,38,812</td>
<td>48,27,93,363</td>
<td>28,08,44,977</td>
</tr>
<tr>
<td>Males</td>
<td>43,47,63,622</td>
<td>28,13,61,374</td>
<td>15,34,02,248</td>
</tr>
<tr>
<td>Females</td>
<td>32,88,75,190</td>
<td>20,14,32,461</td>
<td>12,74,42,729</td>
</tr>
</tbody>
</table>

### Literacy rate

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2011</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons</td>
<td>10,13,78,066</td>
<td>15,38,50,562</td>
<td>4,75,27,524</td>
</tr>
<tr>
<td>Males</td>
<td>10,35,35,165</td>
<td>7,91,19,138</td>
<td>2,44,17,027</td>
</tr>
<tr>
<td>Females</td>
<td>9,78,42,921</td>
<td>7,47,32,424</td>
<td>2,31,10,497</td>
</tr>
</tbody>
</table>

### Scheduled Caste Population

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2011</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons</td>
<td>20,13,78,066</td>
<td>15,38,50,562</td>
<td>4,75,27,524</td>
</tr>
<tr>
<td>Males</td>
<td>10,35,35,165</td>
<td>7,91,19,138</td>
<td>2,44,17,027</td>
</tr>
<tr>
<td>Females</td>
<td>9,78,42,921</td>
<td>7,47,32,424</td>
<td>2,31,10,497</td>
</tr>
</tbody>
</table>

### Scheduled Tribe Population

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2011</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons</td>
<td>10,42,81,034</td>
<td>9,38,19,162</td>
<td>1,04,61,872</td>
</tr>
<tr>
<td>Males</td>
<td>5,24,09,823</td>
<td>4,71,26,341</td>
<td>52,83,482</td>
</tr>
<tr>
<td>Females</td>
<td>5,18,71,211</td>
<td>4,66,92,821</td>
<td>51,78,390</td>
</tr>
</tbody>
</table>
### Lucent's General Knowledge

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>Rural</th>
<th>Urban</th>
<th>% of Total Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Persons</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>48,17,43,311</td>
<td>34,85,97,535</td>
<td>13,31,45,776</td>
<td>39.8</td>
</tr>
<tr>
<td>Work Participation Rate</td>
<td>39.8</td>
<td>41.8</td>
<td>35.3</td>
<td></td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td>33,18,65,930</td>
<td>22,67,63,068</td>
<td>10,51,02,862</td>
<td>53.3</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>14,98,77,381</td>
<td>12,18,34,467</td>
<td>2,80,42,914</td>
<td>25.5</td>
</tr>
<tr>
<td><strong>Main Workers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>36,25,65,571</td>
<td>24,58,68,421</td>
<td>11,66,97,150</td>
<td>75.2</td>
</tr>
<tr>
<td>Work Participation Rate</td>
<td>75.2</td>
<td>70.5</td>
<td>89.6</td>
<td></td>
</tr>
<tr>
<td><strong>Persons</strong></td>
<td>27,32,09,976</td>
<td>17,80,95,330</td>
<td>9,51,14,646</td>
<td>82.3</td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td>5,87,16,571</td>
<td>4,87,28,355</td>
<td>99,88,216</td>
<td>17.7</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>6,05,80,320</td>
<td>5,41,19,910</td>
<td>64,60,410</td>
<td>40.4</td>
</tr>
<tr>
<td><strong>Marginal Workers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>11,92,96,891</td>
<td>10,28,48,265</td>
<td>1,64,48,626</td>
<td>24.8</td>
</tr>
<tr>
<td>Work Participation Rate</td>
<td>24.8</td>
<td>29.5</td>
<td>12.4</td>
<td></td>
</tr>
<tr>
<td><strong>Persons</strong></td>
<td>5,87,16,571</td>
<td>4,87,28,355</td>
<td>99,88,216</td>
<td>17.7</td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td>6,05,80,320</td>
<td>5,41,19,910</td>
<td>64,60,410</td>
<td>40.4</td>
</tr>
<tr>
<td><strong>Marginal Workers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>9,70,44,107</td>
<td>8,30,31,670</td>
<td>1,40,12,437</td>
<td>81.3</td>
</tr>
<tr>
<td>Work Participation Rate</td>
<td>81.3</td>
<td>80.7</td>
<td>85.2</td>
<td></td>
</tr>
<tr>
<td><strong>Persons</strong></td>
<td>4,85,79,387</td>
<td>4,00,34,385</td>
<td>85,45,002</td>
<td>82.7</td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td>4,85,79,387</td>
<td>4,00,34,385</td>
<td>85,45,002</td>
<td>82.7</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>6,05,80,320</td>
<td>5,41,19,910</td>
<td>64,60,410</td>
<td>40.4</td>
</tr>
<tr>
<td><strong>Marginal Workers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>2,22,52,784</td>
<td>1,98,16,595</td>
<td>24,36,189</td>
<td>18.7</td>
</tr>
<tr>
<td>Work Participation Rate</td>
<td>18.7</td>
<td>19.3</td>
<td>14.8</td>
<td></td>
</tr>
<tr>
<td><strong>Persons</strong></td>
<td>1,01,37,184</td>
<td>86,93,970</td>
<td>14,43,214</td>
<td>17.3</td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td>1,01,37,184</td>
<td>86,93,970</td>
<td>14,43,214</td>
<td>17.3</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>1,21,15,600</td>
<td>1,11,22,625</td>
<td>99,29,975</td>
<td>20.0</td>
</tr>
<tr>
<td><strong>Total Cultivators</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>11,86,92,640</td>
<td>11,49,68,498</td>
<td>37,24,142</td>
<td>24.6</td>
</tr>
<tr>
<td>Work Participation Rate</td>
<td>24.6</td>
<td>33.0</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td><strong>Persons</strong></td>
<td>8,27,06,724</td>
<td>7,98,39,098</td>
<td>28,67,626</td>
<td>24.9</td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td>8,27,06,724</td>
<td>7,98,39,098</td>
<td>28,67,626</td>
<td>24.9</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>3,59,85,916</td>
<td>3,51,29,400</td>
<td>8,56,516</td>
<td>24.0</td>
</tr>
<tr>
<td><strong>Total Agricultural Labourers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>14,43,29,833</td>
<td>13,69,94,451</td>
<td>73,35,382</td>
<td>30.0</td>
</tr>
<tr>
<td>Work Participation Rate</td>
<td>30.0</td>
<td>39.3</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td><strong>Persons</strong></td>
<td>8,27,40,351</td>
<td>7,79,30,236</td>
<td>48,10,115</td>
<td>24.9</td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td>8,27,40,351</td>
<td>7,79,30,236</td>
<td>48,10,115</td>
<td>24.9</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>6,15,89,482</td>
<td>5,90,64,215</td>
<td>25,25,267</td>
<td>24.9</td>
</tr>
<tr>
<td><strong>Total Household Industry Workers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>1,83,36,307</td>
<td>1,19,47,619</td>
<td>63,88,688</td>
<td>3.8</td>
</tr>
<tr>
<td>Work Participation Rate</td>
<td>3.8</td>
<td>3.4</td>
<td>4.8</td>
<td></td>
</tr>
<tr>
<td><strong>Persons</strong></td>
<td>97,75,635</td>
<td>58,63,891</td>
<td>39,11,744</td>
<td>3.9</td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td>97,75,635</td>
<td>58,63,891</td>
<td>39,11,744</td>
<td>3.9</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>85,60,672</td>
<td>60,83,728</td>
<td>24,76,944</td>
<td>5.7</td>
</tr>
<tr>
<td><strong>Total Other Workers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>20,03,84,531</td>
<td>8,46,86,967</td>
<td>11,56,97,564</td>
<td>41.6</td>
</tr>
<tr>
<td>Work Participation Rate</td>
<td>41.6</td>
<td>24.3</td>
<td>86.9</td>
<td></td>
</tr>
<tr>
<td><strong>Persons</strong></td>
<td>15,66,43,220</td>
<td>6,51,29,843</td>
<td>9,35,13,377</td>
<td>47.2</td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td>15,66,43,220</td>
<td>6,51,29,843</td>
<td>9,35,13,377</td>
<td>47.2</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>4,37,41,311</td>
<td>2,15,57,124</td>
<td>2,21,84,187</td>
<td>29.2</td>
</tr>
</tbody>
</table>

*subject to revision.