



PRABHAT

# General KNOWLEDGE

(For All Competitive Examinations)

# 2020



## OIL REFINERIES

- There are 19 refineries in India, 16 in public sector, one in joint sector and two in private sector.

## ENERGY

- Power development commenced in India with the commissioning of electricity supply in Darjeeling during 1897, followed by a hydropower station at Sivasamudram in Karnataka during 1902.
- National Hydropower Corporation (NHPC) was set up in 1975.
- National Thermal Power Corporation (NTPC) was set up in 1975.
- Atomic Energy Institute at Trombay was set up in 1954 and then renamed as Bhabha Atomic Research Centre (BARC) in 1967.
- The first heavy water plant was set up in Nangal in 1962.
- The renewable energy programme started with the establishment of the Department of Non-Conventional Energy Sources in 1982. Indian Renewable Energy Development Agency was set up in 1987. In 1992; DNES was converted into Ministry of Non-conventional Energy Sources.

## SOURCES OF IRRIGATION IN INDIA

There are various sources of irrigation which are:

- Wells and Tubewells:** 46% of total irrigation.
- Canals:** 39% of total irrigation.
- Tanks:** 8% of total irrigation.
- Other sources:** 7% of total irrigation (Dongs, Kuhls, Springs etc.).

## POWER RESOURCES OF INDIA

India uses a large amount of fossil fuels as a source of energy alongwith a number of renewable sources of energy.

## NATIONAL HIGHWAYS

- National Highways is the responsibility of the central Government. These have about 96,214 km length, according to the survey

of India 2014-15 and comprise only 2% of the total traffic.

- The longest NH in India is 375 km long NH-44 (Srinagar – Kanyakumari).
- The new NH-44 is the combination of NH - 1A, 1, 2, 3, 7, 26 and NH - 75.
- It passes through 12 states: Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Delhi, Uttar Pradesh, Madhya Pradesh, Maharashtra, Telangana, Andhra Pradesh, Karnataka and Tamil Nadu.
- Earlier NH-7 was the largest highway of India. (Varanasi-Kanya Kumari : 2369 km).
- NH-7 passes through UP (120 km), MP (504 km), Maharashtra (232 km), Telangana (504 km), Andhra Pradesh (250 km), Karnataka (125 km) Tamil Nadu (627 km).
- NH 1 & 2 is called G.T. Road.
- Jawahar Tunnel is located in NH1A.
- NH 47A is the smallest highway of India. Its length is only 6 km. This is in Kerala.
- NH-15 passes through the desert of Rajasthan.
- Recently NH-7 renamed as NH-44.
- Golden Quadrilateral (5846 km) : High quality road joining the four megacities of the country (Delhi, Kolkata, Chennai and Mumbai) is called as Golden Quadrilateral Connecting National Highways.

- (1) Delhi-Kolkata : NH-2
- (2) Mumbai -Delhi : NH-8
- (3) Mumbai -Chennai : NH-4
- (4) Chennai-Kolkata : NH-5

## TOP TEN LONGEST NATIONAL HIGHWAYS OF INDIA

Rank National Highway	Major cities on Route
1 NH-7(44)	Varanasi — Jabalpur — Nagpur — Hyderabad — Bengaluru — Madurai — Kanyakumari
2. NH-6	Hajira — Surat — Dhule — Nagpur — Raipur — Sambalpur — Kolkata
3. NH-5	Bhubaneswar — Vishakhapatnam — Vijayawada — Nellore — Chennai

# **General KNOWLEDGE**

**(FOR ALL COMPETITIVE EXAMINATION)**

# **2020**

**R.K. Saxena**



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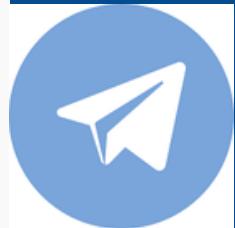
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# PREFACE

This is a well known fact that importance of GK is increasing day by day in terms of all competitive exams. Although, General Knowledge is the very basic knowledge of History, Geography, Science, Computer, Polity and Constitution etc. but due to latest researches and findings, facts keep on changing. Therefore, it is very important to be up-to-date in order to crack a competitive exam. This book is an attempt in that direction with all the latest data, facts and concepts.

This book is based on the questions asked in different competitive exams but with an eye on the future prospects also. It is largely divided into different segments so that an aspirant can easily find out the desired information from it. Thus, it can be used as a reference book as well.

— **R.K. Saxena**



## INDIAN HISTORY

# ANCIENT INDIA

## SOURCES OF ANCIENT INDIAN HISTORY

1. **Literary Sources** : Vedic, Sanskrit, Pali, Prakrit and other literature and foreign accounts.
  2. **Archaeological** : Epigraphic, numismatic and architectural remains; archaeological explorations and excavations.
- Study of development of scripts: Palaeography.
  - Study of inscriptions: Epigraphy.
  - Study of coins: Numismatics
  - Study of monuments, material remains: Archaeology.

### LITERARY SOURCES

- Winternitz writes in his work History of Sanskrit Literature, “It has never been the Indian way to make a clearly defined distinction between myth, legend and history; histography in India was never more than a branch of epic poetry.”

#### PURANIC LITERATURE

- The Puranic literature is very vast.
- 18 main Puranas, 18 subsidiary Puranas and a large number of other books.
- In all the Puranas royal genealogies are dealt with the reign of Parikshit, the grandson of Arjun, as a benchmark. This may be because of the fact that the coronation of Parikshit is considered to be the beginning of Kali Age.

#### RAMAYANA, VALMIKI

- The composition of *Ramayana* started in 5BC. It passed through five stages, the fifth stage being 12AD.
- 6000 verses to 12000 verses and finally 24000 verses.

- As a whole, this text seems to have been composed later than Mahabharata.

#### MAHABHARATA, VED VYAS

- Reflects the state of affairs between 70BC to 4AD.
- Originally 8800 verses, collection dealing with victory.
- Later raised to 24000 verses- came to be known as Bharata after Bharat tribe
- Final compilation: 1 lakh verses and came to be known as Mahabharata or Satasahasri Samhita.
- Didactic portion from Post Maurya, Gupta times.

#### VEDIC LITERATURE

- The Four Vedas : We cannot find much trace of political history in the Vedas, but can have reliable glimpses of the culture and civilization of the Vedic period.
- Vedic literature are entirely in a different language, which can be called the Vedic language. Its vocabulary contains a wide range of meaning and at times different in grammatical usages.
- It has a definite mode of pronunciation in which emphasis changes the meaning entirely.

#### LATER VEDIC LITERATURE

Brahmanas	elaborate on vedic rituals
Aranyakas	give discourses on different spiritual and philosophical problems.
Upanishads	culmination of the vedas
Sulvasutra	prescribe measurements for sacrificial altars. Mark the beginning of study of geometry and maths.

Srautasutra	account of royal coronation ceremonies
Grihyasutra	domestic rituals with birth, naming, marriage, funeral etc.

### JAIN AND BUDDHIST LITERATURE

- Jain literature was written in Prakrit language
- Buddhist literature was written in Pali.
- Since the modern historians have discarded most of the dynasties mentioned in the Puranas; and Mahavira and Buddha are considered historical personalities, only those portions of the puranic dynastic lists have been accepted which are supplemented and supported by the Buddhist and Jaina literature.

### JATAKA STORIES

- Before he was born as Gautama, the Buddha passed through more than 550 births, in many cases in animal-form.
- Each birth story is called Jataka. There are more than 550 such stories.
- Throw light on socio-economic conditions between 5BC to 2BC.

### DHAMASUTRAS AND THE SMRITIS

- These are rules and regulations for the general public and the rulers.
- It can be termed in the modern concept as the constitution and the law books for the ancient Indian polity and society. These are also called Dharmashastras.
- These were compiled between 600 and 200 B.C.
- Manusmriti and Arthashastra are prominent among them.

### KAUTILYA'S ARTHASHASTRA

- A book on statecraft was written in the Maurya period.
- The text is divided into 15 chapters known as books.
- Different books deal with different subject matter concerning polity, economy and society.
- Even before the final version of Arthashastra was written in the fourth century B.C. by Kautilya, there appeared a tradition of writing on and teaching of statecrafts because Kautilya acknowledges his debt to his predecessors in the field.

- *Mudrarakshasa*, a play written by Vishakhadatta, also gives a glimpse of society and culture.

### NOTABLE WRITERS

Kalidasa	<i>Malavikagnimitram</i> is based on some events of the reign of Pushyamitra Sunga dynasty which followed the Mauryas. <i>Abhijanashakuntalam</i> : glimpse of Guptas.
Bhasa and Sudraka	Wrote plays based on historical events
Banabhatta	<i>Harshacharita</i> throws light on many historical facts
Vakpati	Wrote <i>Gaudauaho</i> , based on the exploits of Yasovarman of Kanauj
Bilhana	<i>Vikramankadevacharita</i> describes the victories of the later Chalukya king Vikramaditya.
Kalhana	His book <i>Rajatarangini</i> .

### BIOGRAPHICAL WRITINGS

Banabhatta's <i>Harshacharita</i>	7th AD
	Describes the early career of Harshavardhana-courtlife and social life in his age.
Sandhyakar Nandi	Ramacharit. 12th AD
	Conflict between Kaivarta peasants and Pala prince Ramapala. Prince wins.

Bilhana's <i>Vikramankadevacharita</i>	On the life of king Vikramaditya, the sixth
---	---

- *Kumarapalacharita* of Jayasimha,
- *Kumarapatacharita or Duayashraya Mahakavya* of Hemachandra,
- *Harmirkavya* of Nayachandra,
- *Navasahasankacharita* of Padmagupta,
- *Bhojaprabandha* of Billal,
- *Prithvirajcharit* of Chandbardai.
- Sangam Literature
- Earliest Tamil text

- These poets assembled in colleges and compiled poems over a period of 3 to 4 centuries. This is Sangam literature.
- Describes many kings and dynasties of South India.
- This literature generally describes events upto the fourth century A.D.
- Total 30,000 lines of poetry
- Arranged in eight Anthologies called *Ettuttokai*
- Two main groups, Patinenkilkankkku (18 lower collections) and the Pattupattu (ten songs). The former is older than the latter.
- Some kings and events are supported by inscriptions also.

## FOREIGN ACCOUNTS

### Greek Ambassadors :

- Ambassadors were sent to Pataliputra by Greek kings.
- Notable: Megasthenese, Deimachus and Dionysios.
- They mention Sandrokottas (Chandragupta Maurya)- help fixing his date of accession at 322BC. This helps as sheet-anchor in Ancient Indian Chronology.

### Greek Writers

Darius	India figures in his foreign inscriptions
Ctesian	Got Info of India from through the Persian sources.
Herodotus	In his "Histories" gives us much information about Indo-Persian relations
Arrian	Detailed account of the invasion of India by Alexander on the basis of information from those who accompanied the campaign.
Anonymous	Book: "Periplus of the Erythrean Sea" by an anonymous author, who was a Greek, settled in Egypt on the basis of his personal voyage of Indian coast in about A.D.80. He gives valuable information about the Indian coasts.
Ptolemy	Wrote a geographical treatise on India in the second century A.D.

## CHINESE TRAVELLERS

- Visited India from time to time- as Buddhist pilgrims and therefore their accounts are

## HISTORIANS

- Notable: Herodotus, Megasthenese, Nearchus, Plutarch, Arrian, Strabo, Pliny the Elder, and Ptolemy (Geography).
- They were concerned mostly with the north western part of India and primarily the areas which were either part of the Persian and Greek Satrapies or Alexander's campaign.

### Megasthenese :

- The Greek ambassador (in the court of Chandragupta Maurya c. 324-300 B.C.)
- Megasthenese wrote extensively in a book called Indika which is no longer available to us.
- We know about Megasthenese's Writings through various extracts of the writings of Diodorus, Strabo and Arrian.
- These fragments of Indika, provide valuable information on Maurya Administration, social classes and economic activities.
- The existence of a list of 153 kings whose reigns had covered a period of about 6053 years till then.

somewhat tilted towards Buddhism. Three important pilgrims were:

### Notable Chinese writers

Fa-Hien	visited India in fifth century A.D. Describes social-religious and economic conditions of India in the time of Guptas.
Hiuen-Tsang	7th Century. In the age of Harshavardhana and some other contemporary kings of Northern India.
I-tsing	7th Century

## ■ ARAB HISTORIAN: AL-BERUNI

- Abu Rihan better known as Al-Beruni.
- Born in central Asia in A.D. 973 and died in Ghazni (present-day Afghanistan) in A.D. 1048
- Contemporary of Mahmud of Ghazni.
- When Mahmud conquered part of central Asia, he took Al-Beruni with him.
- Though Al-Beruni deplored his loss of freedom, he appreciated the favourable circumstances for his work.
- Unlike Megasthenese, Al-Beruni studied Sanskrit language and tried to gain a precise knowledge of Indian sources. The list of works consulted by him is long and impressive. His observations range from philosophy, religion, culture, society to science, literature, art and medicine.
- Al-Beruni's work can be termed as fairly objective and wherever he has faltered- is not because of any other reason but his lack of proper understanding.
- Does not give any political information of his times.
- Comparatively free from religious or racial biases.

## ■ ARCHAEOLOGICAL SOURCES

### ■ MEGALITHS :

- Some people in South India buried their dead with tools, weapons, potteries etc. Such graves were encircled by a big piece of stone. These structures are called Megaliths.

### ■ CARBON-DATING PRINCIPLE

- Half life-period during which, half of the material decays out.
- Half-life of C<sup>14</sup> is 5568 years.
- Carbon is associated with all living beings.
- When an object ceases to live, it stops receiving fresh supply of Carbon C<sup>14</sup>
- And its existing undergoes decay into an isotope C<sup>12</sup>.
- We can measure the decaying of C<sup>14</sup> to C<sup>12</sup> and identify the number of years elapsed.

## ■ INSCRIPTIONS

- James Burger writes, "Indian inscriptions are the real archives of the annals of its ancient history of the contemporaneous witnesses of the events and of the men whose deeds they handed down and their authenticity renders them most valuable and deserving careful record."
- The Inscriptions occupy a unique position as a source material of Indian history.
- Inscriptions were carved on seals, stone pillars, rocks, copper plates, temple walls, bricks, images etc. and so cannot be altered, subtracted from or added to.
- While in case of books, there is possibility of interpolations by known and unknown authors, that is not the case with inscriptions. In the country as a whole the earliest inscriptions were recorded on stone.
- The earliest inscriptions were written in the Prakrit language in the 3rd century BC. Sanskrit was adopted as an epigraphic medium in the 2nd century AD and its use became widespread in the 4th-5th century AD.
- There can be various kinds of inscriptions: commercial, magical, religious and didactic, administrative, eulogistic, votive or dedicative, donative, commemorative and literary.

### Ashokan Inscriptions

- These were recorded in different years of his reign and are called edicts because they are in the form of the king's order or desire.
- They also give a glimpse of Ashoka's image and personality as a benevolent king concerned with the welfare of not only his subjects but also of the whole humanity.
- These are found written in four scripts.

### Language used in Ashokan inscriptions

Empire	Script used in Ashokan Edicts
Afghanistan	1. Aramaic 2. Greek scripts
Pakistan	3. Kharoshthi evolved on the Varnantata system of the Indian languages and is written from right to left.

Kalsi in the north in  
Uttaranchal upto  
Mysore in the south

#### 4. Brahmi

- written from left to right.
- Its individual letters were modified century after century and through this process all the scripts of India, including Tamil, Telugu, Kannada and Malayalam in the south and Nagari, Gujarati, Bangla., etc. in the north have developed from it.

- Firoz Shah Tughlaq found an Ashokan Pilar inscription from Topra, Haryana, brought it to Delhi and asked Pandits to decipher it. How ever they failed in this endeavour.
- James Prinsep made a complete chart of Ashokan Alphabets in 1837. After this the study of epigraphs became a subject in itself. Thus, the oldest inscriptions deciphered so far were issued by Ashoka in the 3rd century BC. But the earliest inscriptions were found on the seals of Harappa belonging to about 2500 BC.
- Inscriptions of the Indo-Greeks, Saka-kshatrapas and Kushanas adopt Indian names within two or three generations. These inscriptions show them engaged in social and religious welfare activities like any other Indian.

### SANSKRIT

- Most of the Gupta epigraphs give genealogy. This became the practice of the subsequent dynasties. They took the opportunity to give an account of their conquests and achievements of their predecessor including mythology of their origins.
- Sanskrit came to occupy a prominent place since the Gupta period.
- The Harappan inscriptions seem to have been written in a pictographic script, are commercial inscriptions. There are also references to the use of seals for commercial purposes in other inscriptions: Mandsore stone inscriptions of the time of Kumaragupta and Bandhuvarman Malwa (S.V. 529).
- The inscriptions of Ashoka are the best specimen of the religious and didactic

inscriptions. The edicts of Ashoka are appropriately called *Dhamma-Lipi*.

- The Sohagaura Copper plate inscriptions of the 3rd century BC is an example of pure administrative inscription.
- The Junagarh Rock Inscription contains inscriptions of Ashoka, Rudraman I and Skandagupta. Banskhera copper plate gives us information about harshavardhana and his ancestor Naravardhana.
- The Hathigumpha Inscription of King Kharvela of Kalinga belongs to the category of pure eulogy. The Allahabad Pillar Inscription, written by Harisena, the court poet of Samudragupta, is also a good example of pure eulogistic inscription.
- The Aihole Inscription of Pulakesin II is a good example of votive inscription which gives a dynastic genealogy.
- The Gwalior Inscription of Bhoja gives full account of his predecessors and their achievements.
- The Piprahwa vase inscription records the dedications of the relic casket of Lord Buddha. The Besnagar Gruda Pillar Inscription of Heliodorus also belongs to this category.

### COINS

- Although a good number of coins have been found on the surface, many of them have been unearthed by digging. The study of coins is called Numismatics.
- The numismatic evidence is the second important source to determine the chronology, property, territorial extent, religion and relation with neighbouring countries of the reigning king and dynasty; the most important source being inscriptions.
- The coins alone tell us the history of the Saka, Kushanas, Scythians, Parthians and the Bactrian Greeks. The Greek coins refer to about 30 Greek kings and queens who ruled in India.
- The existence of the Malavas, Yaudheyas and Mitra rulers of Panchala is known only from the coins.
- The coins of Satavahanas supplement, correct and corroborate the accounts of the Puranas. The Kushana coins

- unmistakably point out the relation between India and Rome.
- The numerous coins of the Gupta Kings prove their prosperity and their high artistic sense. Coins have helped us to fix the dates of Samudragupta.
  - The earliest coins of India have only figures, devices or symbols and no legends.
  - Some coins were issued by merchants and guilds with permission of rulers. This proves that commerce had become important in later history of Ancient India.
  - Coins found in systematic excavations are less in number but are very valuable because their chronology and cultural context can be fixed precisely.

## COIN TYPES

### PUNCH-MARKED COINS

- The earliest coins of India so far found were punch-marked silver or copper pieces. Usually these were square or rectangular in shape and called Karsapana. This type of coin was prevalent between 7th century BC and 2nd century BC.
- The basic silver punch-marked coin of the usual type was the Karsapana of 57.8 grains (3.76 grams). The Masa or Masika weighed one-sixteenth of this or 3.6 grains.

Gold Coins : Nishka, Hiranyapinda and Suvarnadhool (1400 BC)

- However, Nishka was not a gold coin but a gold ornament.
- Rayya : Silver coins (It was a measurement batt).

- They do not bear any inscription, or legend on them.
- These have been found throughout the country from Taxila to Magadha to Mysore or even further south.
- Only one gold punch-marked coin is known and it must be assumed that gold was very rarely minted before the beginning of the Christian era.

### INDO-GREEK COINS

- The Indo-Greek coins show beautiful artistic features on them.

- The portrait or bust of the king on the obverse side appear to be real portraits. On the reverse some deity is depicted.
- From these coins we know that more than forty Indo-Greek rulers ruled in a small north-western region of India.
- The earlier Greek kings minted coins according to the Attic standard, based on the drachm of 67.2 grains and the obol (one-sixth of drachm) of 11.2 grains.
- Silver coinage of this type ranges from hemiobols to the very large double decadrachms, struck by a king Amyntas, which have recently been found in Afghanistan.
- After their southward expansion, the Greeks adopted a reduced weight, with silver coins of 152 and 38 grains.
- The Greek kings issued numerous copper coins, but their metrology is not clear. Gold coins must have been very rare. There exist a very large 20 stater piece of the Bactrian usurper Eucratides and rare staters of a few other kings.
- Saka and Pahlava coins in silver and copper follow the reduced Indo-Greek standard.

### KUSHANAS COINS

- Kushanas issued mostly gold coins and numerous copper coins which are found in most parts of north India up to Bihar.
- The Gold Dinaras or Suvarnas were based on the Roman denarius and were of 124 grains (8.04 grams). Double and quarter Dinaras were also issued. The copper coins were large, from 26 to 28 Masas or 240 to 260 grains (15.55 to 16.85) grams.
- The coins of Vima Kadphises bear the figure of Siva standing beside a bull.
- In the legend on these coins the king calls himself Maheshwara, i.e. devotee of Siva.
- Kanishka, Huvishka and Vasudeva etc. all have this depiction on their coins.
- We find many Indian gods and goddesses depicted on Kushana coins besides many Persian and Greek deities.

### PRE GUPTAN AND GUPTAN COINS

- Gupta kings issued largest number of Gold coins.

- A large range of coins in silver and copper of varied weight and character, was issued by the indigenous kings, tribes and cities of Northern India in the centuries immediately preceding and following the beginning of the Christian era.
- The Satavahanas issued coins of lead and potin (base silver). Satavahanas' copper coins with the Ujjain symbol bearing a ship were abundant in Avanti.
- The gold coins of the Guptas (Dinara) originally approximated to the Kushana standard, but in the middle of the 5th century rose in weight to 144 grains, thus returning to the Indian standard of the copper Karsapana.
- The silver coins (Rupaka or Rupiya) of the Guptas based on those of the Sakas of Ujjaini, weighed 32-36 grains.
- The metrology of Gupta copper coinage is obscure, and weights of those from 3.3 to 101 grains are attested.
- Kings are depicted engaged in activities like hunting a lion or rhinoceros, holding a bow or battle-axes, playing musical instrument or performing Ashwamedh yajna.

## EXCAVATIONS

- In addition to epigraphic and numismatic sources there are many other antiquarian remains which speak much about our past.
- Temples and sculptures are found all over the country right from the Gupta period upto recent times.
- These show architectural and artistic history of the Indians.
- They excavated large caves in the hills in Western India which are mostly Chaityas and viharas.

## CULTURE AND CIVILISATION

- The people of a particular region in a particular period adopt one pattern, while others in other areas adopt a different behaviour. In the language of History and Sociology they are called Cultural Groups.
- Each culture group has its own language, its own type of family organisation, its own form of economic life and system of

law, its own art and literature, scientific knowledge and its own beliefs in religion. These various ways of acting and thinking constitute Culture.

- When the group is very large and its organisation is complex, the culture is called Civilisation. It includes economy, social condition, religious condition and political condition.
- The earliest traces of human activity in India, so far discovered, go back to the second Inter-Glacial Period i.e., 400,000 and 200,000 BC and these show evidence of the use of stone implements.
- The part of man's past that was not recorded in writing is referred to as Pre-History. The archaeologist who studies Pre-History, does so by analysing artefacts that are usually uncovered through excavation.
- Artefacts are objects made, modified or used by man. It is any object that involves human skills.
- The first modern use of term Pre-History was made in 1581 by Daniel Wilson in his text *The Archaeology and Pre-Historic Annals of Scotland*.
- T Wilson (1899) writes, "Man be assumed to be Pre-historic wherever his chroniclings of himself are undesigned and his history is wholly recoverable by induction".
- Pre-History ends about 4000 BC.
- Proto-History refers to the transitional period and though it is a part of Pre-History, it has written records which are not deciphered yet.
- History may be defined as the recorded memory of mankind. History is primarily the story of the people of a nation. It is a progressive record of their life and achievements.
- The exploits and traditions of people serve as the pillars on which the superstructure of history is built to elucidate the characteristic reaction of the people to political, social and economic changes.
- History includes the story of political changes and vicissitudes which create the forces and conditions operating upon life, social institutions and beliefs.

## THE STONE AGE: AN INTRODUCTION

- The Palaeolithic culture of India developed in the Pleistocene period or the Ice Age.
- Palaeolithic men belonged to the Negrito race. **Homo sapiens** first appeared towards the end of this phase.
- Palaeolithic men were hunters and food gatherers. They had no knowledge of agriculture, fire or pottery; they used tools of unpolished, undressed rough stones and lived in cave rock shelters. They are also called **Quartzite men**.
- The main tools used during palaeolithic age include hand axes, cleavers, choppers, flakes, burins and scrapers.
- The Mesolithic people survived by hunting, fishing and gathering food; at a later stage, they also domesticated animals.
- Adamgarh** in Madhya Pradesh and **Bagor** in Rajasthan provide the earliest evidence for the domestication of animals.
- The people of Palaeolithic and Mesolithic ages practised painting. **Bhimbetka** in Madhya Pradesh is a striking site of **prehistoric painting**.
- The term Neolithic was coined by Sir John Lubbock in his book 'Pre-Historic times'.
- The Neolithic settlers were the earliest, farming communities. They produced ragi and horse-gram (kulath). Neolithic sites in Allahabad district are noted for the cultivation of rice in the sixth millennium BC. They domesticated cattle, sheep and goats. They wove cotton and wool to make clothes.
- Handmade pottery and use of potter's wheel first appear during the Neolithic Age.
- The earliest evidence of use of pottery in the world was found in "Chopani Mando".
- Koldihwa in Uttar Pradesh revealed a three-fold cultural sequence: Neolithic, Chalcolithic and Iron Age. **Mehrgarh** in **Baluchistan** is the oldest Neolithic site in India (7000 BC).
- Belan Valley** of Vindhya and middle part of the Narmada Valley show all the three phases of the Stone Age.
- Chalcolithic people primarily were rural communities. They domesticated animals and practised agriculture. They were not acquainted with the technique of burnt bricks and lived in thatched houses. They venerated the mother Goddess and worshipped the bull.
- The people of Chalcolithic culture were the first to use painted pottery. Black and red pottery painted with white line design was the most popular.
- The **Malwa ware** is considered the richest among the Chalcolithic ceramics.

**Overview of Stone Age**

Stone Age	Period	Tools	Sites
Lower Palaeolithic Age	(500000 BC-100000 BC)	Hand axe, cleavers and choppers	Pahalgam, Belan Valley (U.P.), Bhimbetka (M.P.), Narmada Valley, Soan Valley
Middle Palaeolithic Age	(100000 BC-40000 BC)	Blades, Point and Scrapers	Sindh, Rajasthan, M.P., West Bengal
Upper Palaeolithic Age	(40000 BC-9000 BC)	Bone tools, needles, fishing tools, harpoons, blades and florin tools	A.P., Karnataka, M.P., U.P., Rajasthan, Gujarat
Mesolithic Age	(9000 BC-4000 BC)	Microlithic, pointed cresconic blades, scrapers	Adamgarh (M.P.), Bagor (Rajasthan), Langhanaj (Gujarat)
Neolithic Age	(4000 BC-1000 BC)	Polished stone	Mehrgarh (Pak) Gufkral and Burzahom (J&K), Mahgara, Chopani Mando, Kodihwa in Belan Valley (U.P.), Chirand (Bihar)

Chalcolithic Culture	(2800 BC-700 BC)	Distinct painted pottery	Cultures: Ahar culture (oldest), Kayatha, Malwa culture, Salvada culture, Prabhas culture, Rangpur culture and Jarwe culture
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### COPPER HOARD CULTURE

- OCP Culture (Ochre Coloured Pottery)
- Harpoons, Antennae Swords Anthromorphs.
- Pottery with bright red slip & painted black Gungeria (MP) is found all over the Gangetic plain with some regions of copper hoard culture.

### PRE-HISTORICAL FINDINGS

- **Bhimbetka**—*Homo sapiens*' cave 500 Painted Rock Shelters (MH)
- **Nevasa**—Evidence of cotton
- **Atranjikheda**—Textile Printing
- **Hastinapur**—Wild Sugarcane
- **Inamgaon**—Statue of Mother Goddess
- **Mehangerh**—Earliest evidence of agriculture, settled life
- **Koldihva**—Earliest evidence of rice
- **Bagor and Adamgarh**—Earliest evidences of domestication of animals
- **Chirand**—Serpant cult Burzahom
- **Gufkaral**—Pit-dwelling
- **Ahore people (Aravalli region)**—distinctive black & red ware decorated with white designs.
- **Prabhas & Rangpur** wares have a glossy surface due to which they are called lustrous red ware.
- **Jarwe culture** (Maharashtra)—Painted black on red but has a matt surface treated with a wash.

### INDUS VALLEY CIVILISATION

- The most accepted period—2500 BC-1750 BC (by Carbon-14 dating).
- **John Marshall** was the first scholar to use the term 'Indus Valley Civilisation'.
- The Indus Valley Civilisation belongs to Protohistoric Period (Chalcolithic Age/Bronze Age).
- **Dayaram Sahni** first discovered Harappa Civilisation in 1921.
- **R.D. Banerjee** discovered Mohenjodaro or **Mound of the Dead** in 1922.
- The Indus Valley Civilisation was spread over Sindh, Baluchistan, Punjab, Haryana, Rajasthan, Gujarat, Western Uttar Pradesh and Northern Maharashtra.
- The northernmost site of Indus Valley Civilisation—Manda (Chenab)/Jammu-Kashmir (now).
- The southernmost site of Indus Valley Civilisation—Daimabad (Pravara)/Maharashtra (now).
- The easternmost site of Indus Valley Civilisation—Alamgirpur (Hindon)/Uttar Pradesh.
- The westernmost site of Indus Valley Civilisation—Sutkagen Dor (Dashk), Makran Coast, Pakistan-Iran Border.

### Indus Site at a Glance

Site	District	River	Year of Excavation	Archaeologist(s)
Alamgirpur	Meerut, Uttar Pradesh	Hindon	1974	Y.D. Sharma
Banawali	Hisar, Haryana	Ghaggar	1974	R.S. Bisht
Chanhudaro	Sindh, Pakistan	Indus	1931	M.G. Majumdar
Dholavira	Gujarat	Rann of Kutch	1985-90	M.S. Vats, B.B. Lal
Harappa	Montgomery, Pakistan, Punjab	Ravi	1921	Daya Ram Sahni
Kalibangan	Hanumangarh, Rajasthan	Ghaggar	1953	B.B. Lal
Kot Diji	Khairpur, Sindh	Indus	1953	Fazal Ahmed
Lothal	Ahmedabad, Gujarat	Bhogava	1957	S.R. Rao

Mohenjo daro	Larkana, Sindh	Indus	1922	R.D. Banerjee
Rangpur	Ahmedabad, Gujarat	Bhadar	1931	R.S. Bisht
Ropar	Rupnagar, Punjab	Sutlej	1953	Y.D. Sharma
Surkotada	Gujarat	Rann of Kutch	1964	J.P. Joshi
Sutkagen Dor	Makran, Balochistan	Dasht	1927	R.L. Stein

- **Capital cities**—Harappa, Mohenjodaro.
  - **Port cities**—Lothal, Sutkagen Dor, Allahadino, Balakot, Kuntasi and Daimabad were **coastal towns** of the civilisation.
  - **Mohenjodaro**—The largest site of Indus Valley Civilisation.
  - **Rakhigarhi**—The largest Indian site of Indus Valley Civilisation.
  - Common features of major cities: Systematic town planning on the lines of grid system; Use of burnt bricks in construction; Underground drainage system (giant water reservoirs in Dholavira); Fortified citadel (exception: Chanhudaro).
  - A common feature of this was grid system, i.e. streets cutting across one another at right angles, dividing the town into large rectangular blocks.
  - **The Great Bath (Mohenjodaro)**: It was used for religious bathing.
  - **The Granaries (Harappa)**: Six granaries in a row were found in the Citadel at Harappa.
  - Windows did not face the main streets. They had tiled bathrooms.
  - **Lamp-posts** were erected at regular intervals.
  - **Surkotada** (Kutchh district, Gujarat): The only Indus Valley site where the remains of a horse have actually been found.
  - **Main Crops**: Wheat, Barley and Cotton
  - The Harappans were the earliest people to produce cotton. (It was called Sindon by the Greeks.)
  - **Exports**: Agricultural products, cotton goods, terracotta figurines, pottery, certain beads (from **Chanhudaro**), conch-shell (from **Lothal**), ivory products, copper, etc.
- Major Imports**
- | Imports | From  |
|---------|---|
| Gold    | Kolar (Karnataka), Afghanistan, Persia (Iran) |
| Silver  | Afghanistan, Persia (Iran), South India       |
- |                           |   |
|---------------------------|---|
| Copper                    | Khetri (Rajasthan), Baluchistan, Arabia                 |
| Tin                       | Afghanistan, Bihar                                      |
| Lapis Lazuli and Sapphire | Badakshan (Afghanistan)                                 |
| Jade                      | Central Asia  |
| Steatite                  | Shaher-i-Sokhta (Iran), Kirther Hills (Pakistan)        |
| Amethyst                  | Maharashtra   |
| Agate                     | Chalcedonies and Saurashtra, and West India Carnelians. |
- Agriculture was the backbone of the civilisation.
  - They used wooden plough share (ploughed field from Kalibangan) and stone sickles for harvesting.
  - Gabarbands or nala enclosed by the dam for string water were a feature in parts of Baluchistan. Grains were stored in granaries.
  - Sugarcane was not known to the Indus Valley people.
  - Animal rearing was practised and mainly humped bull was reared. They domesticated buffaloes, oxen, sheep, asses, goats, pigs, elephants, dogs, cats, etc.
  - Camel bones have been reported at Kalibangan.
  - Trade was based on **Barter System**. Coins are not evident; bullock carts, animals and boats were used for transportation.
  - Weights and measures were made of limestone, steatite, etc.
  - Linear system of measurement was in use.
  - Foreign trade flourished with Mesopotamia or Sumeria (Iraq), Central Asia, Persia, Afghanistan and Bahrain.
  - Iron was not known to these people although copper, bronze, silver and gold were known.
  - The Sumerian texts refer to trade relations with **Meluhha** which was the name given to the Indus Valley region.

- **Shatughai** and **Mundigaq** were the Indus Valley 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.
- Harappans used stone tools and implements, and were well acquainted with bronze.
- **Pottery**, both plain (red) and painted (red and black), was made.
- **Seals** were made of steatite; pictures of one-horned bull (the most), buffalo, tiger, rhinoceros, goat and elephant are found on the seals. These seals marked ownership of property.
- Steatite was mainly used in the manufacture of seals.
- **Metal images:** Bronze image of a nude woman dancer (identified as devdasi) and stone steatite image of a bearded man have been obtained from Mohenjodaro.
- **Terracotta figurines:** Fire-baked clay was used to make toys, objects of worship, animals, cattle toys with movable head, toy-carts, whistles shaped like birds and both male and female figurines.
- The Indus valley civilisation was primarily urban.
- It was Pictographic in nature first symbol is most represented.
- Overlapping of the letters in the script shows that it was written from right in the second line. The style is called **Boustrophedon**.

### Harappan Sites and their Archaeological Findings

Harappan Sites	Archaeological Findings
<b>Harappa</b>	Gateway city, fortified wall, workmen's quarter, copper chariot with canopy, R-37 cemetry vanity case, seven layers showing pre-Harappan to late Harappan stage, two statues (red stone torso and a dancer), copper specimen of bullock cart.
<b>Mohenjodaro</b>	Mound of the dead—well-known for the Great Bath, Great Granary, Collegiate Building and Assembly Hall. A steatite male head with flowing hair, long-bearded; the bronze dancing girl and complex toys.
<b>Kalibangan</b>	Mud-brick fortification, stone blade, cart wheel, a grave in east-west direction, discovery of a plough field, no drainage system, wall bifurcating citadel, fire altars
<b>Koti-Diji</b>	Defensive wall, wheel-turned pottery. Blade industry and houses of stone.
<b>Chanhudaro</b>	Brick or Stone fortification, curved bricks for bath tubs, water tanks, intersecting circles painted on jars, toys like decorated carts with humped oxen, fish compartmented seals of faience, bronze shaft-hole axe.
<b>Amri</b>	Evidence of antelope ditches, shopping complex, traces of drainage and platforms, Bronze tools and knives.
<b>Ropar</b>	Ware with and without slip, black and red ware and ochre-coloured ware, spouted vessels and copper objects.
<b>Banwali</b>	Pre-Harappan and Harappan sites; remains of streets and drains; traces of barley.
<b>Alamgirpur</b>	Pottery; black ware, red ware, plant fossils, animal bone and copper tools.
<b>Suktagendor</b>	Trade point between Harappa and Babylon is situated on a natural rock in western-most site.
<b>Lothal</b>	A coastal site, dockyard built with brick, discovery of dyeing-vats, Large cemetery, Rice grain funnel, evidence of cotton, bead factory, pottery with the painting of 'clever fox'; Iranian Seal, Ivory etc.

<b>Surkotada</b>	Flourishing urban centres, elaborate fortification, shipping complex, large stone-age jar with a short inscription, bead industry, antimony rod, fossils, remains of horses.
<b>Rangpur</b>	Surrounded by a fort, local Rangpur Pottery (red ware, lustrous red ware), plant remains (rice, millets and possibly bajra) and copper rod.
<b>Rojdi</b>	Red pottery, perforated jars and sprinklers.
<b>Dholavira</b>	Several cultural stages; three parts of city; unique water management, first evidence of stone architecture, largest Harappan inscription, use of fire-altars.
<b>Kunal</b>	Silver crown.
<b>Mitathal</b>	Copper Axe.

### RELIGIOUS PRACTICES

- The Harappan people did not worship their gods in temples. An idea of their religion is formed from the statues and figurines found.
- Shiva-Shakti** worship, the oldest form of worship in India, appears to have been part of the religious belief of Harappan people (especially humped bull).
- The origin of the **Swastika** symbol can be traced to the Indus Valley Civilisation.
- Chief female deity:** A terracotta figure, where a plant is shown growing out of the embryo of a woman, represents Mother Goddess (Goddess of Earth).
- Chief male deity:** Pashupati Mahadeva (Proto-Shiva), represented in seals as sitting in a yogic posture on a low throne and having three faces and two horns. He is surrounded by an elephant, a tiger, a rhino and a buffalo and two deer appear at his feet.
- Lingam and yoni worship was prevalent.
- Indus Valley people **believed in ghosts** and **evil forces** and used amulets as protection against them. Fire altars are found at Lothal and Kalibangan.

- Evidence of snake worship is also found.
- General practice was extended inhumation in North-South direction.

### Decline of Harrapan Civilisation

Thinkers	Views
Wheeler, Pigott and Gordon Childe	External Aggression
Sahani	Inundation
KVR Kennedy	Epidemic
Marshall and Raikes	Tectonic Disturbance
Wheeler	Sudden Decline
RL Stein and AN Ghosh	Climatic Change
Marshal, SR Rao, Maickey	Flood
HT Lambrick, Walter Fairservis, Sood and Aggarwal	Unstable river system, Ecological imbalance, Dryness of river

### Sites of Pre-Harappan Civilisation (Now outside India)

Site	Situation
Dabarkot	Baluchistan
Kotdiji	Sindh (Pak)
Ranaghundai	Baluchistan
Anjira	Baluchistan
Goomla	Afghanistan
Deh Morasi Ghundai	Afghanistan
	Afghanistan

### VEDIC CULTURE (1500 BC-600 BC)

- Aryans were migrated from outside [Central Asia (Max Muller)/Europe/Arctic region B.C. Tilak].
- Boghazkai inscription (Asia Minor, Turkey) 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 **Sapta Sindhu**, i.e. region of seven rivers.
- Vedic literature comprises four literary productions: (1) The Samhitas or Vedas; (2) The Brahmans; (3) The Aranyakas; (4) The Upanishads.

- There are four Vedas—Rigveda, Samaveda, Yajurveda and Atharvaveda. The first three Vedas are jointly called Vedatrayi, i.e. trio of Vedas.

## RIGVEDA

- The oldest religious text in the world.
- Collection of hymns, composed around 1700 BC, contains 1,028 hymns and is divided into 10 mandalas.
- The third mandala contains the **Gayatri Mantra**.
- Saraswati is the deity river in the Rigveda.
- Rigveda consists of 10 Mandalas of which 2nd to 7th are the earliest Mandalas each of which is ascribed at a particular family of Rishi Gritsamad, Viswamitra, Vama, Atri, Bharadwaja, Vashistha. VIII Mandal is ascribed to Kanvas and Angiras. IX Mandala is the compilation of soma hymns.
- The 10th Mandala of Rigveda contain the Purushasukta hymn which tells about the origin of caste system.

## SAMAVEDA (BOOK OF CHANTS)

- It is a collection of melodies. The hymns of the Samaveda were recited by Udgatri at the Soma sacrifice.
- It contains Dhrupad Raga.

## YAJURVEDA

- The beliefs and rituals of non-Aryans are written in it.
- Two texts of Yajurveda are:
  - Shukla** (White) Yajurveda
  - Krishna** (Black) Yajurveda.

## ATHARVAVEDA

- It is book of **magical formula**.
- Mentioned of the Gotra is found in Atharvaveda.

## THE UPANISHADS

- Also called Vedarita because they denote the last phase of the Vedic period.
- They define the doctrine of Karma, Atman (soul), Brahma (God), and origin of Universe.

- There are 108 Upanishads and the period of 800 BC to 500 BC is known as the period of Upanishads.
- 11 are predominant and they are called mokhya Upanishads.

## VEDANGS

- They are the limbs of the Vedas. These are treatises of Science and Arts.**
- There are six Vedangs:**
  - Shiksha (Phonetics)
  - Kalpa Sutras (Rituals)
  - Vyakarana (Grammar)
  - Nirukta (Etymology)
  - Chhanda (Metrics)
  - Jyotisha (Astronomy)
- Panini wrote Ashtadhyayi (4th century BC) on Vyakarana.

## BRAHMANAS

- These are the prose commentaries on various vedic hymns.
- The most important is the 'Shatapatha Brahmana' attached to Yajurveda.

## THE ARANYAKAS

- The sages dwelling in the forest explained the Vedic scriptures to their pupil in the form of Aranyakas.

## UPAVEDAS

- There are four Upavedas:
- Ayurveda** (Upaveda of the Atharvaveda)
  - Dhanurveda** (Upaveda of the Rigveda)
  - Gandharvaveda** (Upaveda of the Samaveda).
  - Sthapatyaveda** (Upaveda of the Yajurveda)

## PHILOSOPHY

- There are six systems of Hindu philosophy, given by six philosophers of ancient India.
- |                      |           |
|----------------------|-----------|
| • Nyaya (analysis)   | Gautama   |
| • Vaisesika          | Kanaad    |
| • Sankhya            | Kapila    |
| • Yoga (application) | Patanjali |
| • Purva Mimansa      | Jamini    |
| • Uttar Mimansa      | Vyasa     |

## PURANAS

- It refers to the change in the mode of worship (from sacrifice to idol worship) and visual appeal of deities as against worship of ideas.
- There are 18 famous 'Puranas'. **Matsya Purana** is the oldest Puranic text.

## SUTRAS

- Sutra literature is divided into three classes:
  - Srauta Sutra**—Dealing with large public sacrifices
  - Griha Sutra**— Dealing with rituals connected with birth, naming, marriage
  - Dharma Sutra**—Explain social and local customs

## SMRITIS

- Dharma Shastra** is the other name for smritis, which are the law books written in shloka form.
- Manav Dharma Shastra or Manusmriti** is the oldest and most famous. Manu is supposed to be the first king and law maker.

## EPIC

- There are mainly two **Mahakavyas** (Epics):
  - The Ramayana (Valmiki)**: It is known as **Adi Kavya** (the oldest epic of the world). At present, it consists of 24,000 shlokas.
  - The Mahabharata (Ved Vyasa)**: The longest epic of the world. At present, it consists of 1,00,000 shlokas, i.e., verses in 18 Parvans, i.e., chapters, plus the Harivamsa supplement. **Bhagavad Gita** is extracted from Bhishma Parvan of Mahabharata. Shanti Parvan is the largest parvan (chapter) of the Mahabharata.

## THE ARYAN AND THE VEDIC AGE

### Original Home and Identity

- The location of the original homeland of the Aryans is still controversial but the most accepted theory is that they migrated from Central Asia in several groups between

2000 and 1500 BC and settled in Eastern Afghanistan, modern Pakistan, Punjab and Western Uttar Pradesh.

### Original Home of Aryans

Arctic Region	B.G. Tilak
Central India	Rajbali Pandey
Kashmir	L.D. Kala
Central Asia	Max Muller
Tibet	Dayanand Saraswati
German plain	Professor Penka
Pamirs	Mayor
Steppes	Brandstein
Turkistan	Hurz Feld
Bactria	J.C. Rod
Sapta Sindhu	A.C. Das

### RIGVEDIC/EARLY VEDIC PERIOD (1500–1000 BC)

#### Geographical Area

- Rigveda is the only source of knowledge for this period.
- Rigveda mentions 40 rivers.
- Early Vedic people had knowledge of rivers Yamuna, Saraswati (Nandi tara) and Ganga, Ocean mentioned as Samudra (referred to collection of water and not sea), snow mountains (Himvat) and desert land (Dhawa). So, they lived in Sapta Sindhu region.
- Aryans came into conflict with the indigenous inhabitants called **Dasas** (early branch of Aryans) and **Dasyus** (original inhabitants). **Dasyuhatya** or slaughter of Dasyus is repeatedly mentioned in Rigveda.
- According to the Rigveda, the most mentioned river is Sindhu, the most pious river is Saraswati while mention of the Ganges and occurs just once.

#### Rivers Mentioned in Rigveda

Rigvedic Name	Modern Name
Sindhu	Indus
Vitasta	Jhelum
Askini	Chenab
Purushni	Ravi

Vipas	Beas
Sutudri	Satluj
Gumal	Gomati
Krumu	Kurram
Drishdvati	Ghagghar
Kubha	Kabul
Suvastu	Swat

Vish	170
Krishi	24
Gau	176
Mitra	1
Samiti	9
Ashwa	215
Sury	10
Yava	15
Brahmana	14
Kshatriya	9
Sudra	1
Ganga	2
Yamuna	3
Sabha	8
Vidata	122
Veshya	1
Arya	33
Gana	46

### Words Mentioned in Rigveda

Words	No. of Times Mentioned
Indra	250
Agni	200
Varuna	30
Som	114
Jana	275

### SOCIETY

- The Rig-vedic society comprised four varnas, namely **Brahmana**, **Kshatriya**, **Vaishya** and **Shudra**. This classification of society was based on the professions or occupations of the individuals.
- These vocations were followed by people according to their ability and liking, and the occupations had not become hereditary as they became later on.
- 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 movable things, like cattle, horse, gold and ornaments and also in respect of immovable property like land and house.
- Milk and its products—curd, butter and ghee—formed an important part of the diet.
- The meat of fish, birds and animals was eaten.
- The cow was already deemed **Aghanya**, i.e. not to be killed.
- Rigveda prescribes a penalty of death or expulsion from the kingdom to those who kill or injure cows.

- Aryans were primarily agricultural and pastoral people who reckoned their wealth in terms of cows.
- Alcoholic drinks, **Sura** and **Soma** were also consumed.

## RELIGION

- During the Rigvedic time, the gods worshipped were generally the personified powers of nature.
- Indra, Agni** and **Varuna** were the most popular deities of Rigvedic Aryans.
- Indra** or **Purandara** (destroyer of fort) was considered to be the rain god.
- Agni:** The second most important god, 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 (**Ritasyagopa**).
- Savitri (the god of light):** The famous Gayatri Mantra is addressed to her.
- 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.

### Rigvedic Gods

<b>Indra</b>	He was the most important divinity. He played the role of a warlord, leading the Aryan soldiers to victory against the demons. He was associated with thunder and storm and is addressed by various names: <i>Ratheshttha, Jitendra Somapa, Purandra, Varitrahana</i> and <i>Maghayam</i> .
<b>Agni</b>	He was the second-important divinity. He was intermediary between Gods and men.
<b>Varuna</b>	He was the upholder of Rita or cosmic order or natural order. He personified water.
<b>Soma</b>	He was considered to be the God of plants. An intoxicant drink was also called soma.
<b>Yama</b>	He was the guardian of the world of dead.

<b>Surya</b>	Similar to that of the Greek God, Helios.
<b>Savitri</b>	The famous Gayatri mantra is addressed to Savitri.
<b>Pusan</b>	Lord of jungle pathi, the main function was that of guarding of roads, herdsmen and cattle.
<b>Vishnu</b>	A relatively minor God at that time.
<b>Vayu</b>	Wind God.
<b>Dyaus</b>	Father of Heaven.
<b>Aditi</b>	Goddess of Eternity.
<b>Maruts</b>	Storm spirits.
<b>Gandharvas</b>	Divine musicians.
<b>Ashvins</b>	Healers of diseases and experts in surgical art.
<b>Ribhus</b>	Gnomes.
<b>Apsaras</b>	Mistresses of Gods.
<b>Rudra</b>	An archer of God, whose anger brought disease.
<b>Vishvadeva</b>	Intermediate deities.
<b>Aranyani</b>	Goddess of Forest.
<b>Usha</b>	Goddess of Dawn.
<b>Prithvi</b>	Goddess of Earth.

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

## ECONOMY

- Aryans followed a mixed economy, both agriculture and pastoralism.
- They possessed better knowledge in agriculture. **Ploughshare is mentioned in Rigveda.**
- The reference of cow in the Rigveda shows that Rigvedic Aryans were predominantly pastoral people. The term for war in the Rigveda is **Gavishthi** or search for cows. The horse was almost as important as cow.
- Cow** was the standard unit of exchange. Gold coins like Niskka, Krishna and Satmana were also in use. Godhuli was used as a measure of time and Gavyuti as a measure of distance.

- 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.
- The art of healing wounds and curing diseases were in existence.

### Metals Known in Rigvedic Period

Gold	Hiranya
Iron	Shyama (Krishna Ayas)
Copper	Ayas

## LATER VEDIC PERIOD (1000 BC-600 BC)

### GEOGRAPHICAL AREA

- Later Vedic literatures mention Vindhya Mountain (Southern mountain).
- With reference to the territorial divisions, the later Vedas give three broad divisions of India, viz. **Aryavarta** (Northern India), **Madhyadesa** (Central India) and **Dakshinapath** (Southern India).

### POLITY

- The term 'Rashtra', indicating territory, first appeared in this period.
- There was development of judiciary. Kings administered the criminal court. Treason was a capital offence.
- Large kingdoms and stately cities made their appearance in the later Vedic period.
- In **Taittariya Brahmana**, we notice the theory of the divine origin of kingships.
- New civil functionaries besides the only civil functionary of the Rig-vedic period, the Purohita came into existence.

### Regions and Kings

Eastern King	Samrat
Western King	Suvrat
Northern King	Virat
Southern King	Bhoja
King of middle country	Raja

- The popular control over the affairs of the kingdom was exercised through **Sabha** and **Samiti** as in the Rigvedic period.

- Even during the later Vedic times, kings did not possess a standing army.

### Important Officers in Later Vedic Period

Purohita	Chief Priest
Senani	Supreme Commander of Army
Vrajapati	Officer in charge of Pasture land
Jivagribha	Police Officer
Spasas	Dutas
Gramani	Head of village
Kulapati	Head of family
Madhyamasi	Judge
Bhagadugha	Revenue Collector
Sangrahitri	Treasurer
Mahishi	Chief Queen
Suta	Charioteer
Govikartana	Head of Forest Department
Palagala	Messenger
Akshavapa	Accountant
Sthapati	Chief Justice
Takshan	Carpenter

### SOCIETY

- Judiciary also grew. The king played a great role in administering criminal law.
- As the time passed by, **Yajnas** became elaborate and complicated ceremonials leading to the emergence of learned men known as **Brahmanas**.
- And as the Aryans expanded to the east and south, group of people known as **Kshatriyas** 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**.
- The institution of **Gotra**, i.e. the clan appeared in the later Vedic period.
- The higher castes could marry with the lower ones, but marriage with Shudras was not permitted. The concept of pollution started appearing in the society.
- The status of women declined.
- According to **Maitrayani Samhita**, there are three evils—liquor, woman and dice.

- Women were prohibited to attend the political assemblies.
- **Yajnavalkya-Gargi dialogue (Vrihadaranyaka Upanishada)** indicates that some women had got higher education.

### TYPES OF MARRIAGE

- Brahma:** Marriage of a girl to a man of the same class with proper dowry.
- Daiva:** The father gives a daughter to a sacrificial priest as a part of his fee.
- Arsa:** A token bride-price of a cow and a bull is given in place of dowry.
- Prajapatya:** The father gives the girl without dowry and without demanding the bride-price.
- Gandharva:** Marriage by the consent of the two parties (love marriage).
- Asura:** Marriage in which the bride was bought from her father. It was looked down upon with disfavour by all sacred texts, though Arthashastra allows it without criticism.
- Rakshasa:** Marriage with the daughter of a defeated king-practised especially by warriors or marriage with a captured girl.
- Paishacha:** Marriage to a girl after seducing or raping her

**Anuloma Vivaha:** Marriage between a man from an upper caste and a girl from a lower caste.

**Pratiloma Vivaha:** Marriage between a girl from an upper caste and a man from a lower caste.

### 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** became the God of **Shudras**.
- **Vrihadaranyaka Upanishad** was the first work to give the doctrine of transmigration (**Punarjanma/Sansara-chakra**) and deeds (**karma**).

- In the later Vedas and Brahmanas, sacrifices (**Yajnas**) came into prominence.
- There were two varieties of sacrifices:
  - Laghuyajnas** (simple sacrifices): Performed by householders.
  - Mahayajnas** (grand sacrifices): Sacrifices that could only be undertaken by an aristocratic and wealthy man and the king.
- Towards the end of the Vedic period, there was the emergence of a strong reaction against cults, rituals and priestly domination; reflection of the mood is found in the Upanishads.

### 16 SANSKARAS

- |                   |                 |
|-------------------|-----------------|
| 1. Garbhadhana,   | 2. Pumsavana,   |
| 3. Simantonnyan,  | 4. Jatakarma,   |
| 5. Namakaran,     | 6. Nishkramana, |
| 7. Annaprashana,  | 8. Chudakarma,  |
| 9. Karnachhedana, | 10. Vidyarmbha, |
| 11. Upanayana,    | 12. Vedarambha, |
| 13. Samavaratana, | 14. Vivaha,     |
| 15. Vanaprastha,  | 16. Antyesti.   |

### ECONOMY

- Agriculture began to replace rearing of cattle. Manure was known.
- Rice, barley, beans, sesame and wheat were cultivated.
- Mention of tin, silver and iron was made apart from gold and **ayas** (either copper or iron) in the Rigveda.
- New occupational group emerged, such as fishermen, washermen, dyers, door-keepers and footmen.
- Evidence was there regarding organisation of merchants into guilds because of reference to corporations (**Ganas**) and aldermen (**Sreshtins**).

### IMPORTANT VEDIC RITUALS

- **Asvamedha:** A King performed this sacrifice which meant control over the area in which the royal horse ran uninterrupted. The ceremony lasted for three days in the end of which the horse sacrifice was performed. The Aswamedha sacrifice concluded with the sacrifice of 21 sterile cows.

- Vajapeya:** A chariot race was performed in which the king must win the race. It was meant to re-establish the supremacy of the king over his people.
- Rajasuya:** A sacrifice ceremony which conferred supreme power on the King.
- Ratnahavimsi:** A part of Rajasuya ceremony where different royal officials invoked different gods and goddesses.
- Upanayana:** An initiation ceremony to confer *dvija* status to boys of the higher varnas in their eighth year.
- Paumasyam:** A ceremony to produce a male child.

## MAHAJANAPADA PERIOD (600 BC-325 BC)

Kamboja	Rajput
Vajjis	Vaishali
Asmaka	Patna
Anga	Champa
Vatsa	Kaushambi
Kashi	Banaras
Avanti (North/South)	Ujjain/Mahishmati
Kosala	Sravasti
Shurasena	Mathura
Magadha	Girivraja
Chedi	Shuktimati
Panchala (North/South)	Ahichhatra/Kampilya
Malla	Kushinara
Kurus	Indraprastha
Gandhara	Taxila

### PRE-MAURYAN AGE

- Many janapadas sprung up in the 6th century BC, the larger of which were called **Mahajanapadas**.
- Buddhist literature (**Anguttara Nikaya, Mahavastu**) and Jain literature (**Bhagavati Sutra**) present a list of 16 Mahajanapadas with minor variations of names.

They were of two types:

- Non-monarchical/republican states:** Kamboj, Kuru, Koliyas (Ramgrama), Malla, Moriya (Pipplavana), Shakya (Kapilavastu), Vajji (Panchal), Lichchhavis (Vaishali), Bhaggas (Sumsumasa), Kalamas (Kesaputta), Videhas (Mithila) and Jnatrikas (Kundalgrama).
- Monarchical States:** Anga, Avanti, Chedi, Kashi, Kosala, Gandharva, Magadha, Matsya, Sursena, Vatsa.

### THE REPUBLICAN STATES

- The republicans, unlike the monarchies, were ruled by tribal oligarchies and Brahmanas had no place.
- Lichchhavis** are said to be the oldest republicans in the world.

#### The Mahajanapadas

Mahajanapadas	Capitals
Matsya	Virat Nagari

### MAGADHA EMPIRE

- The period from 6th century BC to 4th century BC saw the struggle for supremacy among four mahajanapadas—Magadha, Kosala, Vatsa and Avanti.
- Ultimately, Magadha emerged as the most powerful and prosperous kingdom in North India.
- The founder of Magadha was **Jarasandha** and **Brihadratha**.

### RISE OF MAGADHA

- The political history of India from 6th century BC onwards is the history of struggle between four states—Magadha, Kosala, Vatsa and Avanti—for supremacy.
- Ultimately, the kingdom of Magadha emerged to be the most powerful one and succeed in founding an empire.

### CAUSES OF MAGADHA'S SUCCESS

- Magadha enjoyed an advantageous geographical position in the age of iron, because the richest iron deposits were situated not far away from Rajir, the earliest capital of Magadha and could be used for making weapons.
- Magadha lay at the centre of the middle Gangetic plains. The alluvium, once

cleared of the jungles, proved immense fertile and food surplus was thus available.

- iii. Magadha enjoyed a special advantage in military organisations. Although the Indian states were well acquainted with the use of horses and chariots, it was Magadha who first used elephants on a large scale in its war against its neighbours.

## HARYANAKA DYNASTY (544 BC-412 BC)

### BIMBISARA (SHRONIKA) (544 BC-492 BC)

- He was the founder of Haryanaka dynasty with capital Rajagriha.
- Magadha came into prominence under the leadership of **Bimbisara**.
- He was a contemporary of **Gautama Buddha**.
- He married the princesses of Kosala (**Kosaldevi/Mahakosala**, sister of Kosal King Prasenjit), Lichchhavi (**Chellana**, sister of Lichchhavi Head Chetaka) and Madra (**Khema**, daughter of Madra King), which helped him in his expansionist policy.
- He gained a part of **Kashi** as the dowry in his marriage with the sister of king Prasenjit of Kosala.
- He conquered **Anga**.
- The Gandhara ruler of Taxila, Pukku Sati sent an embassy to Bimbisara.
- Known as **Seniya**, he was the first Indian king who had a regular and standing army.
- He built the city of New Rajagriha.

### AJATASHATRU (492 BC-460 BC)

- He was son of Chellana and Bimbisara.
- Gained complete control over Kashi.
- He defeated Vajji confederacy and divided it with the help of Vassakar.
- He defeated his maternal uncle Prasenjit, king of Kosala and married his daughter Vajira.
- He destroyed Vaishali (capital of Lichchhavis).
- **Mahashilakantaka**—A war, engaging in which catapulted a big stone and **Rathamusala**, a kind of chari with a mace.

- He fortified Rajagriha to meet the threat from Avanti. He also built the fort of Rajagriha and Jaladurga (a watch fort) at Patali village on the bank of river Ganges.
- He patronised first Buddhist Council and Buddha died during his reign.

### UDAYIN (460 BC-440 BC)

- Ajatshatru was succeeded by his son Udayin.
- His reign is important because he laid the foundations of the city of **Patliputra** at the confluence of the Sone and the Ganges and shifted the capital from Rajagriha to Patliputra.
- Udayin was succeeded by **Anuruddha**, **Munda** and **Naga-Dasak**, respectively who all were weak and parricides.

## SHISHUNAGA DYNASTY (413 BC-344 BC)

- **Naga-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**. From then on, Avanti became a part of the Magadha rule.
- The most famous event was that the capital was shifted to Vaishali.

### KALASOKA

- He succeeded Shishunaga in 344 BC.
- He transferred the capital from Vaishali to Patliputra and convened the **second Buddhist Council** in Vaishali (383 BC).
- Mandivardhana was the last ruler of this dynasty.

## NANDA DYNASTY (344 BC-323 BC)

### MAHAPADMANANDA

- The Shishunaga dynasty was overthrown by **Mahapadma** who established a new line of kings known as the Nandas.
- It is considered to be the first non-Kshatriya dynasty and ruled for 100 years.

- Mahapadma is known as **Sarvashatrantak**, 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 is often described as “the first empire builder of Indian history”.
- He conquered **Kosala** and **Kalinga** (from here he brought an image of the Jina as victory trophy).
- Succeeded by his eighth sons, last one being Dhanananda.

### DHANANANDA

- The last king Dhanananda is possibly identical with the **Agrammes** 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.
- 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

### IRANIAN AND MACEDONIAN INVASIONS

- Cyrus** of Persia was the first foreign conqueror who penetrated well into India. He enrolled the Indian soldiers in the **Persian Army**.
- Darius-I**, grandson of Cyrus invaded north-West India (516 BC) and annexed Punjab, west of Indus and Sind.

### IMPACT OF IRANIAN INVASION

- Iranian contact gave an impetus to Indo-Iranian trade.
- There was cultural exchange in the form of Kharoshthi script from Iran to India. Some of Ashoka's inscriptions in North-West India were written in this script.
- Iranian influence is perceptible in sculpture, e.g., the bell-shaped capitals.

### ALEXANDER'S INVASION

- Alexander, from Iran, marched towards India attracted by its great wealth and divided polity.
- Alexander conquered Kabul in 328 BC. He moved to India through the unguarded Khyber Pass and reached Sirhind near Attock in 326 BC.
- Ambhi**, the ruler of Taxila, readily submitted to Alexander.
- Porus**: Alexander defeated Porus in the **Battle of Hydaspes** on the bank of river Vitasta (Jhelum). He restored to Porus his kingdom and made him his ally.
- After the **Battle of Sakala**, Alexander proceeded upto Beas with a view to conquer the East, but his fatigued army refused to cross the river.
- So, he was forced to retreat. He placed the North-Western India under the Greek Governor **Seleucus Nicator**.
- Died in Babylon (323 BC) at the age of 33 years.

### EFFECTS OF ALEXANDER'S INVASION

- India and Europe: It brought both of them closer to each other.
- Invasion made possible the establishment of Indo-Bactrian and Indo-Parthian States.
- The invasion opened the eyes of Indian politicians to the necessity of creating a unified empire.
- The date of the invasion of Alexander is the ‘first reliable date in early Indian history’ and considerably helps us in solving chronological difficulties.

## RELIGIOUS MOVEMENTS (600 BC-400 BC)

### CAUSES OF RELIGIOUS MOVEMENTS

- The Vedic philosophy had lost its original purity.
- The Vedic religion had become very complex and had degenerated into superstitions, dogmas and rituals.
- Supremacy of the Brahmins created unrest in the society and Kshatriyas reacted against the Brahmanical domination.

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.
  - Division of the society into four varnas.
  - To preserve cattle wealth.
  - Desire to go back to simple life. The use of Sanskrit in Vedic texts was not understandable to the masses.

## Buddhism: Buddha's Life

- **Gautama Buddha**, founder of Buddhism, was born in 563 BC (widely accepted), on the Vaishakha Purnima day at **Lumbinivana** in **Kapilavastu** (now situated in the foothills of Nepal) in the **Sakya Kshatriya** clan.
- His father **Suddhodhana** was the republican king of Kapilavastu and mother **Mahamaya** was a princess of Kosala dynasty.

### Major Events of Buddha's Life

Events	Symbols
Janma (Birth)	Lotus and Bull
Mahabhiniskramana (Renunciation)	Horse
Nirvana (Sambodhi Enlightenment)	Bodhi tree
Dharmachakra Paravartan First Sermon	Wheel
Mahaparinirvana (Death)	Stupa

- After his mother's early death, he was brought up by his stepmother and aunt **Mahaprajapati Gautami**.
- His father married him at an early age to **Yosodhara** (princess of Kolli dynasty) from whom he had a son **Rahul**.
- Four sights—an old man, a diseased person, a dead body and an ascetic—proved to be a turning point in his career.
- At the age of 29, he renounced home, this was his **Mahabhiniskramana**.
- His first teacher was **Alara Kalam** from whom he learnt the technique of meditation.
- His next teacher was **Udraka Ramputra**.
- At the age of 35, under a peepal tree at **Uruvelli (Bodh Gaya)** on the bank of river

**Niranjana** (modern name Falgu), he attained **Nirvana** (enlightenment) after 49 days of continuous meditation; now he was a fully enlightened (**Buddha or Tathagat**).

- Buddha delivered his first sermon at **Sarnath** (deer park) to his five disciples. This is known as **Dharmachaka Pravartana** (turning of the wheel of law).
- He died at the age of 80 in 483 BC at **Kushinagar** (identical with the village Kasia is Siddharthanagar Japanaa of Deoria district of U.P.). This is known as **Mahaparinirvana** (final blowing out).

## TEACHINGS OF BUDDHA

- (a) His four Noble Truths:
  1. The world is full of sorrows.
  2. The cause of sorrow is desire, Dwadash Nidan/Pratitya Samutpada.
  3. If desires are conquered, all sorrows can be removed, Nirvana.
  4. This can be achieved by following the eight-fold path, Ashtangika Marga.

- (b) Eight-fold Path:

### (Ashtangika marga)

- Right understanding
- Right thought
- Right speech
- Right action
- Right livelihood
- Right effort
- Right mindfulness
- Right concentration.

- (c) Three Jewels (Triratnas):

- Buddha
- Dhamma
- Sangha

- (d) Belief in Nirvana:

- Also known as **moksha** or salvation. It refers to belief in the concept of ultimate bliss, where by the person gets freedom from the cycle of birth and death.

- (e) Belief in Ahimsa:

- Law of Karma and Madhya Marga/ Madhyama Pratipada (the middle path).
- **Note:** Pratitya Samutapada is also known as **Hetuvada** (theory of cause-effect) and **Kshana-bhanga Vada** (theory of momentariness impermanence).

(f) Code of conduct:

- Do not covet the property of others.
- Do not commit violence.
- Do not use intoxicants.
- Do not speak a lie.
- Do not indulge in corrupt practices.

### Buddhist Sangha

- It consisted of monks (Bhikshus or Shramanas) and nuns, who acted as a torchbearer of the dhamma. The worshippers were called upasakas.

### Buddhist Councils

Councils	Year	Venue	Chairman
First	483 BC	Rajgriha	Mahakassapa
Second	383 BC	Vaishali	Sabakami
Third	250 BC	Patliputra	Mogaliputta Tissa
Fourth	72 AD	Kundalvan	Vasumitra

### Buddhist Scriptures

- Tripitakas
- Vinay Pitaka consist rules of monastic discipline for monks.
- Sutta Pitaka is the collection of Buddha's sermons.
- Abhidhamma Pitaka is the philosophy of Buddha's teachings.
- **Milindapanho** (i.e. Questions of Milinda)—a dialogue between **Milinda** (identical with Indo-Greek ruler **Menander**) and Buddhist saint **Nagasena**.
- Dipavamsha and Mahavamsha—The great chronicles of Sri Lanka.
- **Sects of Buddhism: Hinayana (i.e. Lesser Vehicle):** (i) Its followers believed in the original teachings of Buddha. (ii) They sought individual salvation through self-discipline and meditation. (iii) They did not believe in idol-worship. (iv) They favoured **Sanskrit** language. (v) It is known as Northern Buddhist Religion, because it prevailed in the North of India, e.g., China, Korea, Japan, etc. (vi) There were two subsects of Mahayana-Madhyamika/Shunyavada (founder-Nagarjuna) and Yogachar/Vijnanavada (founder-Maitreyanath and his disciple Asanga).

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

### SACRED SHRINES

- Lumbini, Bodh Gaya, Sarnath and Kushinagar, 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, Sravasti, Rajgriha, Vaishali and Sankasya—these eight places have all long been considered as the eight holy places (Ashtasthanas).
- Other centres of Buddhism in Ancient India—Amaravati and Nagarjunakonda in Andhra Pradesh; Nalanda in Bihar; Junagadh and Vallabhi in Gujarat; Sanchi and Bharhut in M.P.; Ajanta-Ellora in Maharashtra; Dhaulagiri in Orissa; Kannauj, Kaushambi and Mathura in U.P. and Jagadala and Somapuri in West Bengal.
  - i. Stupa—relics of the Buddha or some prominent Buddhist monks are preserved.
  - ii. Vihara—residence.

### ROYAL PATRONS

- Bimbisara and Ajatshatru (Magadhan ruler), Prasenjit (Kosala ruler), Udayan (Vatsa ruler), Pradyota (Avanti ruler), Ashoka and Dasharatha (Mauryan ruler), Milinda/Menander (Indo-Greek ruler), Kanishka (Kushana ruler), Harshavardhana (Vardhana ruler); Gopala, Dharampala and Rampala (Pala rulers).

#### Notes:

- i. Ashoka, the greatest patron of Buddhism, called 3rd Buddhist Council and sent mission comprising his son **Mahendra** and his daughter Sanghamitra to **Sri Lanka**.
- ii. Kanishka called 4th Buddhist Council and sent mission to China, Korea and Japan.
- iii. Palas of Bengal and Bihar were the last great patrons of Buddhism.

## CAUSES FOR THE DECLINE OF BUDDHISM

- Incorporation of rituals and ceremonies, it originally denounced.
- Reform in Brahmanism and rise of Bhagavatism.
- Buddhists took up the use of Sanskrit (earlier Pali), started practising idol worship, receiving offerings and huge donation.

## SOME FAMOUS BUDDHIST SCHOLARS

- Ashvaghosha, Nagarjuna, Asanga, Vasubandhu, Buddhaghosha, Dinnaga and Harmakirti.
- Buddhist Architecture:** Buddhism takes the credit for first human statues to be worshipped.
- Stone pillars depicting the life of Buddha are at Gaya, Sanchi and Barhut.
- Gandhara art and the beautiful images of the Buddha.
- Gaya architecture in the Barahat hills at Gaya and in the Western India around Nashik.
- Art pieces of Amaravati and Nagarjunakonda.
- Stupa relics of Buddha or some prominent monks.

### Buddhist Universities

Buddhist University	Location	Founder
Nalanda	Badagaon	Kumargupta I
Vikramshila	Bhagalpur	Dharmapala
Somapuri	North Bengal	Dharmapala
Jagadai	Bengal	Ramapala
Odantpuri	Bihar Sharif	Gopala
Vallabhi	Gujarat	Bhattark

## JAINISM

- It was founded by Rishabhdeva.
- According to Jain tradition, there were 24 **Tirthankaras** (literally Ford makers, across the stream of existence), the first being Rishabhdeva/Adinatha and the last being Mahavira.
- The **Vishnu Purana** and the **Bhagavat Purana** describe Rishabha as an incarnation of Narayana.

The name of two Jain Tirthankaras—**Rishabha** and **Arishtanemi** are found in the **Rigveda**.

**Parshvnath:** 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, i.e., **Brahmacharya** (chastity) to it.

## JAIN TIRTHANKARAS

- |                    |                     |
|--------------------|---------------------|
| 1. Rishabhdev      | 13. Vimalnath       |
| 2. Ajitnath        | 14. Anandanath      |
| 3. Sambhavnath     | 15. Dharmanath      |
| 4. Abhinandan      | 16. Shantinath      |
| 5. Sumitnath       | 17. Kunthunath      |
| 6. Padmaprabhu     | 18. Arnath          |
| 7. Suparsavanath   | 19. Mallinath       |
| 8. Suridhi         | 20. Munisuvratanath |
| 9. Chandraprabh    | 21. Neminath        |
| 10. Sheetal Nath   | 22. Arishtanemi     |
| 11. Shreyanshanath | 23. Parshvanath     |
| 12. Vasupujya      | 24. Mahavira        |

## MAHAVIRA'S LIFE

- Mahavira was born in 540 BC in a village named **Kundgrama** near **Vaishali** in **Bihar**.
- His father **Siddhartha** was the head of the **Jnathrika Kshatriya** clan under Vajji of Vaishali and his mother **Trishala** was the sister of Chetaka, the king of Vaishali. Mahavira was also related to Bimbisara.
- Mahavira was married to **Yashoda** (daughter of Samavira king) and a daughter **Anonja Priyadarshini**, whose husband **Jamali** became the first disciple of Mahavira.
- At the age of 30, he renounced his family, became an ascetic and proceeded in search of truth. He was accompanied by **Makkhali Gosala**, but, later, due to some differences, Gosala left him and founded **Ajivika** sect.
- At the age of 42, under a sal tree at Jambhikagrama on the bank of river Rijupalika, **Mahavira** attained **Kaivalya** (supreme knowledge).
- From then onwards, he was called **Kevalin Jina** or **Jitendriya Nrigranatha**, **Arihant Mahavira**.

- He delivered his first sermon at **Pava**.
- At the Age of 72 in 468 BC, he passed away at **Pavapuri** near **Bihar Sharif** in **Bihar**.

## TEACHINGS OF MAHAVIRA

- Rejected the authority of Vedas and did not believe in existence of God.
- He believed that every object possesses a soul. So he professed strict non-violence.
- Attainment of salvation by believing in penance and dying of starvation.
- Universal brotherhood (equality) and non-belief in caste system.
- He believed in karma and transmigration of soul.

## DOCTRINES OF JAINISM

- **Triratnas**, i.e., **Three Gems of Jainism**
  1. **Samyak Shradha/Vishwas (right faith)**: It is the belief in Tirthankaras.
  2. **Samyak Gyan (right knowledge)**: It is the knowledge of the Jain creed.
  3. **Samyak Karma/Acharana (right action/conduct)**: It is the practice of the five vows of **Jainism**.

### Five Carinal Principles

- Non-injury (Ahimsa).
- Non-lying (Satya).
- Non-stealing (Asteya).
- Non-possession (Aparigraha).
- Observing continence (Brahmacharya).

- Mahavrata monks, who observed five principles.
- Anuvratas lay members, who observed five principles. The first four principles were given by Parshvnath while fifth was added by Lord Mahavira.

### Five Instruments of Knowledge

- Mati jnana
- Avadhi jnana
- Shruta jnana
- Manahparyaya jnana
- Keval jnana

## JAIN PHILOSOPHY

- **Syadvada**—All our judgements are necessarily relative, conditional and limited.

- **Anekantavada**—Doctrine of merriness of reality.

## JAIN LITERATURE

- The sacred literature of the Svetambaras is written in a type of **Prakrit** called **Ardhamagadhi Prakrit**.
- The important Jain texts are: (i) **Kalpasutra** (in Sanskrit)—Bhadrabahu, (ii) **Bhadrabahu Charita**, (iii) **Parishishta Parvan** (an appendix of **Trishashthi-shalaka Purush**)—Hemchandra.

## SACRED LITERATURE

- The sacred literature of the Svetambaras is written in a form of Prakrit called Ardhamagadhi, and may be classified as follows:
  - (a) The twelve Angas
  - (b) The twelve Upangas
  - (c) The ten Parikarnas
  - (d) The six Chheda-sutras
  - (e) The four Mula-sutras.

## SECTS OF JAINISM

- After the death of Mahavira, during the reign of King **Chandragupta Maurya**, a severe famine led to a great exodus of Jain monk from Ganga valley to the Deccan. This migration led to a great schism in Jainism.
- **Bhadrabahu**, who led the emigrants, insisted on the retention of the rule of nudity, which Mahavira had established for the **Digambaras**.
- **Sthulabhadra**, the leader of the monk, who remained in the North allowed his followers to wear white garments—**Svetambaras**.

## JAIN COUNCILS

- First Jain council was held at Pataliputra in the fourth century BC under the leadership of Stulabahu.
- Second Jain council was at Vallabhi in Gujarat in third century under the leadership of Aryaskandil Nagarjuna Suri.
- Third Jain council was held at Vallabhi in 5th century A.D. under the leadership of Devardhi Kshama Sramana.

## CAUSES BEHIND THE DECLINE OF JAINISM

- Extreme observance of ahimsa, penance and austerity.
- No patronage from later kings.
- The Jains did not make any efforts to spread their religion.

### Examples of Jain Architecture:

- Guphas, i.e. caves
- Dilwara temples
- Statue of **Gomateshwara/Bahubali**– Shravancelagola (Karnataka).

## ROYAL PATRONS

- I. North India:** 1. Nandas: Bimbisar, Ajatshatru and Udayin (Haryank), Chandragupta Maurya, Bindusara

and Samprati (Mauryan) Magadha. 2. Pradyota (Avanti). 3. Udayan (Sindhu-Sauvira). 4 Kharavela (Kalinga).

- II. South India:** 1. Ganga Dynasty. 2. Kadamb Dynasty. 3. Amoghavarsha (Rashtrakuta Dynasty). 4. Sidharaj Jai Singh and Kumarpal (Chalukya/Solanki) were the last great patrons of Jainism.

## SIMILARITIES BETWEEN BUDDHISM AND JAINISM

- Both opposed Brahmanical domination and caste system, but upheld the essence of Vedas, preached truth, non-violence, celibacy and detachment from material comforts, believed in karma and rebirth and were liberal towards women.

## Other Heterodox Sects

Sect	Founder	Theory
Ajivikas	Gosala Maskariputra	Believed in Faith called 'Niyati'
Amoralism	Purana Kassapa	Sankhya Philosophy
Lokayata or Charvaka School	Ajita Keshakambalin	Uchchedavada annihilationism
Hindu Vaisheshika School	Pakudha Katccayana	Sorrow, happiness and life are indestructible like Earth, water etc.

## MAURYA PERIOD (322 BC-185 BC)

### SOURCES FOR MAURYAN HISTORY

#### 1. Literary Sources

- **Kautilya's Arthashastra:** It is a treatise on government and polity.
- **Indica of Megasthenes:** Socio-economic and administrative structure under Mauryas.
- **Vishakha Datta's Mudra-rakshasa:** It describes how Chandragupta Maurya got Chanakya's assistance to overthrow the Nandas. Besides this, it gives an excellent account of the prevailing socio-economic conditions.
- **Dipavamsa and Mahavamsa (Sri Lankan chronicles):** Ashoka's role in spreading of Buddhism in Sri Lanka.
- **Jataka's** socio-economic conditions of Mauryan period.

- Sthaviravali Charita or Parishishthaparvan of Hemachandra (a biography of Chanakya).
- Chandragupta's conversion to Jainism.
- **Puranas** give us the chronology and lists of Mauryan kings.
- **Buddhist Literature:** 1. Indian Buddhist text **Jatakas** reveal a general picture of socio-economic conditions. 2. **Dipavamsa** and **Mahavamsa** describe the part played by Ashoka in spreading Buddhism to Sri Lanka. 3. Tibetan Buddhist text **Divyavadana** gives information about Ashoka and his efforts to spread Buddhism.

#### 2. Archaeological Sources

- **Ashoka's edicts and inscriptions:** Their importance came to be appreciated only after their decipherment by James Pracep in 1837. Though **Prakrit** was the language used in them, the script varied from region to region (**Kharosthi** in the North-west, **Greek**

and **Aramaic** in the West and **Brahmi** in the East of India).

- **Other inscriptions:** Junagadh Rock Inscription of Rudradaman, Sohgaura Copper Plate Inscription in the Gorakhpur district of U.P.

### 3. Epigraphical Evidences

- Ashoka's edicts were first deciphered by James Princep in 1837. It was written in Prakrit language and three scripts, viz. Kharoshthi in North-west, Greek and Aramaic in the West and Brahmi in the East of India.

### Various Edicts of Mauryan Age

Edict	Content	Location
A Rock Edicts • 14 Major Rock Edicts	Ashoka's Principle of government and policy of Dharma.	Kalsi (Dehradun) Girnar (Gujarat Yerragudi) (Andhra Pradesh), Mansehra (Pakistan) Sopara (Bombay), Dhauli and Jaugada (Odisha) Shahbazgarhi Pakistan
• Two Separate Kalinga Edicts	Kalinga war and new system of administration after war (All men are my children-Dhauli)	Dhauli or Tosali, and Jaugada (Odisha)
• Minor Rock Edicts	Personal history of Ashoka and summary of his Dharma	South and central Parts of the empire
B. Pillar Edicts • 7 Pillar Edicts	Appendix of the Rock Edicts	Delhi-Topra, Delhi-Meerut, Rampurva, Lauriya-Araraj, Lauriya-Nandangarh and Allahabad-Kosam

### ORIGIN OF THE MAURYAS

- The Puranas describe them as Shudras.
- Mudrarakshasa of Visakhadatta uses the terms Vaishali Kulthina (of low).
- The Junagadh Rock Inscription of Rudradaman (150 AD) suggesting that the Mauryas might have been of Vaishya origin.
- The Buddhist work, on the other hand, tries to link the Mauryan dynasty with the Sakya Kshatriya clan to which Buddha belonged.
- In conclusion, we can say that the Mauryas belonged to the Moriya tribe.

- Chandragupta defeated Seleucus I Nicator, the general of Alexander in North-West India in 305 BC.
- Seleucus sent a Greek Ambassador, **Megasthenes**, to the court of Chandragupta Maurya.
- Chandragupta embraced Jainism and went to Chandragiri Hill, at Shravasti with Bhadrabahu, where he died of slow starvation (Salekhan).
- Chandragupta was the first Indian ruler to unite the whole North India.
- In 305 BC, Chandragupta Maurya defeated Seleucus Nikator, who surrendered a vast territory.

### CHANDRAGUPTA MAURYA (322 BC-298 BC)

- Also called **Sandrocottus/Androcottus** by the Greek scholars.
- He entered into alliance with Pravartaka and with the help of Chanakya, he dethroned the last Nanda ruler Dhanananda and founded the Mauryan dynasty with capital at Patliputra.

### BINDUSARA (298 BC-273 BC)

- Chandragupta Maurya was succeeded by his son Bindusara.
- Bindusara was known to the Greeks as **Amitrochates**.

- Bindusara asked **Antiochus I of Syria** to send some sweet wine, and said that Greek philosophers are not for sale.
- He extended the kingdom further to the peninsular region of India as far south as Mysore.
- Antiochus I, the Seleucid king of Syria, sent his Ambassador, **Deimachus**, to his court. Pliny mentions that Ptolemy Philadelphus of Egypt sent **Dionysus** as his Ambassador to the court of Bindusara.
- Bindusara patronised **Ajivikas**.

## ASHOKA (273 BC-232 BC)

- He was the greatest Mauryan ruler; Governor of Taxila and Ujjain previously. His rule extended to the whole of sub-continent except extreme south. It also included Afghanistan, Baluchistan, Kashmir and valleys of Nepal.
- According to Buddhist tradition, Ashoka usurped the throne after killing his 99 brothers and spared **Tissa**, the youngest one.
- 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 fought the **Kalinga War** in 261 BC in the 9th year 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 **Dhammadhosa**.
- Ashoka was not an extreme pacifist. He retained Kalinga after his conquest and incorporated it into his empire.
- He embraced Buddhism under **Upagupta**.
- He sent his son Mahendra and daughter Sanghamitra to Ceylon as Buddhist missionaries with a sapling of original peepal tree.
- He inaugurated **Dharma Yatras** from the 11th year of his reign by visiting Bodh Gaya; also appointed Dharma Mahamatras (officer of righteousness to spread the message of Dharma).

- Ashoka sent missionaries to the kingdoms of the Cholas and the Pandyas and five states ruled by Greek kings (Antiochus II, Syria; Philadelphus Ptolemy II, Egypt; Antigonus, Macedonia; Magnus, Syria; Alexander, Epirus).

## 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 Brahmins and Buddhist monks show mercy to slaves and servants.

## LATER MAURYAS (232 BC-185BC)

- Ashoka's death was followed by the division of the Mauryan Empire into two parts- Western and Eastern.
- The Western part came to be ruled by **Kunala** (son of Ashoka) and the Eastern part came to be ruled by **Dasaratha**.
- The last Mauryan ruler, **Brihadratha**, was assassinated in 185 BC by his commander-in-chief, **Pushyamitra Sunga**.
- Causes for the Decline:** 1. Highly centralised administration. 2. Peaceful policy of Ashoka. 3. Brahmanical reaction. 4. The partition of the Mauryan Empire. 5. Weak later Mauryan rulers. 6. Pressure on Mauryan economy. 7. Neglect of North-West Frontier.

## MAURYAN ADMINISTRATION

### 1. Central administration

- The Mauryan government was a centralised bureaucracy, of which the nucleus was the king.
- The Mantri Parishad:** The king was assisted by Mantri Parishad, whose members included:
  - The Yuvaraja** (the crown prince)
  - The Purohita** (the chief priest)
  - The Senapati** (the commander-in-chief) and other ministers.

Administrative Officers	Duties
• <b>Nagaraka</b>	The officer-in-charge of the city administration

• <b>Sitaadhyaksha</b>	Supervised agriculture.
• <b>Panyaadhyaksha</b>	Superintendent of commerce.
• <b>Samsthadhyaksha</b>	Superintendent of market.
• <b>Pauthavadhyaksha</b>	Superintendent of weight and measures.
• <b>Navadhyaksha</b>	Superintendent of ships.
• <b>Sulkadhyaksha</b>	Collector of tolls.
• <b>Akaradhyaksha</b>	Superintendent of mines.
• <b>Lohadhyaksha</b>	Superintendent of iron.
• <b>Amatyas</b>	The Secretaries.
• <b>Sannidhata</b>	Chief treasury officer.
• <b>Samaharta</b>	The collector general of revenue.
<b>Durgapala</b>	Governor of fort.
<b>Antapala</b>	Governor of the frontier.
<b>Akshapatala</b>	Accountant General.
<b>Vachabhumiika</b>	Officer-in-charge of the rest houses, groves and wells, etc.
<b>Lipikaras</b>	Scribes.
<b>Dhamma</b>	A new post created by Asoka, empowered with the dual functions of mahamatras propagating Dhamma and taking care of the commonfolk for their material well-being.

- **Prativedikas:** Reporters.
- **Kumaras:** The viceroys in-charge of a province. Generally, they were of regular though the exceptions were also there. In order to check the growing power of the viceroys, the provincial ministers were empowered sufficiently.
- **Pradesikas:** They were the modern district magistrates and in-charge of district. They were to make tours once in every 5 years to inspect the entire administration of the areas under control.
- **Rajukas:** They were the later-day Patwaris. They were responsible for surveying and

assessing the land. In rural areas, they were the judicial officers.

- **Yukta:** A subordinate revenue officer of the district level. He was responsible for the secretarial work of accounting.
- **Gopa:** Responsible for accounts.
- **Sthanika:** The tax-collecting officer directly under the control of the Pradesikas.

## ARMY

- The most striking feature of the Mauryan administration was the maintenance of a huge army. They also maintained a Navy.
- In the Mauryan period, there were two types of **Gudhapurushas** (detectives): **Sansthan** (stationary) and **Sanchari** (wandering).
- Tax collected from peasants varied from 1/4th to 1/6th of the produce.
- The state also provided irrigation facilities (**Setubandha**) and charged water-tax.
- **Sohgaura** (Gorakhpur district, U.P.): Copper plate inscription and **Mahasthana** (Bogra district, Bangladesh) inscription deal with the relief measures to be adopted during famine.
- **Important ports:** **Bharukachch/Bharuch** and **Supara** (Western coast) **Tamralipti** in Bengal (English coast).
- During Mauryan period, the punch-marked coins (mostly of silver) were the common units of transactions.

## Provincial Administration

Provinces	Capital
Uttarapatha (North)	Taxila
Avantipatha (West)	Ujjain
Prachypatha (South)	Suvarnagiri
Central Province	Pataliputra

## SOCIETY

- Kautilya's *Arthashastra* looked upon the Shudras as an Aryan community.
- Reduction of gap between the **Vaishyas** and the **Shudras**.
- **Megasthenes** states that the Indian society was divided into 7 classes.
- Women occupied a high position and freedom in the Mauryan society. According to Kautilya, women were permitted to have a divorce/remarry. Women were employed as

personal bodyguards of the king spies and in other diverse jobs.

### MAURYAN ART

- The Mauryans introduced stone masonry on large scale during Ashoka's reign.
- Fragments of stone pillars and wooden floor and ceiling indicating the existence of an 80-pillared hall have been discovered at Kumhrar at the outskirts of Patna. Seeing this, **Fahien** remarks as follows: **These palaces are so beautiful and excellent that they appear to be the creation of God rather than of men.**
- Four-lion capital at Sarnath and Sanchi. Lion capital of Sarnath adopted as the National Emblem of India on 26th January, 1950.
- Single-lion capital at Rampurva and Lauriya Nandangarh.
- Single-bull capital at Rampurva.
- A carved elephant at Dhauli 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 examples are **Barbar caves** in Gaya (Ashokan). The other examples are **Nagarjuni caves** in Gaya (**Dasharatha**).

### SIGNIFICANCE OF MAURYAN RULE

- Many **Gurukuls** and **Buddhist** monasteries (Taxila and Banaras) developed with royal patronage.
- Literary development, e.g., *Arthashastra* (Kautilya), *Kalpasutra* (Bhadrabahu), *Katha Vastu* (Buddhist text), *Bhagwati Sutra*, *Acharanga Sutra* and *Dasavali* (Jain text).

## POST-MAURYA/PRE-GUPTA PERIOD (185 BC-319 AD)

### THE SUNGA DYNASTY (185 BC TO 73 BC)

- Sunga Dynasty was established by **Pushyamitra Sunga**, a Brahmin Commander-in-Chief of the last Mauryan ruler named Brihadratha in 185 BC.
- Pushyamitra was a staunch adherent of orthodox Hinduism. However, the great

Buddhist stupa at Bharhut (in MP) was built during the reign of Sungas.

- Pushyamitra Sunga** ruled from Vidisha (MP). He defeated Bactrian king, Demetrius and conducted two Ashvamedha Yajnas (chief priest—**Patanjali**). He is considered to be the persecutor of Buddhism.
- Pushyamitra was succeeded by his son **Agnimitra**, the hero of Kalidasa's drama **Malavikagnimitra**.
- Patanjali**, author of the **Mahabhasya** was born at Gonarda in Central India. Patanjali was the priest of two Ashvamedha Yajnas, performed by Pushyamitra Sunga.
- The fine gateway railing which surrounds the Sanchi stupa, built by Ashoka, was constructed during the Sunga period.
- The Greek Ambassador **Heliodorus** visited the court of fifth Sunga king **Bhagabhadra** and set up a pillar in honour of Lord Vasudeva near Vidisha (MP).
- The famous book on Hindu law **Manusmriti** was compiled during this period.
- Later Kings**—Vasumitra, Vajramitra, Bhagabhadra and Devabhuti.
- Sunga Art-Bharhut Stupa, gateway railing surrounding the Sanchi Stupa built by Ashoka, Vihara, Chaitya and Stupa of Bhaja (Poona), Nasika Chaitya, Amaravati Stupa, etc.

## KANVA DYNASTY (73 BC-28 BC)

- 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.
- Bhumimitra** and **Narayana** succeeded Vasudeva.
- The last ruler, Susarman, was killed by Andhra King, Simuka.

## SATAVAHANA DYNASTY (60 BC-225 AD)

### CAPITAL-PRATISHTHAN-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 Andhars, who were mentioned in the Puranas.
- Simuka** (60 BC-37 BC) was the founder of the Satavahana Dynasty.
- Satakarni I**, its third ruler, raised its power and prestige by conquests.
- Hala** was the author of **Gathasaptashati** or **Sattasi** in Prakrit. **Gunadhyā**, the author (in Prakrit), was the contemporary of Hala.
- Gautamiputra Satakarni** revived the Satavahana power and defeated the Saka Satrap Snehabana. He was the greatest Satavahana ruler.
- Yajna Sri Satakarni** was the dynasty's last great ruler.
- Vasishthiputra Sri Satkarni** married to daughter Saka Satrap Rudradaman.
- Pulamayi III** was the last Satavahana ruler succeeded by Ikshavakus in the 3rd century BC.
- Satavahanas started the practice of donating land with fiscal and administrative immunities to Brahmanas and Buddhist monks, which eventually weakened their authority.
- Under the Satavahanas, many Chaityas (worship halls) and Viharas (monasteries) were cut out from rocks. The famous examples were **Nasik**, **Kanheri** and **Karle**.
- Stupas**: 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**.

#### Important Aspects of Satavahanas

- They issued mostly lead coins.
- Satavahanas were the Brahmins.
- Satavahanas rulers called themselves Brahmins.
- Stupas at Nagarjunakonda and Amravati in Andhra Pradesh became important seats of Buddhist culture under Satavahanas.
- In the Satavahana phase, many Chaityas, e.g., Karla caves in Western Deccan, Nasik and Kanheri and Viharas were cut out of the soiled rock in the North-Western Deccan.

## THE CHETI DYNASTY OF KALINGA

- The Hathigumpha inscription of Kharavela, the third ruler of the dynasty, gives information about the Chetis.
- Kharavela pushed his kingdom upto Godavari in the south and recovered the Jain image from Magadha.
- He was a follower of Jainism. He constructed residential caves for Jain monks on the Udayagiri Hill near Bhubaneswar, Orissa (now Odisha).

## FOREIGN SUCCESSORS OF MAURYAS

### THE INDO-GREEKS (2ND CENTURY BC)

- Indo-Greeks (Bactrian Greeks) were the first foreign rulers in North-Western India in the post-Maurya period.
- The first to invade India were the Indo-Greeks.
- They occupied a large portion of North-Western India and moved upto Ayodhya and Patliputra.
- The most famous Indo-Greek ruler was **Menander** (165 BC-145 BC) or Melindo. He had his capital at Sakala (modern Sialkot in Punjab). He was converted to Buddhism by Nagasena. Menander and Nagasena's conversation were recorded in the book **Milindapanho** or 'the questions of Milinda'.
- 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 Hellenic, i.e., Greek features in art giving rise to **Gandhar 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.
- The most famous Saka ruler in India was **Rudradaman** (130 AD). He repaired the

famous Sudarshan lake of the Mauryan period and he issued the first-ever long inscription in chaste Sanskrit, depicting his patronage of Sanskrit.

- In about 58 BC, the 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)

- Parthians** replaced the Sakas in North-Western India.
- 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 KUSHANAS (1ST CENTURY AD-3RD CENTURY AD)

- Kushanas replaced the Greeks and Parthians.
- The first Kushana dynasty was founded by Kujula Kadphises. Vima Kadphises issued gold coins in India. Kanishka founded the second Kushana dynasty.
- Their capitals were at **Peshawar (Purushapura)** and **Mathura**.
- The most famous Kushana ruler was Kanishka, 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.
- Kanishka was a great patron of Mahayana Buddhism. In his reign, **4th Buddhist Council** was held in **Kundalavana, Kashmir** where the doctrines of the Mahayana form of Buddhism were finalised.
- The last great Kushana ruler was Vasudeva I.
- The Kushanas controlled the famous **silk route** starting from China, passing through their empire on to Iran and Western Asia.
- The Kushanas were the first rulers in India to issue gold coins on a wide scale.
- In the royal court of Kanishka, a host of scholars found patronage. **Parsva, Vasumitra, Asvaghosha, Nagarjuna, Charaka** and **Mathara** were some of them.
- Important ports:** **Barygaza (Bharuch), Barbaicum (Western Coast), Aricamedu**

(**Podeku** according to Periplus) near Pondicherry, Eastern Coast.

- Kushana Empire gave rise to Gandhara and Mathura Schools of Art.
- Vatsyayana wrote **Kamasutra** in this period.

### GANDHARA SCHOOL OF ART

- It exhibits the influence of Greek and Roman art; patronised by Shakas and Kushanas.
- They used blue schist stone.

### MATHURA SCHOOL OF ART

- Buddha of Gandhara Art was copied here, but in a refined way.
- The majority of creation consisted of nude, seminude figures of females, Yakshinis or Apsaras in erotic poses.

### GUPTA PERIOD (319 AD-540 AD)

- Guptas arose in Magadha and established a large kingdom over the greater part of Northern India. Their empire was not as large as that of the Mauryas.
- This period is referred to as the Classical Age or Golden Age of ancient India.
- Although the Gupta Empire was not as large as the Maurya Empire, it kept North India politically united for more than a century.
- Sri Gupta was the founder of the Gupta dynasty. Sri Gupta was followed by his son Ghatotkacha and he was followed by his son Chandragupta. Both used the simple title of Maharaja.

### CHANDRAGUPTA I (319AD-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. He got married to the Lichchhavi princess **Kumaradevi**.
- He started the **Gupta Era** in 319AD-320AD.
- He established his authority over Magadha, Saketa and Prayaga.

### SAMUDRAGUPTA (335AD-380 AD)

- Samudragupta was the greatest king of the 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 **Harisena**.
- According to Prayaga Prasasti, he was a great conqueror.
- 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 Malaya islands in the sea shows that he had a navy.
- Samudragupta annexed the territories after defeating the monarchs in North India, but did not annex territories in South India.
- When he died his mighty empire bordered that of the Kushana of Western province and Vakatakas in the Deccan province.
- Titles:** **Kaviraja Param Bhagavat** Ashvamedha-parakrama Vikram Sarva-rajochchhetta only Gupta ruler had the title of **Sarva-raj-ochchhetta**.
- Allahabad pillar inscriptions mention the title Dharma Prachar Bandhu, i.e. he was the upholder of Brahmanical religion.
- Meghavarna**, the king of Sri Lanka, sent an Embassy to Samudragupta with his permission build a monastery for Buddhist pilgrims at Bodh Gaya.

### Gupta kings, their titles and coins

Gupta Kings	Titles	Gold Coins
Chandragupta I	Maharajadhiraja or king of the king	Kumardevi type
Samudragupta	Kaviraj (Prayag Prasati Ashvamedha, Vikram, Param, Bhagvat, Sarva-rajochchhetta)	Dhanurdhari-Archer Garud, Axe, Ashvamedha. Vyaghra hanam (Tiger Killing) Veena Vadana
Chandragupta II	Vikramaditya, Sakari Devagupta/ Devashri/Devraja Narendra. Chandra Singh Vikram Param Bhagvata etc.	Ashvarohi Chhatradhari Chakra-Vikram type etc.
Kumargupta	Mahendraitya, Ashvamedha Mahendra and Mahendra Singh	Gajarohi, Khadgadhari, Gajarohi, Sinh-nihanta, Khang-nihanta, Kartikeya and Apratighmudra type
Skandgupta	Vikramaditya Kramaditya, Param Bhagvat (on coins) Shakrapoma (Kahaum Pillar inscription); Devaraja (Arya Manjushri Mula Kalpa)	Archer king and queen, chhatra and horseman type

### CHANDRAGUPTA (II) VIKRAMADITYA (380 AD-414 AD)

- According to Devi Chandragupta (Vishakha Datta), Samudragupta was succeeded by **Ramagupta**. He was the only Gupta ruler to issue copper coins.
- He married **Kubernaga** of the Naga dynasty and married his daughter **Prabhavatigupta** to Vakataka prince **Rudrasena II**.
- Chandragupta II conquered Western Malwa and Gujarat, from the Shaka Kshatrapas Rudrasena III.**
- 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 Qutub Minar, Delhi) Iron Pillar inscription says that the king defeated the confederacy of Vangas and Vahilkas (Bulkh).

### KUMARAGUPTA I (415 AD-455 AD)

- Chandragupta II was succeeded by his son Kumaragupta I.
- He founded the **Nalanda Mahavihara** which developed into a great centre of learning.

**Navratna (Nine Gems) of Chandragupta II**

- |  |                                       |
|--|---------------------------------------|
| 1. Kalidas (Poetry: Ritusamhara, Meghadutam Abhijnan Shakuntalam). | medicine text)                        |
| 2. Amarsinh (Amarsinh Kosha)                                       | 4. Varahamihira (Panchar Siddhantika) |
| 3. Dhanvantri (Navanitakam)  | 5. Vararuchi                          |
|  | 6. Ghatakarna                         |
|  | 7. Kahapranak                         |
|  | 8. Velabhatta                         |
|  | 9. Shanku                             |
- It was in Chandragupta's time that the Chinese pilgrim **Fahien** visited India.

**VAKATAKAS (3<sup>RD</sup> CENTURY AD-5<sup>TH</sup> CENTURY AD)**

- The Vakatakas were the important powers that held sway over parts of Deccan and Central India after the fall of the Satavahanas and before the rise of Chalukyas. The founder of the Vakataka dynasty was Vindhya Shakti (255 AD-275 AD). Vindhya Shakti was succeeded by his son Pravarsena I (275 AD-335 AD), who was the real founder of the Vakataka Empire. He performed four **Ashvamedha Yajnas**. Rudrasena I was the contemporary of Samudragupta.

**SKANDAGUPTA (455AD-467 AD)**

- He repulsed the ferocious Hunas' attacks twice. The heroic feat entitled him the title **Vikramaditya** (Bhitari Pillar Inscription).
- During his period, Sudarshana Lake was repaired and its embankments were rebuilt.

**CONTRIBUTION OF GUPTA RULERS**

- City Administration:** Paura was the council responsible for city administration.
- Army Military:** Chariots receded into the background and **cavalry** came to the forefront.
- Senabhatta:** It was a form of tax.
- Revenue:** Land revenue was the chief source of states' income.
- Judiciary:** For the first time, civil and criminal laws were clearly defined and demarcated.
- Coinage:** Guptas issued the largest number of gold coins, which were called **Dinaras** in their inscriptions. Silver coins were called **Rupayakas**.

**THE HUNAS (500 AD-530 AD)**

- The Hunas were primitive pastoralists owing herd of cattle and horses but knowing nothing about agriculture. Whenever the Gupta Empire's resistance collapsed, the Hunas occupied the areas upto Central India and Malwa about 500 AD. There were two powerful Huna rulers, **Toramana** and his son **Mihirakula**. **Mihirakula**, a Shaivite, was a persecutor of Buddhism. Hunas were uprooted by Yashodharman of Mandsaur.

**ADMINISTRATION**

- The Gupta administration was highly decentralised.
- The practice of appointing the crown prince (**Kumara**) came in vogue.
- The Gupta kings were assisted by a council of ministers (**Mantriparishad/ Mantrimandalam**).
- Among the high officers, we may take special notice of the **Kumaramaty** and the **Sandhivigrahika**.
- The **Kumaramatyas** formed the chief cadre for recruiting high officials under the Guptas.
- The office of **Sandhivigrahika** first appears under Samudragupta, whose Amatya **Harisena** held this title.
- 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.
- In the Gupta period, for the first time, civil and criminal laws were clearly defined and demarcated.
- Gupta kings depended primarily on land revenue.
- The villagers were subjected to forced labour called **Vishti** for serving royal army and officials.
- The Gupta period also experienced an excess of land grants.

**SOCIETY**

- The Supremacy of Brahmins** continued.
- The Varna system begins to get modified owing to the proliferation of castes.

- The **Shudras** were permitted to listen to the epics and **Puranas** and also worship a new God called Krishna.
- Katyayana Smriti**, a writer of the Gupta period, was the first to use the expression **asprasya** to denote the untouchable.
- The position of women deteriorated further.
- Early marriages were advocated and often pre-puberty marriages took place.
- The first example of **Sati** appears in Gupta time in 510 AD in Eran in Madhya Pradesh.
- Women were denied any right to property except for **Stridhana** in the form of jewellery and garments.
- Idol worship became a common feature of Hinduism from the 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 **Pahadpur Copper Plate inscription** of Buddhagupta.
- The Guptas issued the largest number of gold coins in ancient India, but in gold content, Gupta coins are not as pure as the Kushanas.
- Trade:** There was decline in trade with the Roman Empire after 3rd century AD while the South-East Asian trade increased.
- The ports of the East coast—**Tamralipti**, **Ghantashala** and **Kandura**—handled the North-Indian trade with South-East Asia; and those of the West coast—**Bharuch**, **Chaul**, **Kalyan** and **Cambay**—traded with the Mediterranean and West Asia.

### Taxes

- Bhaga: King's share in the produce, to be paid by cultivators
- Bali: An additional and oppressive tax during Gupta period
- Bhoga: Periodic supplies of fruits, firewood, etc. which the villagers had to furnish to the king.
- Uparika: An extra tax levied on all subjects

- Rock-cut caves:** **Ajanta** and **Ellora Group** (Maharashtra) and **Bagh** (Madhya Pradesh).
- Structural Temples:** **Dasavatara temple** of Deogarh (Jhansi district, Uttar Pradesh), the oldest and the best.
- Stupas:** **Mirpur Khas** (Sindh), **Dhammadmekh** (Sarnath) and **Ratnagiri** (Orissa).
- The art of architecture had achieved greater heights. By evolving the **Nagara Style (Shikhar Style)**, the Guptas are usherers in the history of Indian architecture. The temple architecture, with its **garbha griha** in which the image of the God was placed, began with the Guptas.
- Samudragupta** is represented on his coins playing the Veena and Chandragupta II is credited with maintaining in his court nine **luminaries** or great scholars, viz. Kalidasa, Amarsingha, Dhanvantri, Varahamihira, Vararuchi (Vartika, a comment on Ashtadhyayi), Chatakarna, Kshapranaka, Velabhata and Shanku.
- Over two-metre-high **bronze image of the Buddha** of Gupta period has been recovered from **Bhagalpur**.
- The centres of the Gandhar sculptures declined and their places were taken by **Benares**, **Patliputra** and **Mathura**.
- For the first time, we get images of **Vishnu**, **Shiva** and other gods.
- Buddha's idols of sitting in Dharmachakra mudra (Sarnath) and his images of Bamiyan belong to this period.
- The paintings of this period are found in **Bagh** (Dhar district, MP) and **Ajanta** (Aurangabad district, Maharashtra).
- Stupas** were of Mirpur Khas (Sindh), Ratnagiri (Orissa) and Chammekh (Sarnath) regions.

## RELIGION

- Bhagavad Gita was written in this period.
- Idol worship in the temple became a common feature. The gods were unified with their respective consorts. Thus, Parvati got associated with Shiva and Lakshmi with Vishnu.
- There was also an evolution of Vajrayana and Buddhist tantric cult.

## CULTURE

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

- Buddhism** no longer received royal patronage in the Gupta period.

### Administrative Units and their heads

Unit	Headed by
Bhukti (Province)	Uparika
Vishayas (district)	Vishyapati Purapala/Nager
Nagar/Peth Village	Pati Gramika

### RELIGIOUS LITERATURE

- Hindu texts:** Many old religious books were rewritten, e.g., **Vayu Purana**, **Vishnu Purana**, **Manu Smriti** (translated into English under the title of "Institutes of Hindu Law", William Jones), **Ramayana** and **Mahabharata**.
- Buddhist text:** **Abhidharmakosa** written by Ignaga, **Visudhimagga** written by Buddhaghosa.
- Mrichakatikam** (e.g., the clay cart) is the love story of a poor brahmin Charudatta and virtuous **courtesan** Vasantasena.
- There was development of Sanskrit Grammar based on **Panini** and **Patanjali**. Amarakosha was compiled by Amar Singh.

### Important officials

Official	Field work
Maha Pratihari	Chief usher of Royal Palace
Danda pashika	Chief officer of the police department
Maha prajapati	Chief officer of elephant corps
Mahashvapati	Chief of Cavalry
Mahadandanayaka	Minister of justice

### ASTRONOMY (SCIENCE)

- Aryabhatta, the great mathematician, wrote **Aryabhatiyam** and **Surya Siddhanta**. He placed the value of first line number and the **use of zero** ('0').
- Varahamihira** wrote **Panchasiddhantika** and **Brihat Samhita**. He said the Moon moves round the Earth and Earth together with Moon move round the sun.
- Brahmagupta** hinted the law of gravitation in **Brahma-Sphuta-Siddhanta**. **Vagabhatta** was a distinguished **physician**.

- Dhanvantari** was famous for the knowledge of **Ayurveda**.
- Palakapya** wrote **Hastyagarveda**.
- Bhaskara** wrote **Mahabhaskarya** and **Laghu Bhaskarya**.

### Literary Works

Author	Book
Sudraka	Mrichakatikam
Sudraka	Mrichakatikam
Bharavi	Kiratarjuniya
Dandin	Dasa Kumar Charitra and Kavyadarshan
Bhasa	Svapnavasavadattam Charudatta
Vishakhadatta	Mudrakshasa Devi Chandraguptam
Vishnu Sharma	Panchtantra and Hitopadesha
Amiarismha	Amarkosh
Iswara Krishna	Sankhya Kanika
Vatsyana	Kamsutra
Bhatin	Ravan Vadha
Varahmihira	Panchasiddhantika Birhad Samhita

### POST-GUPTA PERIOD/VARDHANA DYNASTY (550 AD-647 AD)

- The Pushyabhuti or Vardhana dynasty was founded at **Thaneswar** (Karnal district, Haryana) by **Pushyabhuti**.
- The first important ruler of the dynasty was **Prabhakaravardhana** (580 AD-605 AD).
- Prabhakaravardhana was succeeded by his eldest son **Rajyavardhana** (605 AD-606 AD).

### HARSHAVARDHANA (606 AD-647 AD)

- Harshavardhana, also known as **Siladitya**, ascended the Pushyabhuti throne in 606 AD and from this year started the **Harsha Era**.
- He not only unified Kannauj with Thaneswar but also made it his new capital, which made him the most powerful king of North India.
- After the death of Shashanka (in 637AD), he conquered Magadha and Shashanka's empire.

- Harshavardhana defeated **Dhruvasena II** of Chalukya dynasty of Vatapi/Vadami. He inflicted a decisive defeat on him at the bank of Narmada. It was the only defeat of Harsha's victorious life.
- 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.
- In 641 AD, he sent an envoy to Tai-Tsung, the Tang Emperor of China. **Huen-Tsang**, the celebrated Chinese pilgrim, visited India during Harsha's reign.
- 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 honour of Huen-Tsang and to popularise Mahayana sect of Buddhism.
- Harshavardhana was a Shaiva by faith, but he showed equal respect to other sects. Huen-Tsang portrays him as a liberal Buddhist (Mahayana).
- He also granted revenue of 200 villages for the maintenance of Nalanda University.
- He died in 647 AD.
- He wrote three Sanskrit plays—**Nagananda**, **Ratnavali** and **Priyadarshika**. He gathered around him a circle of learned men, of whom **Banabhatta**, the author of **Harshacharita** and **Kadambari**, **Bhartrihari**, the author of **Niti Shataka**, **Shringar Shataka** and **Vairagya Shataka** (jointly called **Shatakatrayi**) are well-known.

## STATES OF THE DECCAN AND SOUTH INDIA

### CHALUKYAS OF VATAPI/VADAMI (543 AD-755 AD)

- The Vakataka power was followed by Chalukyas.
- Chalukyas established their capital at Vatapi/Vadami in the district of Bijapur in Karnataka.

- Pulakesin I (543–566 AD) founded the Chalukya dynasty, who claimed his descent either from Manu or Moon.
- Pulakesin II succeeded Kirtivarman-I. Pulakesin II ably put a check on Harsha's design to conquer Deccan.
- Aihole inscription** is an eulogy written by his court poet **Ravikirti**.
- The Chinese pilgrim Hiuen-Tsang visited his kingdom.
- Pallava ruler Narsimhavarman Mammala invaded the Chalukya kingdom, killed Pulakesin II and captured Vatapi. He adopted the title **Vatapikonda**, i.e. the conqueror of Vatapi.

#### Vesara Style/Deccan Style

- It was started by **Chalukyas**.
- Vesara style temples at Aihole (town of temples):
  - Jinendra temple (Meguti temple)
  - Vishnu temple
  - Lad Khan temple (god Surya)
  - Durga temple
  - Nagara style temple at Pattadakal
  - Papanatha temple
  - Dravida style temple at Pattadakal
  - Virupaksha temple
  - Sangamesvara temple

### THE ABHIRAS

- On the downfall of the Satavahanas, the Abhira Ishvarasha established himself in northern Maharashtra. He started an era in AD 249. It is known as Kalchuri-Chedi or Abhira era.

### THE SHAKAS OF MAHISHAKA

- It was founded by Mana after the decline of the satavahanas in the Deccan.

### PALLAVAS OF KANCHI

- They were orthodox Brahmanical Hindus and their capital was Kanchi.
- Both Chalukyas and Pallavas tried to establish their supremacy over land between Krishna and Tungabhadra.

Administrative Units of the Pallavas	Names of the Chiefs
Mandal (Province)	Rastrik
Nadu (District)	Deshatric
Village (Kottam–Group of villages)	Gram Bhojak

### PALLAVA ART

- Pallavas began the Dravida style of temple architecture, which reached culmination under the rule of Cholas.
- The Pallavas also contributed to the development of sculpture in South India.

### TRIPARTITE STRUGGLE

- The struggle for supremacy between the Palas, the Gurjara-Pratihara and the Rashtrakutas for the possession of Kannauj at the end of 8th Century AD is known as the Tripartite struggle in the history.

### KALACHURIS

- The early period the Kalachuris were known as Haihayas with Mahishmati as their capital.
- Krishnaraja, the earliest known chief of this dynasty was succeeded by his son Buddharaja.

### THE GANGAS

- Also called Chedagangas of Orissa.
- King Narsimhadeva constructed the Sun temple at Konarka.
- King Anantvarman Ganga built the famous Jagannath temple at Puri
- Kesaris, who used to rule Orissa before Ganga built the Lingaraga temple at Bhubaneshwar.

### THE SENAS

- They ruled Bengal after the Palas.
- Its founder was Samantsena. His grandson Vijayasena brought the family into limelight.
- The famous poet Shri Harsha composed the Vijayaprasasti in memory of Vijaysena.
- He was succeeded by Ballalasena. He wrote Danasagra and Adbhut Sagara.

- He was succeeded by Lakshmanasena Jayadeva. The famous Vaishnava poet of Bengal and the author Gita Govinda lived at his court.

### THE PALAS (750 AD-1150 AD), CAPITAL: MUDDAGIRI/MUNGER (BIHAR)

- Gopala founded the Pala Empire in 750 AD.
- His son Dharmapala (770 AD-810 AD) succeeded him. Dharmapala revived Nalanda University.
- He founded the Vikramshila University.
- The Pala dynasty was succeeded by Sena dynasty of Bengal. Jayadeva (Gita Govinda) was the great court poet of Laxman Sen.

### THE PRATIHARAS (730 AD-1036 AD)

- Bhoja/Mihir Bhoja (836 AD-882 AD) was the greatest ruler of this dynasty.
- He was a devotee of Vishnu and adopted the title of Adi-Varah.

### THE RASHTRAKUTAS (752 AD-953 AD)

- Dantidurg (752 AD-756 AD) who fixed his capital at Malkhand/Malkhed (Gulbarga district, Karnataka), founded the kingdom.
- The greatest Rashtrakuta rulers were Govinda III (793 AD-814 AD) and Amoghavarsha. Amoghavarsha wrote Kavirajamargam, 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.

### THE TRAIKUTAKAS

- Appear to be the feudatories of Abhiras at first.
- First ruler was Indra Dutta. Who was followed by Dahrasena, Vyaghrasena and Madhyamsena.
- Aniruddhapura was the capital of this kingdom.
- Vikramsen was the last known King of this dynasty.

### Temples Constructed by Rashtrakutas

Temple	Place	Constructed by
Tiruvalleswaram	Brahmadesha	Raj Raj I

Uttarkailash	Tiruvadi	Raj Raj I
Rajrajeswar	Tanjore	Rajendra I
Gangaikondchola	Gangai Kondacholapuram	Rajendra I
Airavateshwari	Darsunam	Raj Raj II
Kamhaveshwar	Tirumaranam	Kallotunga III
Vijayalcholeshwar	Naratmatai	Vijayalaya
Balsubramaniyam	Kannanur	Aditya I
Nageshwar	Kuminakanam	Aditya I
Kornagnain	Sriniwasnallur	Vartak I
Moverkaite	Padukottai	Bhutivikram Kesiri

## SANGAM AGE

### THE CHERAS

- The capital of Cheras was **Vanji**.
- Its main ports were **Muzris** and **Tondi**.
- One of the earliest and better known among Chera rulers was **Udiyangeral**.
- The greatest of Chera king, however, was **Senguttuvan** or **Red Chera**.
- He was also the founder of the famous **Pattini cult**.

### THE PANDYAS

- The Pandya's territory included modern districts of Tirunelveli, Ramnad and Madurai in Tamil Nadu. It had its capital at Madurai, situated on the banks of Vaigai river.
- The Pandya king sent emissaries to Roman emperor **Augustus** and **Trojan**.
- The earliest known Pandyan ruler was **Mudukudumi**.
- The greatest Pandya king was **Nendujelian**.

### SANGAM ADMINISTRATION

- The king was the centre of administration.
- Avai** was the court of the crowned monarch.
- Revenue Administration: Karai** (Land Tax), **Irai** (Tribute paid by feudatories and booty collected in war).

- Ulgu** (Customs duties), **Iraju** (Extra demand or forced gift), **Viriyam** (A well-known unit of territory yielding tax) and **Variyar** (Tax collector).
- Sangam** was an assembly of Tamil poets held under royal patronage of Pandyan kings in Madurai.
- The first Sangam** was attended by gods and legendary sages.
- Of **the second Sangam**, the only surviving work is **Tolkappiyam**, an early work on Tamil grammar written by **Tolakapryar**.
- Of **the third Sangam**, most of the works are surviving. These are **Ettuthogai**, **Pattupattu** and **Pathinenkilkanakku**.
- Kural** or **Muppal**, a part of Pathinenkilkanakku and written in Thiruvalluvar is called the Bible of the Tamil land. It is treatise on polity ethics and social norms.

### SANGAM LITERATURE

- The whole Sangam age is called Golden or Augustan Age. According to Tamil sources, the father of Tamil literature is Agastya.

### IMPORTANT SANGAM WORKS

- Tolkappiyam by Tolakapryar.
- Thirukural or Kural by Thiruvalluvar is sometimes called the 'fifth veda' or 'Bible of the Tamil land'.

### Sangam Regions

Panchtinai	Inhabitants	Occupation
Five tamil regions kurinji (hilly backwoods)	Kurvar, Vetar	Hunting, Gathering
Palai (Pastoral tract)	Eyinar Maravar	Cattle lifting, robbery
Mullai (Pastoral tract)	Ayar Idiyer	Shifting agriculture, animal husbandry
Marutam (wetlands)	Ulavar, Uellalar	Plough agriculture

### Tamil Sangams

Sangams	Venue	Chairman	Surviving Texts
1st	Madurai	Agastaya	—
2nd	Kapatapuram Alvi	Agastaya	Tolakappiyam (Tamil Grammar)
3rd	North Madurai	Nakkirar	Ettuogai Patinenki Lakanakku

#### EPICS

- **Silapathikaram** by Ilango Adigal is also called ‘Illiyyad’ of Tamil Poetry.
- **Bharatman** written by Perudevanar.

#### THE CHOLA EMPIRE (850 AD-1279 AD)

**Capital:** Tanjore, Gangaikonda Cholapuram.

- The founder of the Chola dynasty was **Vijayalaya**, who was at first a feudatory of the Pallavas. He captured Tanjore in 850 AD.
- The ancient capital of Cholas was **Palyarai**.
- **Vijayalaya** revived the Chola Empire in 9th century AD. He took the title of ‘Narkesari’.
- **Aditya Chola** defeated the Pallava king Aparajit, captured Tondamandalam and took the title of ‘Maduraikonda’. He built a Siva Temple at Tanjore.
- **Parantak I** established his authority over the North-Eastern part of Sri Lanka.
- **Rajaraja I** (985 AD-1014 AD) attacked over Sri Lanka. He permitted the Shailendra king to build the Churamani Buddhist Vihara at Nagapattanam.
- The greatest Chola rulers were **Rajaraja** (985 AD-1014 AD) and his son **Rajendra I** (1014 AD-1044 AD).
- **Rajaraja** built **Vrihadshwar/Rajarajeshwar temple** (attributed to Shiva) at Tanjore.
- **Rajendra I** conquered Orissa, Bengal, Burma and Andaman and Nicobar islands. The Chola dynasty was at its zenith during his reign.
- **Rajendra I** assumed the title of ‘Gangaikonda Cholam’ and built a city called Gangaikonda Cholapuram.
- **Rajendra I** (1014 AD-1044 AD) conquered the complete Sri Lanka and made Anuradhapura his capital. He defeated the Pala king Mahipala and took the title of Gangaikonda Cholam and he also built

the Cholamandalam Lake and the city of Gangikonda Cholapuram. He won the Java, Sumatra and Malaya areas from the Shailendra king.

#### Epithet of the Chola Rulers

Name of the King	Epithet
Rajendra I	Vijayrajendra
Vikramachola	Tagayasamudra
Kulothunga	Sangam Tavarta
Prantak I	Madiraikond
Prantak II	Sundarchola
Rajaraja I	Martanda Chola

- The most important feat of Chola administration was **local self-government**.
- Cholas maintained strong navy. ‘Kasu’ or ‘Kalaju’ was their gold coin.
- **Litterateur** Bentek Madhav wrote commentary on Rigveda in this period.
- Jayanadar wrote Phalingtuparni and Sekkizhar wrote Periya Puranam in the court of Kulottunga I.
- The last ruler of Chola dynasty was Rajendra III.
- Land revenue and trade tax were the main sources of income.
- The style of architecture which came into vogue during this period is called Dravida, e.g., **Kailashnath temple of Kanchipuram**.
- Another aspect was image-making, which reached its climax in the dancing figure of Shiva called **Nataraja**.
- **Kambana**, who wrote **Ramavataram**, was one of the greatest figures of Tamil poetry. His Ramayana is also known as **Kamba Ramayana**.
- **Kambana, Kuttana** and **Pugalendi** are considered as ‘three gems’ of Tamil poetry.
- **Gopuram** and **Garbhagriha** are the other two important structures.

 **Note:** The temple of Hoysaleswara was built at Dwarasamudra (modern Halebid).

## Chola Temples

Temple	Location	Builder
Kailasnath Temple	Kanchipuram	King Rajasimha
Vrihadeshwar Temple	Tanjore	Rajaraja I
Koranganatha Temple	Srinivasanllur	Parantak I
Airawteshwar Temple	Darasuram	Rajarya II
Kampahreshwar Temple	Tribhuvan	Kullotung III
Gangi konda	Gangaikonda	Rajendra II
Cholapuram	Cholapuram	

### IMPORTANT PLACES ASSOCIATED WITH CHOLA RULE

- **Polannaruva:** The Sri Lankan city annexed by Rajaraja.
- **Thanjavur or Tanjore:** The Cholan capital where Rajaraja I constructed the Brihadeswara temple.
- **Uttaramerur:** The place where two tenth-century inscriptions relating to Chola administration have been found.
- **Vellur:** It was the place where Chola king Parantaka I defeated the combined army of the Pandyas and Sri Lanka.
- **Anuradhapura:** The Sri Lankan capital, which was destroyed by Rajaraja I.
- **Chidambaram:** The place where Chola kings were coronated.
- **Gangaikondacholapuram:** The city which was constructed by Rajendra I after his successful North India campaign.
- **Mumidcholamandalam:** The name of the province which Rajaraja I carved out from the Sri Lankan territories.
- **Nagapattanam:** The place where Mahendra V, a Shailendra ruler, constructed a vihara.

## RELIGIOUS DEVELOPMENT

### VAISHNAVISM

- Lord Vasudeva was first worshipped in Western India. Besnagar inscription states that the cults received royal patronage. Soon Vasudeva was identified with Narayana and Krishna.

- Matsya Purana refers to the ten incarnations of Vishnu.
- This cult emphasised over Bhakti and Ahimsa.

### SAIVISM

- Shiva is identified with the Rig Vedic god Rudra. He was worshipped in the form of linga (phallus).
- Gundimallam linga is the oldest idol of Siva excavated from Renugunta in Andhra Pradesh.
- Vamana Puran refers to four schools of Saivism—Pasupati, Saiva, Kapalika and Kalmukha.
- Pashupati is the oldest cult founded by Lakulisa.
- Kanphata or Gorakhnath cult was propounded by Gorakhnath in Eastern Bengal.
- Suddhasaiva cult was expounded by Srikanth Sevacharya.
- Virasiva or Lindayat cult was founded by Basava.
- Rashtrakutas built the Kailash temple of Ellora and Kushan kings inscribed Shiva and Nadi on their coins.

### SHAKTI DHARMA

- It is first mentioned in the Mahabharata.

### CHRISTIANITY

- This religion was founded by Jesus Christ. He was born to Mother Mary in **Bethlehem** near Jerusalem.
- **Bible** is the holy book of Christians and the sign of 'cross' is their holy symbol.

## ISLAM

- **Hazrat Muhammad Saheb** founded the Islamic religion. He was born at Mecca in 570 AD.
- Hazrat Muhammad attained supreme knowledge or enlightenment in 610 AD in the **Hira Cave** near Mecca. His teachings are compiled in the Holy Quran.
- 24th September, 622 AD is the day Hazrat Muhammad started his journey from Mecca to Madina to mark the beginning of Hijri Era.

- After his death, Islam divided into the Shia and Sunni cults. His successors were known as Khalifas. The Turkish ruler, **Mustafa Kamal Pasha**, ended the designation of Khalifa in 1994 AD.
- The birthday of Muhammad Saheb is celebrated as Eid-e-Milad-ul-Nabi.

## ZOROASTRIANISM (PARSI)

- Parsi religion was founded by Prophet Zoroaster (Zarathustra). His teachings compiled in the holy book **Zend Avesta**. His followers believed in one God, Ahur.

# MEDIEVAL INDIA

## THE RAJPUTS

- **Origin:** Four of the Rajputs clans claim, to have descendant from a mythical figure that arose out of a sacrificial fire pit (Agnikund) near Mount Abu. They are:

- Parmars/Pawars of Malwa.
- Chalukyas/Solankis of Kathiawar.
- Chauhans of East Rajasthan.
- Partihara/Pariharas of south Rajasthan.

### Some important Rajputs Kingdoms

Rajputs Kingdom	Capital	Founder
Pawar of Malwa	Ujjain, Dhar	Sri Harsha
Partihara of Kannauj	Avanti Kannauj	Nagabhatta
Chauhan/Chahman of Delhi-Ajmer	Delhi	Vasudeva
Rashtrakuta of Malkhand	Manyakhata	Danti Durga
Chandela of Jejakbhukti	Khajuraho, Mahoba Kalinjar	Nannuk Chandela
Gadhawal/Rathor of Kannauj	Kannauj	Chandradeva
Guhilota/Sisodiya of Mewar	Chittor	Bappa Rawal, Hammir II
Kalchuri/Haihaya of Chedi	Tripuri	Kokkala

## DELHI SULTANATE (1206 AD-1526 AD)

- First Muslim invasion by Mohammad Bin Qasim (712 AD).
- First Turkish Invasion by Mahmud Ghaznavi (998 AD-1030 AD): Sultan Muhamud of Ghazni. In 1025, he attacked and raided the most celebrated Hindu temple of Somnath.

- The objective of Mahmud's expeditions was to plunder and loot. He was not interested in expanding his empire to India.
- In 1173 AD, Muizuddin Muhammad (Muhammad Ghori) ascended the throne at Ghazni. Muizuddin Muhammad conquered **Multan** and **Kutch**.
- In 1178 AD, he attempted to penetrate into **Gujarat** by marching across the Rajputana desert but was completely routed by the Gujarat ruler.
- He conquered **Peshawar**, **Lahore** and **Sialkot**.
- **Prithviraj Raso**, written by court poet of Prithviraj, Chand Bardai, depicts the life story of Prithviraj and his love story.
- In 1194 AD, Jaichand of Kannauj was also defeated at the **Battle of Chandawar**.

## MAHMUD OF GHAZNI

- He patronised three persons, contemporary to him: **Firdausi** (court poet), **Al Beruni** (scholar) and **Utbi** (court historian).
- Al Beruni wrote Kitab-ul-Hind.
- Mahmud is said to have made **17 raids** into India. A decisive battle between Mahmud and Anandpala was fought in 1008AD-1009 AD at **Waihind** during his sixth expedition.

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

#### Battle of Terain

- In the first battle of Terain (1191) the Ghori Forces were completely rooted out by Prithviraj.
- The second battle of Terain (1192) is regarded as one of the turning points in Indian history. Prithviraj was defeated by Ghori.

### THE SLAVE DYNASTY (1206 AD-1290 AD)

#### QUTUBUDDIN AIBAK (1206 AD-1210 AD)

- A Turkish slave by origin after the death of Ghori, Aibak became the master of Hindustan and founded the Slave Dynasty in 1206 AD. For his generosity, he was given the title of **Lakh Baksh** (giver of lakhs).
- Sultan Razia rejected the Pardah, she adorned the male dress and held open courts.
- He died in 1210 AD while playing **Chaugan** or horse polo.
- He constructed two mosques, **Qutub-ul-Islam** in Delhi and **Adhai din ka Jhonpra** in Ajmer. He also began the construction of **Qutub Minar**, in honour of famous Sufi Saint, **Khwaja Qutubuddin Bakhtiyar Kaki**.
- Patronised writers like **Hasan-ul Nizami**, author of **Taj-ul-Massir** and **Fakhrudin**, author of **Tarikh-i-Mubarak Shahi**.

#### ARAM SHAH (1210 AD)

- After Qutubuddin's death, his son Aram Shah succeeded him.

#### SHAMSUDDIN ILTUTMISH (1211 AD-1236 AD)

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

- He 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 **Changez Khan** by refusing shelter to Khwarizm Shah, whom Changez Khan was chasing.
- He got his authority (Sultanate of Delhi) recognised by the **Caliph of Baghdad** (Khalifa) as member of world fraternity of Islamic states.
- He completed the construction of **Qutub Minar**.
- He constituted a group of 40 nobles known as **Turkan-i-Chahalgani** or Chalisa.
- He started the **Iqta-dar system** in Delhi Sultanate. This is an assignment of land in lieu of salary, which he distributed to his officers.
- He introduced the silver coin (**tanka**) and the copper coin (**jital**).
- He patronised Minhaj-al-Siraj, author of **Tabaqat-i-Nasiri**.
- In 1216 Iltutmish defeated Eldoz in the battle of Tarain and crushed him totally.
- In 1227-28 Iltutmish invaded on Bhakkar and killed Qubacha.
- In 1225 Iltutmish invaded on Lakhnavti and defeated Ghyasuddin.

#### RUKN-UD-DIN

- He was the son of Iltutmish and was crowned by her mother, **Shah Turkan**, after the death of Iltutmish.

#### RAZIA SULTAN (1236 AD-1240 AD)

- She was the first and last Muslim woman ruler of Medieval India.
- She appointed Jamaluddin Yakoot as the highest officer of cavalry.
- She abandoned Pardah and appeared before the public in male dress.
- She saved the empire from Mongol invasion.

#### BAHRAM SHAH (1240 AD-1242 AD)

- After Razia, Iltutmish'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.

### MASUD SHAH (1242 AD-1246 AD)

- He was the son of Ruknuddin but was deposed after **Balban** and Nasiruddin Mahamud's mother. **Mallika-e-Jahan** conspired against him and established Nasiruddin Mahamud as the new Sultan.

### NASIRUDDIN MAHAMUD (1246 AD-1266 AD)

- He was the son of Iltutmish and was known as the **Darvesi King**.

### BALBAN (1266 AD-1287 AD)

- He himself was a member of Chalisa or Chahalgani but he broke the power of Chahalgani and restored the prestige of the crown.
- He created a strong centralised army and established the military department **Diwan-i-Arz**. He ordered the separation of military affairs from finance department (Diwan-i-Wazarat).
- He declared the sultan as representative of God on Earth. Persian court model influenced Balban's conception of kingship. He took up the title of Zil-i-Ilahi (shadow of God) and impressed upon the people that the king was the deputy of God (Niyabat-i-Khudai).
- He insisted on the Iranian ceremonies of **sijda** and **paibos**.
- He introduced **zaminbosi** or **practice of sijda**.
- Balban started the festival of **Navroz**. He adopted a policy of blood and iron.
- He was a patron of Persian literature and showed special favour to **Amir Khusro**.

### KAIQUBAD (1287 AD-1290 AD)

- A grandson of Balban was seated on the throne by **Fakhruddin**, the kotwal of Delhi. But Kaiqubad was killed by the Khilji family, which saw the end of Slave dynasty and beginning of Khilji dynasty at the Delhi throne.

## THE KHILJI DYNASTY (1290 AD-1320 AD)

### JALALUDDIN KHILJI

- He was the first ruler of Delhi Sultanate to clearly put forward the view that the state should be based on the willing support of the governed and that since the large majority of the people in India were Hindus, the state in India could not be a truly Islamic State.
- The most important aspect of his reign was invasion of Devagiri in 1294 AD by his nephew and son-in-law Alauddin Khilji.
- The Sultan went to Kara to meet Alauddin Khilji. But Alauddin killed Jalaluddin on a boat in the Ganges on 20 July, 1296.

### ALAUDDIN KHILJI (1296 AD-1316 AD)

- He was the nephew and son-in-law of Jalaluddin Khilji, Alauddin Khilji killed him and succeeded the throne in 1296.
- He came to the throne by treacherously murdering his uncle and father-in-law Jalaluddin Khilji.
- He first conquered Gujarat.
- Then he captured Ranthambhor, Chittor and Malwa.
- He was the first Turkish Sultan who separated religion from politics.
- Alauddin strengthened the north-west frontier under his trusted commander Ghazi Mallik.

### ALAUDDIN'S IMPERIALISM

- In Deccan, Alauddin's army led by Malik Kafur defeated **Ram Chandra** (Yadava ruler of Devagiri), **Pratap Rudradeva** (Kakatiya ruler of Warangal), **Vir Ballal III** (Hoyasala ruler of Dwarsamudra) and **Vir Pandya** (Pandya ruler of Madurai).

### ADMINISTRATIVE REFORMS

- First sultan to have permanent army.
- In order to avoid the problems created by the nobles, Alauddin issued four important ordinances.
- He introduced the system of **Dagh** (the branding of horse) and **Chehra** (descriptive role of soldiers).

- The post of special officer called **Mustakharaj** was created for the purpose of collection of revenue.
- Alauddin sought to fix cost of all commodities. For this purpose, he set up three markets in Delhi.

## REVENUE REFORMS OF ALAUDDIN KHILJI

### Market/Economic Reforms

- Alauddin controlled the market by many regulations.
- Fixed the cost of all commodities.
- He setup three markets in Delhi.
- All goods for sale were brought to the open market called 'Sarai Adi'.
- He established the market control department under a minister called diwan-i-riyasat.
- Measured the cultivable land and fixed the land revenue. Bishwa was declared to be the standard of measurement.
- The state demanded half of the produce.
- Alauddin is credited to have built many forts and the most important of them is **Ali Fort**. He also constructed the **Alai Darwaja**, the entrance gate of Qutub Minar.
- He also built the palace of thousand pillars called 'Hazar Sutun', Hauz Khas and Jamait Khana post and built his capital at Siri. He adopted the title Sikandar-i-Sahni.
- He is the first Turkish sultan who separated religion from politics.
- He patronized Amir Khusro and Mir Hasan Dehlvi.

## SUCCESSORS OF ALAUDDIN

- After the death of Alauddin in 1316 AD, Malik Kafur Hazar Dinari seized the throne, but he could not rule for long and nominated Shihabuddin (Alauddin's sixteenth son) as king.
- Shihabuddin was deposed by Qutubuddin Mubarak Shah (1316 AD-1320 AD).
- Nasiruddin Shah (1320 AD) killed Mubarak Shah and himself was killed by Ghazi Malik, governor of Dipalpur.

## THE TUGHLAQ DYNASTY (1320 AD-1414 AD)

### GHIYASUDDIN TUGHLAQ

- Ghazi Malik or Ghiyasuddin Tughlaq was the founder of Tughlaq dynasty or the dynasty of the Qaraunah Turks.
- He was the first sultan of Delhi who took up the title of Ghazi or **slayer of the infidels**.
- Construction of canals** and formulation of a **famine policy**.
- Started the barter system or sharing of crops.
- He sent his son **Jauan Khan** to re-establish the authority in Warangal (Kakatiya) and Madurai (Pandyas).
- He built the city of **Tughlaqabad** near Delhi and made it his capital.
- Sufi saint, Shaikh Nizam-ud-din Aulia said Delhi is far away in regard to him.
- He died in 1325 AD, after a fall from a high-raised pavilion.

### MOHAMMAD BIN TUGHLAQ (1325 AD-1351 AD)

- Prince **Jauan**, son of Ghiyasuddin Tughlaq, ascended the throne in 1325 AD.
- He had five ambitious projects for which he became particularly debatable.
  - Taxation in the Doab (1326 AD)
  - Transfer of Capital (1327 AD):** from **Delhi** to **Devagiri**. **Devagiri** was thus named **Daulatabad**.
  - Introduction of Token Currency (1329 AD)
  - Proposed Khurasan Expedition (1329 AD)
  - Qarachil Expedition (1330 AD): His five projects led to revolts.
- He was an expert in Arabic, Persian Astronomy, Philosophy, Maths and Medicine.
- He died in **Thatta** (Sind) while campaigning against a Turkish slave **Taghi**.
- A new department of agriculture **Diwan-i-Kohi** was set up. He built fortress of Adilabad and city of 'Jahanpanah'.
- The famous Moroccan traveller Ibn Batuta came to Delhi in 1334 AD and acted as the Qazi of the capital for eight years. He

recorded the contemporary Indian science in his **Safranamah** (Rahela).

### FIROZ SHAH TUGHLAQ (1351 AD-1388 AD)

- He was the cousin of Mohammad-bin-Tughlaq. After his death, the nobles and theologians of the court selected Firoz Shah as the next Sultan.
- 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.
- Firoz extended the principle of heredity to the army.
- Firoz tried to win over the theologians proclaiming that he was a true Muslim king and the state under him was truly Islamic.
- He prohibited the practice of Muslim women going out to worship at graves of saints.
- It was during the time of Firoz that **Jizya** became a separate tax. Firoz refused to exempt the Brahmanas from payment of Jizya.
- Four kinds of taxes sanctioned by the Quran were imposed. These taxes were **Kharaj**, **Zakat**, **Jizya** and **Khams**.
- Firoz repaired a number of canals and imposed **Haque-i-Sharb** or **Hasil-i-Sharb** (water tax).
- He was a great builder. The cities of Fatehabad, Hisar, Jaunpur and Firozabad stand to his credit.
- He encouraged the practice of slavery and selected young boys from the conquered territory for the purpose. Diwan-i-Bandagon was created as the department for slaves.
- He brought two pillars of Ashoka from Topara and Meerut to Delhi, and repaired Qutub Minar when it was stuck by lightening.
- He established a hospital in Delhi. He was known as **Darul-Shifa**.
- He introduced two new coins—Adha (50% Jital) and Bikh (25% Jital). Mathura was destroyed during that period.
- Barani, the historian, was in his court. He wrote **Tarikh-i-Feroshahi** and **Fatwa-i-Jahangiri**.
- However, his rule was marked by peace and tranquility, and the credit for it goes to his Prime Minister **Khan-i-Jahan Maqbul**.

### Taxation System

Firoz Shah Tughlaq introduced new system of taxation according to Quran.

- **Kharaj:** A land tax of 1/10th of the procedure of land.
- **Zakat:** 2.5 tax on property (by muslim only).
- **Jaziya:** A tax by non-muslim (even by Brahmins).
- **Khams:** 1/6<sup>th</sup> of the booty captured during war.

### AFTER FIROZ SHAH TUGHLAQ (1388 AD-1414 AD)

- After **Firoz Shah Tughlaq**, **Ghiyasuddin Tughlaq Shah-I** succeeded. He was replaced by **Abu Bakr Shah** in 1389 AD.
- **Abu Bakr** was replaced by **Nasiruddin Muhammad** in 1390 AD. Nasiruddin Mohammad was replaced by **Alauddin Sikandar Shah** for brief in 1394 AD but regained the throne after Sikandar's death. He ruled till 1412 AD. During his period, Timur invaded India.

### Timur's Invasion (1398 AD-1399 AD)

- **Timur, the lame**, a Turkish Chief invaded India in 1398 during the reign of **Muhammad Shah Tughlaq**, the last ruler of Tughlaq dynasty. Timur returned to Central Asia, leaving a nominee named Khizr Khan to rule in Punjab.

### THE SAYYID DYNASTY (1414 AD-1450 AD)

- **Khizr Khan (1414 AD-1421 AD)** founded the Sayyid dynasty and claimed to have descended from the prophet of Islam.
- Khizr Khan took the title of Rayat-i-Ala and not of a king.
- **Mubarak Shah (1412 AD-1433 AD)** led successful expeditions against Mewatis, Katehars and the Ganeti Doab area.
- **Muhammad Shah (1434 AD-1443 AD)** ruled on a very small area, rest being governed by nobles. **Alauddin Shah Alam (1443 AD-1451 AD)** was the last Sayyid king, who retired as a coward, descending in favour of Bahlol Lodhi.

- Yahya-bin-Ahmed-bin-Abdullah Sirhindi wrote **Tarikh-i-Mubarak Shahi** (History of Muhammad Shah of Sayyid Dynasty).

## THE LODHI DYNASTY (1451 AD-1526 AD)

### BAHLOL LODHI (1451AD-1488 AD)

- Founder of Lodhi dynasty in India.
- Annexed entire Sharqi kingdom and issued Bahol coins.
- Never sat on throne, used to sit on carpets along with Anines.

### SIKANDAR LODHI (1489 AD-1517 AD)

- Sikandar Lodhi was the son of Bahol Lodhi who conquered Bihar and western Bengal.
- Noblest of the three Lodhi rulers, real name was **Nizam Khan** (son of Bahalul Lodhi).
- He conquered Bihar and Bengal in 1504 AD. He built a new city named Agra, and made it his capital.
- He shifted his capital from **Delhi** to **Agra**, a city founded by him.
- He broke the sacred images of the Jwalamukhi Temple at Nagarkot and ordered the temples of Mathura to be destroyed.
- He introduced the **Gaz-i-Sikandari** (Sikandar's yard) of 32 digits for measuring cultivated fields.
- He was a poet and wrote verses in Persian under the pen name **Gularukh**.
- He repaired Qutub Minar.

### IBRAHIM LODHI (1517 AD-1526 AD)

- He was the last king of the Lodhi dynasty and the last sultan of Delhi.
- He was the son of Sikandar Lodhi.
- Daulat Khan Lodhi, the Governor of Punjab, invited Bahur to overthrow Ibrahim.
- He captured Gwalior and was defeated by Rana Sanga of Mewar.
- He was defeated and killed at the hands of Babur in the **First Battle of Panipat in 1526 AD**.

### CAUSES OF THE DECLINE OF DELHI SULTANATE

- Despotic and military type of government.
- Degeneration of Delhi Sultans.

- War of succession as there was no fixed law for succession.
- Greed and incompetency of the noble.
- Financial instability.
- Invasion of Timur.

### ADMINISTRATION

- Political, legal and military authority vested in the sultan. He was responsible for administration.
- The country was divided into **Iqta** which was distributed among the nobles, officers and soldiers.
- The key figure in the administration was Wazir.
- The head of military department was called **Ariz-i-Mamalik**.
- Diwan-i-Risalat** dealt with religious matter. The Qazi dispensed civil law based on Muslim law (**Sharia**).
- Diwan-i-Insha headed by Dahir-i-Mumalik managed the royal correspondence.
- The rulers posted intelligence agents called **Braids** in different parts of the empire.
- Wakil-i-Dar was responsible for maintenance of proper decorum at the court.
- The provinces were divided into **Shiqs** and headed by **Shiqdars**.

### Important Central Departments of Delhi Sultanate

Department	Function
Diwan-i-Mustakhraj	Department of arrears
Diwan-i-Khairat	Department of charity
Diwan-i-Kohi	Department of agriculture
Diwan-i-Insha	Department of correspondence
Diwan-i-Risalat (Foreign Minister)	Department of appeals
Diwan-i-Ariz	Military department
Diwan-i-Bandagan	Department of slaves
Diwan-i-Qaza	Department of justice Mamalik
Diwan-i-Isthiaq	Department of pensions

### IMPORTANT CENTRAL OFFICIALS

- Wazir:** The Chief Minister of the State in-charge of revenue and finances, controlled by other departments.

- **Ariz-i-Mumalik:** Head of military department.
- **Amir-i-hazib:** Officer-in-charge of the royal court.
- **Kazi-i-mumalik:** Chief Justice.
- **Kazi-ul-kazat:** Head of the central judicial department.
- **Amir-i-majlis:** Officer-in-charge of royal feasts, conference and festivals.
- **Majlis-i-am:** Council of friends and officers consulted on important affairs of the state.
- **Dahir-i-mumalik:** Head of the royal correspondence.
- **Sadr-us-sudur:** Dealt with the religious matters and endowments.
- **Sadr-i-jahan:** Officers-in-charge of religious and charitable endowment.
- **Amir-i-dad:** Public prosecutors.
- **Qazi:** Legal officer (dispensed civil law based on Muslim law Shariat).
- **Wakil-i-dar:** Controller of the royal household.
- **Barid-i-mumalik:** Head of the state news agency.
- **Naib wazir:** Deputy minister.
- **Mushrif-i-mumalik:** Accountant general.

## ART AND ARCHITECTURE UNDER DELHI SULTANATE

- The new features brought by the Turkish conquerors were: (i) the dome, (ii) the lofty towers, (iii) the true arch unsupported by beam, and (iv) the vault.
- 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. A famous example is **the tomb of Hazrat Nizamuddin Aulia** in Delhi.
- 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.

### Architectural Landmarks of the Sultanate Period

Structure	Location	Builder
Quwwat-ul-Islam Mosque	Delhi	Qutub-ud-din Aibak

Adhai Din Ka Jhonpra	Ajmer	Qutub-ud-din Aibak
Tomb of Ghiyas-ud-din Tughlaq	Delhi	Muhammad-bin-Tughlaq
Tughlaqabad Fort	Delhi	Ghiyas-ud-din Tughlaq
Moth Ki Masjid	Delhi	Prime Minister of Sikandar Lodi
Qutub Minar	Delhi	Iltutmish (founded by Qutub-ud-din Aibak)
Tomb of Hazrat Nizamuddin Aulia	Delhi	Ala-ud-din Khilji
Alai Darwaja	Delhi	Ala-ud-din Khilji
Jamaat Khana Masjid	Delhi	Ala-ud-din Khilji

### MUSIC

- Rabab and Sarangi were introduced.
- Amir Khusro introduced many Persian Arabic ragas. He also invented the **Sitar**.

### PAINTINGS

- Arabs introduced paper in the 15th century and this encouraged painting.

### LITERATURE

- Uday Raj wrote a long poem (Shahnama) praising Mahmud and describing some incidents of his justice and equality.
- Zai Nakshabi translated Sanskrit shlokas into Persian under the title **Tuti namah**.
- Merutanga wrote **Prabandha Chintamani**.

### Literary Sources

Book	Author
Khazyan-ul-Futuh	Amir Khusro
Tuglaqnamah	Amir Khusro
Tabagat-i-Nasiri	Minhaj-us-Siraj
Tarikh-i-Firozshahi	Ziauddin Barni
Gita Govind	Jayadeva
Mitakshara	Vigyaneshwara
Dayabhage	Jimuta Vahana
Ashigaandkhir khan	Amir Khusro
Amuktamalyada	Krishan Deva Raya

Book	Author
Futuhat-i-Firozshah	Firoz Shah
Parsana Kaghava	Jayadeva
Khamsah	Amir Khusro
Miftahul Fatah	Amir Khusro

### AMIR KHUSRO

- He was a Persian poet (1253 AD-1325 AD) associated with royal courts of more than seven rulers of the Delhi Sultanate.
- He was also a musician, he invented sitar.
- He innovated **Khayal** (a style of singing).
- In his book **Tarikh-i-Alai**, he gave an account of conquest of Alauddin Khilji.
- He also lived in the court of Ghiyasuddin Tughlaq and wrote **Tughlaqnamah**.
- Khusro is also known as **Tuti-i-Hind** or 'Parrot of India'.

## PROVINCIAL KINGDOMS

### GUJARAT

- Disintegrated from Delhi in 1397 AD, under Zaffar Khan, who assumed the title of Sultan Muzaffar Shah.
- Ahmed Shah I (his grandson), built a new city Ahmedabad and also built Jama Masjid and Tin Darwaza at Ahmedabad.
- In the reign of Mahmud Beghra, Portuguese set up a factory at Diu. Udayraja was his court poet.
- Akbar annexed Gujarat in 1573 AD.

### MALWA

- Husan Shah was a powerful ruler of Malwa. He built Jama Masjid, Hindol Mahal and Jahaz Mahal at Mandu.
- Malwa became a part of Gujarat in 1531 AD and was annexed to Mughal state in 1562 AD.

### KASHMIR

- Shamsuddin Shah became the first Muslim ruler of Kashmir in 1339 AD.
- Zainulabdin (1420 AD-1470 AD) was the greatest ruler of Kashmir, also known as 'Badshah' and **Akbar of Kashmir**. He introduced the art of shawl-making in Kashmir, built Zaina Lanka and an artificial island in the Wular Lake.

- Later ruled by Chak Dynasty, whose ruler submitted to Akbar in 1586 AD.

### MEWAR

- The capital city of Chittor was captured by Alauddin Khilji in 1303 AD but Rajput rule was soon restored by Rana Hamir (1326 AD-1364 AD).
- Rana Kumbha Karan (1433 AD-1468 AD)** was the greatest ruler of Mewar. He built the famous victory tower **Vijay Stambh** at Chittor to commemorate his victory over Mahmud Khilji of Malwa. His court was adorned by Mandan who wrote many books on architecture, **Parsad Mandan** and **Rupa Mandan**.
- Rana Sangram Singh** (1509 AD-1528 AD) defeated Mahmud II of Malwa and Ibrahim Lodhi.

### BENGAL

- Disintegrated from Delhi during the reign of Muhammad-bin-Tughlaq.
- In 1342 AD, Iliyas Khan founded the new Iliyas Shahi Dynasty.
- The famous poet, Maladhar Basu, compiler of Sri-Krishna Vijay, was patronized by the Sultans and was given the title of 'Gunaraja Khan'.
- Chaitanya and Shankaradeva belonged to this period.
- Sher Shah Suri occupied Bengal in 1538 AD.

## VIJAYANAGAR AND OTHER KINGDOMS

### VIJAYANAGAR EMPIRE (1336 AD-1580 AD)

- Vijayanagar kingdom and the city were founded by Harihara and Bukka.
- They were brought to the centre by Muhammad-bin-Tughlaq, converted to Islam and were sent to South to control rebellion but motivated by a Bhakti saint Vidyaranya, they established Vijayanagar kingdom in 1336AD.
- Vijayanagar period can be divided into four distinct dynasties, viz. Sangam, Saluva, Tuluva and Aravidu.

- Bukka I (1356 AD-1379 AD):**

Bukka I strengthened the city of Vidyanagar and renamed it Vijayanagar. The royal ambassadors from Malabar and Ceylon adorned his court.

- Harihar II (1379 AD-1404 AD):**

Bukka I was succeeded by his son Harihar II.

- Deva Raya I (1406 AD-1422 AD):** His greatest achievement was his irrigation works where a dam was built across the Tungabhadra, with canals leading to the city. **Nicolo de Conti** visited Vijayanagar during his reign.

- Srinatha** was his court poet, who wrote **Haravilasam**.

- There was a **Pearl Hall** in his palace, where he honoured men of eminence.

- Deva Raya II (1423 AD-1446 AD):** He was the grandson of Deva Raya I. Ahmad Shah I of Bahamani invaded Vijayanagar and exacted a war indemnity. He was called **Praudh Deva Raya**. In his inscriptions, he has the title of **Gajabekara** (the elephant hunter). Sri Lanka paid a regular tribute to him. **Dindima** was the court poet, whereas Srinatha was given the title of Kavisarvabhauma. **Abdur Razzak**, the envoy of Shah Rukh, visited Vijayanagar during his reign.

## THE SALUVA DYNASTY (1486 AD-1505 AD)

- Saluva Narsimha** (1486 AD-1491 AD): He founded the Saluva dynasty.

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

## TIRUMAL (1491 AD) AND IMMADI NARASIMHA (1491 AD-1505 AD)

- Ruled under the regency of Narsa Nayaka.
- Vasco Da Gama** came to India (Calicut) during the reign of Immadi in 1498 AD.
- Ultimately, a new dynasty called Tuluva dynasty was founded by Vir Narasimha.

## THE TULUVA DYNASTY (1505 AD-1570 AD)

- Vira Narsimha (1505 AD-1509 AD):** Vir Narsimha, the son of Narsa Nayaka, became the king after assassination of Immadi Narsimha, the last Saluva ruler.

- Krishnadevaraya (1509 AD-1529 AD)** was the greatest ruler of the dynasty. Portuguese traveller, Domingo Paes writes highly about him. Barbosa also came as a traveller. Also Friar Luis, the ambassador of Portuguese Governor, **Albuquerque**, resided in his court.

- His period was known as golden age of Telugu literature.

- Krishnadevaraya maintained friendly relations with **Albuquerque**, the Portuguese Governor. He won Orissa (Gajapati Kingdom) for Vijayanagar and Vijayanagar emerged strongest during his reign.

- He built the **Vijaya Mahal** the **Hazara Rama temple** and the **Vithal Swami temple**.

- He took the titles of **Yavaraja** **Sthapnacharya** and **Abhinava Bhoja**. He is also known as **Andhra Bhoja** and **Andhra Pitamaha**.

- His court was adorned by the **Ashtadiggajas** (the eight celebrated poets of Telugu).

- Krishnadevaraya was a contemporary of **Babur**.

- His political ideas are contained in the Telugu book **Amuktamalyada**. He also wrote a Sanskrit Drama **Jambavati Kalyanam**.

- Achyutadevaraya (1529 AD-1542 AD):** Krishnadevaraya nominated his brother Achyutadevaraya as the successor. During his reign, **Farano**, a Portuguese horse-trader, visited Vijayanagar.

- Venkata (1542 AD) and Sadashiva Raya (1543 AD-1576 AD):** Sadashiva was the last ruler of the dynasty. Real power was exercised by **Rama Raja/Raya** and his two brothers. The Battle of Talikota (also called the **Battle of Rakshasa-Tangadi**) was fought on 23rd January, 1565 between the alliances of Ahmednagar, Bijapur, Golconda and Bidav at one side. Rama Raja was taken prisoner and executed by Hussain Nizam Shah I.

- **Caesar Frederick**, a Portuguese traveller, visited Vijayanagar in 1567 AD-1568 AD during the reign of Sadashiva Raya.

## THE ARAVIDU DYNASTY (1570 AD-1650 AD)

- Tirumala Raya, the brother of Rama Raja, ruled in the name of Sadashiva Raya. He shifted the capital to **Penugonda**.

## ADMINISTRATION

- The Vijayanagar rulers issued gold coins called **Varahas** or **Pagodas**. All were of gold mixed with alloy. The **Tar** 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. Also, it was the only state that promoted widow remarriage.

## ARCHITECTURE

- The Vijayanagar rulers produced a new style of architecture called **Provida** style. The large number and prominence of pillars and piers are some of the distinct features.
- Other important features were the **Mandapa** or open pavilion with a raised platform, meant for seating deities and **Amman Shrine**.
- 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.

### Nayakara System

- Under this system, military chiefs were assigned certain pieces of land called **amaram**. These chiefs, known as **nayaks**, had revenue and administrative rights on their lands.

### The Iyengar System

- It involved the constitution of a 12-member officials group by the Centre to maintain administration at the village level. These officials, called the **Iyengars**, were village functionaries and constituted of groups of families.

## BAHAMANI KINGDOM

- The Bahamani kingdom of Deccan was founded by **Hasan Gangu**. The capital was Gulbarga. Hasan Gangu took the title of Alauddin Hasan Bahaman Shah and became the first king of Bahaman in 1347 AD.
- **Mahmud Shah I (1358 AD-1375 AD)**, son of Bahaman Shah, established a council consisting of eight ministers and decentralised his provincial administration. He fought with Vijayanagar.
- **Firoz Shah**: He inducted Hindus in his administration to a large extent. He built an observatory at **Daulatabad**. He founded the city of **Firozabad** on the bank of river Bhima. Firoz defeated Devaraya.
- Firoz Shah was succeeded by his brother **Ahmad Shah I** (1422 AD-1436 AD). He shifted his capital from Gulbarga to Bidar. Ahmad Shah is known as Wali or saint due to his association with Gesu Daraz.
- **Bidriware** was introduced in his period.
- Ahmad Shah was succeeded by his son **Alauddin II (1436 AD-1458 AD)** and Humayun. **Humayun (1458 AD-1461 AD)** was so cruel that he got the title of 'Zalim'.
- Humayun was succeeded by his son **Nizam Shah (1461 AD-1463 AD)** and then by **Muhammad Shah-III**. Nikitin, a Russian merchant visited Bidar during his reign.
- The last ruler of Bahamani kingdom was **Kalim Ullah Shah**.
- **Nizam Shahis of Ahmadnagar**. Founder-Ahmad Nizam Shah, later annexed by Shahjahan.
- **Adil Shahis of Bijapur (1490 AD-1686 AD)**, founded by Yusuf Adil Shah. It was annexed by Aurangzeb. Greatest ruler of the kingdom was Ibrahim Adil Shah.
- He introduced Dakhini in place of Persian language. Another ruler Muhammad Adil Shah built the **Gol Gumbad**.
- **Imad Shahis of Berar** (1490 AD-1574 AD) founded by Fateullah Daulatabad as capital.
- **Qutub Shahis of Golconda** (1518 AD-1687 AD) founded by Quli Qutub Shah. He built the famous Golkonda fort and made it his capital.

- **Muhammad Quli Qutab Shah** was the greatest of all. He founded the city of **Hyderabad**. He built the famous **Charminar**. The kingdom was annexed by Aurangzeb (1687 AD).
- **Barid Shahis of Bidar** was founded by Ali Barid.
- Sufis were organised 12 orders of silsila.
- Sufi orders are broadly divided into **Bashara**, that is those which followed the Islamic law (sharia), and **Beshara**, that is those which were not bound by it.

### OTHER IMPORTANT RULERS

- **Prithviraj Chauhan (1178 AD-1192 AD)**: He ruled over Delhi and Agra and fought two important battles, viz. **First Battle of Tarain** was fought in 1191 AD between the forces of Prithviraj Chauhan and Mohammad Ghori, in which the latter was defeated. **Second Battle of Tarain** was fought in 1192 AD when Mohammad Ghori again invaded India, in which Prithviraj Chauhan was defeated.
- **Jaichand Garhwal/Rathore (1169 AD-1194 AD)**: He was the last Rajput king, who was also defeated and killed by Mohammad Ghori in the **Battle of Chandawar** (1194 AD).
- **Rana Kumbha, the Sisodiya ruler of Mewar (1433 AD-1468 AD)**: Rana Kumbha was a 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**: In the field of culture, many great fortresses and temples were built by them such as **Khajuraho** (MP), **Lingaraja temple** (Bhubaneswar, Orissa), **Sun temple** (Konark, Orissa), **Jagannath temple** (Puri, Orissa) and **Dilwara temple** (Mount Abu).

#### Some Important Rajputs

- **Jaichand Garhwal/Rathore (1169 AD-1194 AD)** assisted Muhammad Ghori against Prithviraj Chauhan in the 2nd Battle of Terrain (1192 AD), but was killed by Ghori in the Battle of Chandawar (1129 AD).

• **Bhoja Parmar (1010 AD-1055 AD)** of Malwa was known as **Kaviraj**. He wrote **Ayurvedasaravasva** (work on medicine) and **Samrangana Sutradhar** (work on architecture).

• **Architectural works of the period:**

- i. **Kendriya Mahadeva Temple** at Khajuraho was built by Chandellas of Bundelkhand (1000 AD).
- ii. **Dilwara Temple** at Mount Abu (West Indian style of architecture) built by Siddharaja Solanki of Gujarat.
- iii. **Angkorvat Temple** at Cambodia was built by Suryavarman II. It is dedicated to Lord Vishnu and was built on Dravidian model.

#### Literary Works

- **Kathasaritasagara**-Somadeva.
- **Vikramdeva Charita**-Bilhana (Biography of Chalukya King Vikramdeva VI).
- **Rajtarangini**-Kalhana (**History of Kashmir**)
- **Gita Govinda**-Jayadeva (in Sanskrit)

## RELIGIOUS MOVEMENTS IN THE 15TH-16TH CENTURIES

### BHAKTI MOVEMENT

- The Bhakti had been initiated in South India by popular saint poets called **Alvars**.
- It declined in the tenth century but was again revived as philosophical and ideological by Acharyas like **Ramanuja**, whose disciple **Ramananda** took it to North India.
- They considered that God has either form (Saguna) or was formless (Nirguna).

• **Main Features:**

1. Discarded rituals and sacrifices,
2. Emphasised purity of heart and mind, humanism and devotions,
3. Monotheistic in nature,
4. God has either form (**Saguna**) or be formless (**Nirguna**),
5. An egalitarian movement,
6. Denounced casteism,
7. Saint preached in local languages.

## BHAKTI SAINTS

### Ramanuja

- The Vaishnava saint from South India. The earliest exponent of **Bhakti movement** and **Vishitadvaita philosophy**.

### Guru Nanak

- Founder of Sikh faith in India.
- He was born in **Talwandi**, now **Nankana Sahib**.
- He laid emphasis on one God. He was against idolatry, undertaking pilgrimage and other ritualistic conducts.
- Nanak began the practice of Community Kitchen—**Guru-ka-Langar**.
- He named the formless God as **Akal Purush**.
- His teachings are compiled in **Adi-Granth**.

### Vallabhacharya

- He laid on the worship of Krishna as an incarnation of the Almighty God.
- Lived in the court of Krishna Deva of Vijayanagar.
- He founded the Pushti sect.

### Ramananda

- The founder of Bhakti movement in North India.
- He was greatly influenced by the teachings of Ramanuja.
- Among his disciples were **Raidas** the cobbler, **Kabir** the weaver, **Dhanna** the farmer, **Sena** the barber and **Pipa** the Rajput.

### Kabir

- Represents Virguna Bhakti tradition. His followers organised themselves as **Kabir panthis**.
- His teachings contained **Dohas**.
- He was not merely a Bhakti poet but also a social reformer.
- He advocated the **Bhaktimarga**.

### Chaitanya

- Regarded as the founder of modern Vaishnav Sect of Bengal.
- He preached during the reign of Sultan Alauddin Shah of Bengal and Gajpati ruler of Orissa.
- His biography is **Chaitanya Charitmala**.
- Philosophy of Chaitanya was called **Achityabhedaveda**.

- His disciple considered him as incarnation of Lord Krishna.

### Surdas

- Disciple of Vallabhacharya and devotee of Lord Krishna and Radha.
- He wrote **Sur Suravali**, **Shitya Ratna** and **Sursagar** (belonged to Saguna School).

### Shankar Dev

- Chaitanya of Assam, monotheist and worshipped Krishna.

### Madhavacharya

- According to him, the release from transmigration can be secured only by means of knowledge and devotion.
- Purandar Das (1480 AD-1564 AD)**: The foremost and the most prolific Vaishnav saint-composer in Karnataka.
- Mirabai (1498 AD-1546 AD)**: The Rathore princess of Merata and daughter-in-law of Rana Sanga of Mewar. The most well-known woman Bhakti saint of the Krishna cult of Vaishnavism.

### Vidyapati

- Maithili saint poet.
- He wrote **Padavali**, e.g., thousands of love ballads on Radha and Krishna.

### Narsinh Mehta

- He wrote songs in Gujarati, depicting the love of Radha and Krishna.
- He authored Mahatma Gandhi's Bhajan "Vaishnav Jan Toh Tene Kahi Je."

### Shankara Deva

- Vaishnava saint from Assam.
- Tulsidas (1532 AD-1623 AD)**: The greatest saint-poet of the Ram Bhakti cult of Vaishnavism. He was the celebrated author of **Ramcharitmanas**, **Kaviawali** and **Gitawali**.
- Dadu Dayal (1544 AD-1603 AD)**: A Nirguna Bhakti saint and founder of the **Dadu Panth**.
- Thyagaraja (1767 AD-1847 AD)**: The greatest saint-composer of Karnataka music. He adorned God in the form of Rama, the incarnation of Vishnu.

## BHAKTI SAINTS OF MAHARASHTRA DHARMA

- Jnanesvara/Jnanadeva (1271 AD 1296 AD)**: The fountain head of the Bhakti

movement in Maharashtra, founder of Marathi language and literature, wrote a long commentary on the **Bhagavad Gita**, called the **Bhavarthadipika**, more commonly known as **Jnaneshvari**.

- **Namadeva (1270 AD-1350 AD)**: A contemporary of Jnanesvara. The object of his devotion was **Vithoba** or **Vithal** (identified with Vishnu) of Pandharpur. The cult of **Vithoba** or **Vithal** known as **Varkari** sect was founded by Namadeva.
- **Eknath (1533 AD-1599 AD)**: A great scholar saint from Maharashtra, who wrote a commentary on the Ramayana called the **Bhavartha Ramayana**.
- **Tukaram (1598 AD-1650 AD)**: He was the greatest Bhakti poet from Maharashtra, wrote devotional poems, known as **Abhangas**.
- **Ramdas (1608 AD-1681 AD)**: The last great saint poet from Maharashtra. **Dasabodha** is the compilation of his writing and sermons.

### Main Religious Leaders/Sects

Ramanujacharya	Vishishtadvaita	Shree Sect
Madhavacharya	Dvaitava	Brahma Sect
Vallabhacharya	Shuddhadvaitava	Rudra Sect
Shankaracharya	Advaitava	—

### SUFI MOVEMENT

- Sufism is the mystical movement in Islam.
- The Sufi doctrine was based on union with God.

### Sufi Terminology

Sufi words	Meaning
Saikh/Murid/Pir	Spiritual Teacher
Tasawwuf	Sufism
Khanqah	The hospice
Sama	Musical recital
Raksa	Dance
Fana	Self annihilation
Khalifah	Successor

### MAIN FEATURES

1. Organised in different **Silsilas** (orders).
2. Sufis aimed at service of mankind.

3. Eager for Hindu-Muslim unity and cultural synthesis.
4. Opposed to orthodoxy.
5. Discouraged materialistic life.

### SUFI ORDER

#### Chisti Silsila

- The Chisti order was founded by Khwaja Abdal Chisti in Heart. It was brought to India by Khwaja Moin-ud-din Chisti (1141-1236).
- Khwaja's other disciple Qutub-din-Baktiyar Kaki established Chisti Silsila in Delhi. Qutub Minar is named after him.
- Kaki's disciple Baba Farid Ganj-e-shakar based himself in Ajodhan.
- His famous disciple was Nizamuddin Auliya in Delhi. Also known as Mehboob-e-Illahi.
- Last important Chisti sufi of Delhi was Nasserudin Chirag-e-Delhi.
- Burhanuddin Gharib was taken to Daulatabad by Mohd Bin Tughlaq.
- Gesu Daraz was important sufi saint of Deccan.

#### Suhrawardi Silsila

- It was founded by Shaikh Shihabuddin Suhrawardi. Popular in Multan, Lahore and Sindh.
- Considered as more orthodox than Chisti.
- Baha-ud-din Zakaria was the greatest saint of this silsila.
- Accepted royal patronage and donations.
- Baha-ud-din Zakaria invited Iltutmish to attack Qubacha in Multan and was given the title of Shaikh-ul-Islam by Iltutmish.

#### Naqshbandi Silsila

- This Silsila was introduced in India by Khwaja Baqi Billah during the later years of Akbar's reign.
- His disciple Sheikh Ahmed Sarhindi called himself Mujaddid (renovator of I millennium of Islam).
- Sheikh Ahmad Sarhindi propounded the concept of Wahadid-ul-Shujud and was imprisoned by Jahangir.
- Aurangzeb was initiated into Naqshbandiya order.

### ***Qadariya Silsila***

- Shah Niamatullah Qadri was probably the first notable saint of this order to enter India but it was Syed Muhammad Jilaui, who organised it on an effective basis.
- Miyamir or Mir Mohd. Was an important saint of the silsila.
- Dara Shukoh and Jahanara joined Qadariya silsila under the influence of Mullan Shah Badakshi.

### ***Firdausi Silsila***

Sheikh Badruddin of Samark first established it in Delhi, but later on it moved to Bihar and became the most influential mystic older.

### ***Sattariya Silsila***

It was founded in India by Shah Abdullah Shattari.

### ***Kubrawiya Silsila***

It was introduced by Mir Sayed Ali Hamdani in Kashmir.

### **Rishi Movement**

Sheikh Nuruddin began the rishi movement in Kashmir which was synthesis of Kashmiri Shaivism and Islamic thought.

### **Roshaniya Movement**

It was founded by Bayazid Ansari who influenced tribal communities of North-West frontiers and instigated their rebellious activities, which created trouble for Mughal rulers from Akbar to Aurangzeb.

### **Mahadi Movement**

It was founded by Sheikh Mohd. Mahadi of Jaunpur during Sikander Lodhi's time.

## **MUGHAL PERIOD (1526 AD-1540 AD AND 1555 AD-1857 AD)**

### **BABUR (1526 AD-1530 AD)**

- The foundation of the Mughal rule in India was laid by Babur in 1526 AD.
- He was invited to attack India by Daulat Khan Lodhi, subedar of Punjab, Alam Khan Lodhi uncle of Ibrahim Lodhi and **Rana Sanga**.
- He was a descendant of Timur (from the side of his father) and Chengiz Khan (from the side of his mother).

- Babur defeated **Ibrahim Lodhi** in the **First Battle of Panipat** on April 21, 1526 AD and established the Mughal dynasty.
- In 1527 AD, he defeated **Rana Sanga** of Mewar at **Khanwa**.
- In 1528 AD, he defeated **Medini Rai** of **Chaneri** at **Chanderi**.
- In 1529 AD, he defeated Muhammad Lodhi (uncle of Ibrahim Lodhi) at **Ghaghra**.
- Babur was the first ruler to entitle himself 'Badshah'.
- His victory led to rapid popularisation of **gunpowder** and **artillery** in India.
- After the Kushanas, he was the first to bring Kabul and Kandahar into the Indian empire.
- He died in 1530 AD, buried at Aram Bagh in Agra. Later, his body was taken to Aram Bagh at Kabul.
- He adopted **Tughluma** and flanking party system and was the first to use gunpowder and artillery in India.
- He wrote his autobiography **Tuzuk-i-Baburi** in Turki language. **Tuzuk-i-Baburi** was translated in Persian (named Baburnama) by **Abdur Rahim Khankhana** and in English by **Madam Beveridge**.
- He compiled two anthologies of poems, **Diwan** (in Turkish language) and **Mubaiyan** (in Persian language). He also wrote **Risal-i-Usaz** or **Letters of Babur**.

### **Early Invasions of Babur on India**

1518–19	Bajaura, and Bhera
1519	Peshawar
1520	Bajaura, Bheva Sialkot
1524	Lahore, Dipalpur and Sultanpur

## **HUMAYUN (1530 AD-1540 AD AND 1555 AD-1556 AD)**

- He was the son of Babur and ascended the throne in 1530 AD. His succession was challenged by his brothers **Kamran**, **Hindal** and **Askari** along with the Afghans.
- His first campaign was against **Kalinjar**.
- Battle of Chausa** (1539 AD) was fought between **Sher Shah** and **Humayun's** army. **Humayun** was badly defeated and escaped. He was saved by **Nizam**.

- **Battle of Kannauj** (Bilgrama) (1540 AD): Humayun was again defeated by Sher Shah and had to flee.
- He wandered in Sindh during the reign of Shah Hussain Arghuna and then reached to the Iranian Court.
- **Bairam Khan**, his most faithful officer, helped him. The Mughals occupied Lahore without any march towards Delhi. After the battle of Machhiwara against the Afghans and battle of Sirhind against Sikandar Shah, Humayun's second coronation was organised.
- His sister, **Gulbadan Begum** wrote his biography **Humayunama**.
- He built **Din Panah** at Delhi as his second capital.

### SHER SHAH SURI AND THE AFGHAN EMPIRE (1540 AD-1555 AD)

- His real name was **Farid**.
- He joined the Babar Khan Lohani's service and then was appointed as the Deputy Governor of Bihar.
- He usurped the throne as 'Hazarat-i-Ala'.
- He gained Chunar by marrying one widow **Lad Malika**.
- **Battle of Chausa**: In 1539 AD, he captured Chausa from Humayun. He assumed the title of Sher Shah as the emperor.
- He also issued coins and Khutba was read in his name. The whole area from Bengal to Benares was under his empire.
- **Battle of Samel (1544 AD)**: Defeated Rajput forces of Marwar.
- The campaign of Bundelkhand was the last campaign of his life.

### ADMINISTRATION

- He introduced the principles of local responsibility for local crimes.

### REVENUE SYSTEM

- Land was measured using the **Sikandari-gaz**.
- The peasant was given a **Patta** and a **Qabuliyat**, which fixed the peasants' rights and taxes.

### OTHERS

- He introduced silver **Rupiya**.
- The roads built by Sher Shah are called 'the arteries of the empire'. **Sarais** were built

on the road. He restored the old imperial road, Grand Trunk Road from Sonargaon in Bengal to Peshawar.

- He built **Purana Qila**, along with Grand Trunk Road. He also built his tomb at **Sasaram** in Bihar.
- **Malik-Mohammed Jayasi** wrote **Padmavat** (Hindi) during his reign.
- **Tarikh-i-Sher Shani** was written by **Abbas Khan Sarwani**, his court historian.
- He introduced the principle of local responsibility for local crimes.
- He built **Purana Quila** in Delhi.
- He was buried in Sasaram.
- Sher Shah was succeeded by **Islam Shah (1545 AD-1554 AD)**: Islam Shah was succeeded by **Muhammad Adil Shah (1554 AD-1555 AD)**.

### AKBAR (1556 AD-1605 AD)

- Akbar, the eldest son of Humayun, ascended the throne under the title of **Jalaluddin Muhammad Akbar Badshah Ghazi** at the young age of 14 at **Kalanaur, Punjab** and his tutor **Bairam Khan** was appointed as the regent.
- **Second Battle of Panipat (5th November, 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**.
- He also ended the interference from **Petticoat Government** (1560 AD-1562 AD) represented by **Maham Anaga** and **Adham Khan Junta**.
- The Rajputa kingdom of Mewar put up a fierce defence under **Rana Uday Singh** (1537 AD-1572 AD) and his son **Rana Pratap** (1572 AD-1597 AD).
- Most of the Rajput kings recognised the supremacy of Akbar except Rana Pratap Singh and his son Amar Singh (Sisodia Rajputs of Mewar capital, Chittor).
- The **Battle of Haldighati** (1576 AD) was fought between **Rana Pratap** of Mewar and Mughal army led by **Man Singh** of Amer. Rana Pratap was defeated.
- Akbar conquered **Malwa** in 1561 AD defeating **Baz Bahadur**.

- The two powerful forts of Rajasthan-Ranthambhor and Chittor (**Rana Udai Singh** guarded by **Jaimal**) were captured by the Mughals.
- Akbar's Deccan campaign began with the siege of **Ahmadnagar** (defended by Chand Bibi).
- Akbar's last campaign was against Asirgarh resulting into annexation of Khandesh (1601).
- Akbar followed the policy of reconciliation with the Rajputs.
- He won Gujarat in 1572. In order to commemorate his victory of Gujarat, Akbar built **Buland Darwaza** at Fatehpur Sikri.
- Raja Man Singh conquered Bihar, Bengal and Orissa for him.
- In 1586 AD, Akbar conquered Kashmir and in 1593 AD, he conquered Sindh.
- At the time of Akbar's death in 1605 AD, his empire included Kashmir, Sindh and Kandahar, and extended as far as the Godavari in the Deccan.
- Akbar proclaimed a new religion, Din-i-Ilahi, in 1581 AD.
- Birbal was the only Hindu who followed this new religion Din-i-Ilahi. However, it did not become popular.
- Akbar built **Fatehpur Sikri**, **Agra Fort**, **Lahore Fort**, **Allahabad Fort** and **Humayun's Tomb** in Delhi.
- Tulsidas (**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.
- Akbar gave Mughal India one official language (Persian).

#### Navratnas in Akbar's Court

<b>Abul Fazal</b>	He was the Wazir of Akbar. He wrote <b>Akbarnama</b> .
<b>Faizi Abul</b>	His famous work <b>Lilavati</b> is on Mathematics.
<b>Tansen</b>	He served as the court musician to <b>King Ramchandra</b> of Mewar and was sent in Akbar's court. He accepted Islam at the hands of great Sufi saint <b>Sheikh Muhammad Ghaus</b> of Gwalior.

<b>Birbal</b>	His actual name was Mahesh Das. He was conferred the title of <b>Raja</b> by Akbar.
<b>Raja Todarmal</b>	His revenue collection arrangement is called <b>Todarmal's bandobast</b> .
<b>Raja Man Singh</b>	He was the Raja of Amber, a Mansabdar and trusted General of Akbar. He assisted Akbar in many battles including the well-known battle of Haldighati.
<b>Abdul Rahim</b>	He was a poet and the son of Bairam Khan, known for his Hindi couplets.
<b>Faqir Azio Din</b>	He was the chief advisor of Akbar.

#### IMPORTANT ASPECTS OF AKBAR'S RULE

- He abolished Jaziya and pilgrimage tax and forcible conversion of prisoners of war.
- He believed in **Sulh-i-Kul**, that is peace for all.
- He built an **Ibadat Khana** at Fatehpur Sikri to discuss religious matters.
- To curb the dominance of Ulema, Akbar introduced a new Khutba written by Faizi and proclaimed Mazharnamah in 1579 AD, which made him the final interpreter of Islamic law (Mujtahid Imam-i-Adil) in case of any controversies. It made him Amir-ul-Momin (leader of the faithful) and Amir-i-Adil (a just ruler).
- Akbar established the painting karkhana, headed by Abdus Samad.
- Ralph Fitch** (1585 AD) was the first Englishman to visit Akbar's court.
- Abul Fazal wrote **Akbarnama**, the appendix of which was called **Ain-i-Akbari**.
- Mansabdari System was another feature of administration during Akbar's reign to organise nobility as well as the army.
- He was the first Mughal ruler to separate religion from politics.
- Sufi saint Sheikh Salim Chishti blessed Akbar with a son who was named Salim (Jahangir). Akbar shifted his court to Fatehpur Sikri from Agra in honour of the saint.
- Birbal was killed in the battle with Yusufzai Tribe (1586 AD).
- Abul Fazal was murdered by Bir Singh Bundela (1601 AD).

- Persian was made the official language of the Mughal empire.
- He culminated 'Din-i-Ilahi', which recognised no prophets.

### JAHANGIR (1605 AD-1627 AD)

- Salim, son of Akbar, came to the throne after Akbar's death in 1605 AD.
- He was given proper education by his tutor Rahim Khankhana.
- In 1587 AD, he married to **Jodhabai** or Jagat Gosain, daughter of Udai Singh, who gave birth to prince Khusro (Shahjahan). He mostly lived in Lahore which he adorned with gardens and buildings.
- The eldest son of Jahangir, Khusro revolted against him but was suppressed. Khusro received patronage of Guru Arjun Dev (5th Sikh Guru). Guru Arjun Dev was executed for his blessings to the rebel prince.
- He established Zanjir-i-Adal (i.e. Chain of Justice) at Agra Fort for the seekers of royal justice.
- In 1611 AD, Jahangir married Mihar-un-Nisa. Later on, she was given the title Nurjahan. Nurjahan exercised tremendous influence over the state affairs. She was made the official **Padshah Begum**.
- In 1608 AD, **Captain William Hawkins**, a representative of East India Company, came to Jahangir's court. **Sir Thomas Roe**, an ambassador of King James I of England, also came to his court. Jahangir 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 AD). **Malik Amber** ceded back to the Mughals the territory of Balaghat (Maharashtra).
- His greatest failure was loss of Kandahar to Persia in 1622 AD.
- Pietxa Valle**, famous traveller came during his reign.
- Production of tobacco (brought by the Portuguese) started in his reign.
- He wrote his memories **Tuzuk-i-Jahangiri** in Persian.
- He was buried in Lahore.

### SHAHJAHAN (1628 AD-1658 AD)

- His real name was **Khurram**. He was the youngest prince to be appointed as governor of Deccan at the age of 15.
- He was best known for his Deccan and foreign policies.
- His beloved wife **Mumtaj Mahal** (original name **Arzumand Bano**) died in 1631 AD. To perpetuate her memory, he built the Taj Mahal at Agra in 1632 AD-1653 AD.
- Nizam Shahi's dynasty of Ahmadnagar was brought under Mughal control (1633 AD) by Shahjahan. The Deccan Sultanate of Bijapur and Golconda accepted his suzerainty in 1636 AD.
- The Portuguese established their control over Satgaon through a Shahi farman. Shahjahan ordered Qasim Khan in 1532 AD to drive the Portuguese out of Hughli.
- Persia wrested Kandahar from the Mughals in 1649 AD. Shahjahan failed to recover Kandahar.
- Shahjahan was the second Indian ruler to invade Central Asia.
- Two French travellers **Bernier** and **Tavernier** and the Italian traveller **Nicolo Manucci** visited during his reign. **Peter Mundi** described the famine that occurred during Shahjahan's reign. His reign is considered as Golden Age of the Mughal Empire.
- Shahjahan's reign is said to have marked the pinnacle of the Mughal dynasty and empire.
- The **Red Fort**, **Jama Masjid** and **Taj Mahal** are some of the magnificent structures built during his reign.
- Shahjahan was imprisoned by his son Aurangzeb in the Agra Fort, where he died in captivity in 1666 AD. He was buried in the Taj (Agra).

### WAR OF SUCCESSION

- Battle of Bahadurgarh, February 1658 AD:** It was fought between Shuja and Dara, Shuja was defeated.
- Battle of Dharmat, April 1658 AD:** Combined forces of Aurangzeb and Murad defeated Dara.
- Battle of Samugarh, May 1658 AD:** Dara led Mughal forces on behalf of Shahjahan

against Aurangzeb. In this decisive battle, Shahjahan was put into prison by Aurangzeb in the Agra Fort.

- **Battle of Khanjawa, December 1658 AD:** It was fought between Aurangzeb and Shuja, Shuja was defeated and he fled to Arakan.
- **Battle of Devtrai, March 1659 AD:** Dara was defeated and executed by Aurangzeb.

### AURANGZEB (1658 AD-1707 AD)

- Aurangzeb defeated Dara at Dharmat (1658 AD), Samugarh (1658 AD) and Deorai, in which Samugarh was decisive one and Deorai was the last one.
- After victory, Aurangzeb was crowned at Delhi under the title Alamgir. He died in February, 1707 in Ahmadnagar.
- Aurangzeb captured **Guru Teg Bahadur**, the 9th Guru of Sikhs in 1675 AD 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 a community of warriors called **Khalsa** to fight against the Muslims.
- Guru Gobind Singh was assassinated by an Afghan at Nander in Deccan. **Banda Bairagi**, a trusted disciple successor of Guru Gobind Singh, continued the war against Mughals.
- Shivaji was the most powerful Maratha king and an arch enemy of Aurangzeb. He died in 1680 AD and was succeeded by his son Sambhaji, who was executed by Aurangzeb in 1689 AD. Sambhaji was succeeded by his brother Rajaram and after his death in 1700 AD, his widow Tarabai carried on the movements.
- The Mughal conquests reached a climax during Aurangzeb's reign as Bijapur and Golconda were annexed in 1686 AD and 1687 AD, respectively.
- Under him, the Mughal empire reached its greatest extent and the largest single state ever known in India.
- He forbade inscription of Kalma on the coins, also forbade sati, and **Jharokha-darshan**. He ended the celebration of Navroz and, in 1679 AD, reimposed Jaziya.

- **Mutasib** (regulation of moral conduct) was appointed. He ended use of almanacs and weighing of the emperor. Aurangzeb compiled **Fatwa-i-Alamgiri**.
- The Hindu Mansabdar however maintained his high proportion during his rule.
- He died in 1707 AD and was buried at Khuldabad (Daulatabad) near Aurangabad.
- He built "Bibi ka Maqbara" similar to Taj Mahal in Aurangabad.
- He was called **Zinda Pir**, the living saint.
- **Decline of the Mughal Empire:** After Aurangzeb, the Mughal empire rapidly declined.
- **Jat** revolted under **Gokla Rajaram and Churaman**.
- **First Afghan Rebellion** was by Yusuf Shahi Tribes of Afghanistan of Roshni Sect.
- **Second Afghan Rebellion** led by Ajmal Khan.
- He annexed Marwar in 1678 AD. The campaign was led by Akbar II against Durgadas, General of Ajit Singh.
- Bijapur and Golconda were annexed in 1686 AD and 1687 AD, respectively.
- In 1662 AD, **Mir Jumla**, Aurangzeb's able general, led the expedition against Ahoms.

### RELIGIOUS POLICY

- Wanted to convert India from **Dar-ul-Harb** to **Dar-ul-Islam**. He replaced the solar calendar by Lunar Hirg.

### LATER MUGHALS

#### BAHADUR SHAH-I

- Real name is **Muazzam**, ascended the Mughal throne with the title **Bahadur Shah**. He also assumed the title **Shah Alam-I**.
- **Shah Bekhabar:** He made peace with **Guru Gobind Singh** and **Chhatrasal**. He granted Sar Deshmukhi to Maratha and released Shahu.
- He forced **Ajit Singh** of Marwar to submit but later recognised him as the Rana of Marwar. He defeated **Banda Bahadur** at Lohgarh.

#### JAHANDAR SHAH

- He was the **first puppet Mughal Emperor**.
- He introduced the evil practice of revenue faming of **Ijarah**.

- **Jai Singh of Amber** was given the title of **Mirza Raja Sawai** and **Ajit Singh** was awarded the title of **Maharaja**. He abolished **Jaziya**.
- He was defeated by his Nephew **Farrukhsiyar** in Agra.

## FARRUKHSIYAR

- He ascended the throne with the help of Sayyid brothers.
- Banda Bahadur was executed at Gurdaspur. Farrukhsiyar was murdered by the Sayyid brothers with the help of Marathas, in 1719 AD.

## MUHAMMAD SHAH

- Ascended the throne with the help of Sayyid brothers (king-makers).
- Nizam-ul-Mulk was appointed as the Wazir but he relinquished the post in 1722, and marched towards Deccan and found an autonomous state named Hyderabad.
- During his reign, Bengal acquired virtual independence during the governorship of **Murshid Quli Khan**.
- **Saadat Khan** (Burhan-ul-Mulk), who was appointed as Governor of Awadh, laid down the foundation of the autonomous state.
- **Nadir Shah** invaded India in 1739 AD and defeated Muhammad in Battle of Karnal (1739 AD) and he took away Takht-i-Taus (Peacock throne) and Kohinoor diamond.
- **Ahmed Shah Abdali** raided the kingdom for the first time during his reign.
- He was a pleasure-loving king and was nicknamed **Rangeela**.

## AHMAD SHAH

- Ahmad Shah Abdali invaded Delhi many times and Punjab and Multan were ceded to him.

## ALAMGIR II

- Ahmad Shah Abdali occupied Delhi during his reign. He defeated the Marathas in the **Third Battle of Panipat in 1761 AD**.

## SHAH ALAM-II

- He fought the **Battle of Buxar** in 1765 AD and was defeated by the British.
- By the **Treaty of Allahabad**, the emperor received the territories of Allahabad and Kara and 26 lakh annual tributes from Bengal.

- By a farman, the emperor confirmed the English gains and granted them Diwani of Bengal, Bihar and Orissa.

## AKBAR-II

- The king gave Raja Rammohan Roy the title of Raja.

## BAHADUR SHAH-II

- He was the last Mughal Emperor: He was confined by the British in the Red Fort.
- During the 1857 sepoy revolt, he was proclaimed the emperor of India by the rebellions. He was deported to Rangoon and died there.
- He used to write **Shairis** under the pet-name of **Zafar**.

## Later Mughal Emperors' List

Bahadur Shah-I	1707-1712
Jahandar Shah	1712-1713
Farrukh Siyar	1713-1719
Muhammad Shah	1719-1748
Ahmad Shah	1748-1754
Alamgir-II	1754-1758
Shah Alam-II	1758-1806
Akbar-II	1806-1837
Bahadur Shah-II	1837-1857

## SOCIO-ECONOMIC CONDITIONS DURING THE MUGHAL RULE

- **Society:** Society was stratified into several classes. Both sati and child marriage were readily practised. **Purdah system** was in vogue both among Hindus and Muslims.
- **Economy:** Both trade and commerce flourished with the European nations.
- **Ports:** Surat, Cambay, Cochin and Masulipattanam.

## PROVINCIAL ADMINISTRATION

- Mughal empire was divided into 12 Subas province. After expansion of the empire, it became 15 during Akbar, 11 during Jahangir, 22 during Shahjahan and 21 during Aurangzeb.
- **Subedar:** Head of the province (Governor).
- **Provincial Diwan:** Deal with finance directly responsible to central diwan.

## DISTRICT OR SARKAR

- Fauzdar:** Administrative head of the Sarkar.
- Amil/Amalguzar:** Collecting revenues and patrolling the roads.
- Kotwal:** Duty was to maintain law and order in Sarkar besides, trial of criminal cases and regulations of prices.

## PARGANA

- Siqdar:** Administrative head of the pargana.
- Amin/Qaungo:** They were revenue officials.

## VILLAGE

- Lambardar:** Village headmen
- Patwari:** Village Accountant

## ADMINISTRATION

- Wazir:** The Prime Minister.
- Diwan:** His responsibilities were in three fields: executive, revenue and finance.
- Mir Bakshi:** He was the head of the military department.
- Mir Sama or Khan Samas:** In-charge of the royal household.
- Sadar-us-sadar:** In-charge of religious matters, religious endowments and charities.
- Chief Qazi:** Head of the judiciary department after the king.
- Barids:** Intelligence officers.
- Mustaufi:** Auditor General.
- Mughal empire was divided into **Subas**, which were further subdivided into **Sarkar**, **Pargana** and **Gram**.
- Akbar introduced Mansabdari system. The term **Mansab** indicates the rank of its holder. Mansabdari was both civil and military.
- Mansabdari System** (1595 AD-1596 AD) showed a noble's civil and military capacities. In its broader aspect, the mansab or rank awarded to an individual fixed both his status in the official hierarchy and his salary.
- Twin ranks **Zat** and **Sawar** were allotted.
- Zabti System** was based on the measurement and assessment of land.
- Ijara System:** The government began contracting the land with the middlemen, also known as revenue farmers, who were supposed to pay fixed amount to the government. However, they were left free to

collect whatever they could from the farmers, leading to their exploitation.

- According to the payment mode, they were of two types: **Naqdi** and **Jagirdar**.
- Jahangir added **asaph-sih-asaph** system.
- Shahjahan added **Jama-Dami** or **Mahanz Zagir** (monthly scale) system.
- Methods of revenue collection in practice, viz. **Kankut Rai** and **Zabti**.
- Dashala System of Raja Todarmal:** Under this system, the average produce of different crops was calculated at the average price prevailing over the last 10 years. One-third of the average produce was the state's share. For the measurement of land, '**Bigha**' was adopted as the standard unit.

## Mugal Architecture

Ruler	Architecture Built
Babur	Mosques at Kabuligarh (Panipat) and at Sambhalgarh
Humayun	City of Dinpannah, Jamali mosque and mosque of Isa Khan at Delhi
Haji Begum (wife of Humayun)	Humayun Tomb
Akbar	Agra Fort; Jahangiri Mahal in Agra fort based on design of Manmandir; Lahore Palace, Allahabad Fort, temple of Govind-Deva at Vrindavana and several buildings at Fatehpur Sikri that included Panch Mahal, Diwan-i-Khas, Jold Habbis Palace Diwan-i-Aam, Buland Darwaja
Jahangir	Moti Masjid at Lahore, own Mausoleum at Shahdara
Nurjahan	Itamduddaulas marble tomb at Agra in Pietra Dura Technique

Shahjahan	<b>At Agra</b> -Taj Mahal, Moti Masjid, Khaas Mahal, Sheesh Mahal, Musamman Burz <b>At Delhi</b> - Jama Masjid, Red Fort (Diwan-i-Khas and Rang Mahal) <b>Others</b> -Shalimar Bagh (Lahore), city of Shahjahanabad (Red Fort and Takht-i-Taus)
Aurangzeb	Moti Masjid at Delhi, Bibi ka Makbara, Badshahi mosque at Lahore

## MUGHAL CULTURE

- Babur built two mosques, one at Kabulibagh in Panipat and the other at Sambhal in Rohilkhand.
- Humayun's tomb was built by his widow **Haji Begum**.
- An unusual building at Fatehpur Sikri is Panch Mahal.
- 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** and **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.
- Nurjahan built **Itimad-ud-daulah/Mirza Ghiyas Beg's marble tomb** at **Agra**, which is noticeable for the first usage of **Pietra Dura** technique.
- Jahangir built **Moti Masjid** in Lahore and his mausoleum at **Shahdara** (Lahore).
- Shahjahan** also built the **Jama Masjid**.
- Some of the important buildings built by Shahjahan at Agra are **Moti Masjid** (the only mosque of marble), **Khaas Mahal** and **Musamman Burj**.
- He laid the foundation of **Shahjahanabad** in 1637 AD, where he built the **Red Fort** and **Takht-i-Taus (Peacock throne)**.
- The only monument associated with Aurangzeb is **Bibi ka Maqbara**, which is the tomb of his wife **Rabbia-ud-Daura**, in Aurangabad.

- Aurangzeb also built the **Badshahi Masjid** in Lahore.
- Humayun had taken into his service two master painters, **Mir Syed Ali** and **Abdus Samad**.
- Daswani** and **Basawan** were the two famous painters in Akbar's court.
- Abdul Hasan**, **Ustad Mansur** and **Bishandas** were the three famous painters in Jahangir's court.

## Mugal period literature

Scholars	Works
Khan Abdur Rehman	Translated Tuzuki-i-Baburi from Turki to persian during Akbar's reign
Abul Fazal	Ain-i-Akbari, Akbarnama
Abdul Qadir Badauni	Kitab-ul-Ahidish, Tarikh-i-Alffi Muntakhab-ul-Tawarikh.
Khawaja Nizamuddin	Tabaqat-i-Akbari
Jahangir	Tuzuk-i-Jahangiri
Hamid	Padshah Namaah
Khafi Khan	Muntakhab-i-Lubab
Dara Shikoh	Translated Upnishadas and Bhagvada Gita, Safinat-ul-Auliya
Mirza Muhammad	Alamgirnamah
Ishwar Das	Fatut-i-Alamgir
Muhammad Salim	Shahjahanama

## MARATHA STATE (1674 AD-1720 AD) AND MARATHA CONFEDERATE (1720 AD-1818AD)

### SHIVAJI (1674 AD-1680 AD)

- Father-**Shivaji Bhonsle**; Mother-**Jija Bai**, Religious Teacher-**Samarth Ramdas**.
- Shivaji inherited the Jagir of Poona from his father.
- After the death of his guardian, **Dadaji Kondadev**, he assumed the full charge of his Jagir.
- Afzal Khan** was deputed by **Adil Shah** (ruler of Bijapur) to punish Shivaji; but later Afzal Khan was killed by Shivaji in 1659 AD.

- **Shaista Khan**, governor of Deccan, was deputed by Aurangzeb to put down the rising power of Shivaji in 1660 AD. Shivaji lost Poona. He made a bold attack on Shaista Khan (1663 AD) and plundered Surat (1664 AD) and later Ahmadnagar.
- **Raja Jai Singh** of Amber was then appointed by Aurangzeb to put down Shivaji (1665 AD). Jai Singh succeeded in besieging Shivaji in the fort of Purandhar. Consequently, the **Treaty of Purandhar** (1665 AD) was signed.
- In 1674 AD, Shivaji was coronated at the capital Raigarh and assumed the title of **Haindava Dharmodharak**.
- He conquered Karnataka during 1677 AD-1680 AD.

### SHIVAJI'S ADMINISTRATION

- Shivaji was helped by the **Ashtapradhan** (eight ministers).

#### Shivaji's Ashtapradhan

- **Peshwa**: Also called 'Mukhya Pradhan', Finance and general administration; later he became Prime Minister and assumed great importance.
- **Majumdar**: Accountant general during the rule of the Peshwas; he later became revenue and finance minister.
- **Sar-i-Naubat**: Senapati or military commander; this was only an honorary post with no real military powers.
- **Surunavis or Sachiv**: Also called chitnis, looked after correspondence.
- **Waqenavis**: Intelligence, posts and household affairs.
- **Dabir or Suriiania**: Master of ceremonies.
- **Nyayadhish**: Justice.
- **Pandit Rao**: Charities and religious affairs.

- The Kathi of Malik Ambar was adopted as the unit of measurement.
- **Chauth** was paid to the Marathas, so far not being subjected to Maratha raids.
- **Sardeshmukhi** was an additional levy of 10% on those lands of Maharashtra over which the Marathas claimed hereditary rights, but which formed part of the Mughal Empire.

### SAMBHAJI (1680 AD-1689 AD)

- Sambhaji, the elder son of Shivaji, defeated Rajaram, the younger son of Shivaji, in the war of succession.
- He provided protection and support to **Akbar II**, the rebellious son of Aurangzeb.

### RAJARAM (1689 AD-1700 AD)

- He succeeded the throne with the help of the ministers at Raigarh.
- Rajaram created the new post of **Pratinidhi**, thus taking the total number of ministers to nine (Pratinidhi + Ashtapradhan).

### TARABAI (1700 AD-1707 AD)

- Rajaram was succeeded by his minor son Shivaji II under the guardianship of his mother Tarabai.

### SHAHU (1707 AD-1749 AD)

- Shahu was released by the Mughal emperor Bahadur Shah.
- Tarabai's army was defeated by Shahu in the **Battle of Khed** (1700 AD), and Shahu occupied Satara.
- Shahu's reign saw the rise of Peshwas.

## THE PESHWAS (1713 AD-1880 AD)

### BALAJI VISHWANATH (1713 AD-1720 AD)

- Shahu honoured him with title of 'Sena Karta' in 1708 AD and made him his Peshwa in 1713 AD. He became the functional head of the Maratha empire.
- He concluded an agreement with the Sayyed brothers, by which the Mughal emperor, Farrukhsiyar recognised Shahu as the King of Swarajya.
- He also helped Sayyed brothers in overthrowing Farrukhsiyar.

### BAJI RAO (1720 AD-1740 AD)

- Maratha power reached its zenith under him.
- Under his leadership, the Marathas compelled the Mughals first to give them the right to collect chauth of the vast areas and then to cede those areas to the Maratha kingdom.
- He conquered Salsette and Bassein from the Portuguese in 1733 AD. He also defeated the

Nizam-ul-Mulk near Bhopal and concluded the treaty of **Durai Sarai**, by which he got Malwa and Bundelkhand (1737 AD).

### BALAJI BAJI RAO NANA SAHIB (1740 AD-1761 AD)

- In the third Battle of Panipat in 1761 AD between the Marathas and Ahmad Shah Abdali, Viswas Rao, the son of Nana Sahib, died.

### PESHWA MADHAV RAO (1761 AD-1762 AD)

- Balaji Baji Rao succeeded by his younger son Madhav Rao I.
- After the death of Madhavrao, peshwaship had lost all its powers.

### LATER PESHWAS

- Narayan Rao (1772 AD-1773 AD)
- Sawai Madhav Rao (1773 AD-1795 AD)
- Baji Rao (1795 AD-1818 AD)

### MARATHA CONFEDERACY

- Under him, several Maratha families became prominent and got themselves entrenched in different parts of India.
  - Gaekwad of Baroda
  - The Bhonsles at Nagpur
  - Holkars at Indore
  - Peshwas at Poona
  - Scindhias at Gwalior

### ANGLO-MARATHA WARS

- First Anglo-Maratha War (1775 AD- 1782 AD):** On being defeated, the British had to sign the humiliating Convention of Wadgaon (1779 AD).
- British later signed Treaty of Salbai (1782 AD).
- Second Anglo-Maratha war (1803 AD- 1806 AD):** The Maratha Peshwa signed the Subsidiary Alliance Treaty of Bassein (1802 AD).
- Third Anglo-Maratha War (1817 AD-1818 AD):** The Marathas were decisively defeated.

#### Important Treaties

The Treaty of Salbai	1782
The Treaty of Devgaon	1803
The Treaty of Surji Anjungaon	1803
The Treaty of Poona	1817
The Treaty of Mandsor	1818
The Treaty of Lahore	1806
The Treaty of Amritsar	1809
The Treaty of Bhairowal	1846

## THE ADVENT OF EUROPEANS

### PORTUGUESE

- The Cape route was discovered from Europe to India by **Vasco da Gama**.
- He reached the port of Calicut on May 17, 1498 AD 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 (1502 AD) was the early capital of the Portuguese in India, later on replaced by **Goa**.
- The first Governor of Portuguese in India was Francisco Almeida (1509 AD). He introduced "The Policy of Blue Water".
- Alfonso d' Albuquerque** arrived in India in 1503 AD and became Governor of the Portuguese in India in 1509 AD. He captured Goa from the ruler of Bijapur in 1310 AD and introduced the policy of imperialism.
- Nino-da-Cunha** (1529 AD-1528 AD) transferred the capital from Cochin to Goa in 1530 AD. He acquired Diu and Bassein from Bahadur Shah of Gujarat (1534 AD).
- Portuguese acquired Daman in 1559 AD. They lost Hugly in 1631 AD during the reign of Shahjahan.
- In 1661 AD, the Portuguese king gave Bombay to Charles II of England as dowry for marrying his sister.
- First Portuguese factory was established at Calicut.
- The famous Jesuit Saint, **Francisco Xavier** arrived in India with Martin Alfonso de'Souza (1542 AD-1545 AD).
- The Marathas captured Salsette and Bassein in 1739 AD.

The Treaty of Purandar	1665
The Treaty of Allahabad	1765
The Treaty of Bargaon	1779

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

## COMING OF THE EUROPEANS

• Portuguese	-	1498
• English	-	1600
• Dutch	-	1602
• Danish	-	1616
• French	-	1664

## DUTCH

- Formation of the company in March 1602.
- The Dutch East India Company established factories in India at Masulipatnam in 1605 AD, Pulicat (1610 AD), Surat (1616 AD), Bimlipatam (1641 AD), Karaikal (1645 AD), Chinsura, Kasimbazar, Patna, Balasore, Nagapatam and Cochin.
- Pulicat was their main centre in India till 1690 AD, when Nagapatam replaced it.
- The Dutch conceded to British after their defeat in the Battle of Sedera in 1759 AD.

## ENGLISH

- John Mildenhall, a merchant adventurer, was the first Englishman, who arrived in India in 1599 AD.
- The Governor and company of merchants of London trading into the East Indies, popularly known as the English East India Company, were formed in 1600 AD.
- Captain William Hawkins** arrived at Jahangir's court (1609 AD) to seek permission to open a factory in Surat. A farman was issued by Jahangir, permitting the English to build a factory in Surat (1613 AD).
- Gerald Aungier was Bombay's first governor from 1669 AD to 1677 AD.
- Sir Thomas Roe** visited Jahangir's court (1615 AD) as an ambassador of King James I to seek permission to trade in India.

## ESTABLISHMENT OF FACTORIES

### By British East India Company

- The first factory was built in Surat (1608 AD). Surat was replaced by Bombay, which was acquired from Charles II on lease as the headquarters on the West coast in 1687 AD.

- In 1639 AD, Madras was obtained from Raja of Chandragiri with the permission to build a fortified factory, which was named **Fort St. George**.
- In 1690 AD, Job Charnock established a factory at Sutanati and the Zamindari of three villages, Sutanati, Kalikata and Govindpur was acquired by the British (1698 AD). These three villages grew as the city of Calcutta.
- The factory at Sutanati was fortified and named Fort William in 1700 AD.
- In 1717 AD, John Surman obtained royal farman from the Mughal emperor Farrukhsiyar. This farman is also called the Magna Carta of the British rule in India as it gave large concessions to the company.

### By Danes

- The Danes arrived in India in 1616 AD. They established settlement at Tranquebar (Tamil Nadu) in 1620 AD and Serampore (Bengal) in 1676 AD. Serampore was their headquarters.
- They were forced to sell their settlements to British in 1854 AD.

### By French

- The French East India Company was formed in 1664 AD by Colbert under state patronage during the reign of **Louis XIV**.
- The first French factory was established at Surat by **Francois Caron** in 1668 AD and second at Masulipatnam in 1669 AD.
- They occupied Mahe, Yanam and Karaikal.
- The foundation of Pondicherry was laid in 1673 AD, which afterwards became its capital. They also developed a factory at Chandernagar.
- The Governors, Lenoir and Dumas revived the French power in India between 1720 AD and 1742 AD and the Anglo-French conflict started with the arrival of Governor Dupleix in 1742 AD.

## ASCENDANCY OF THE BRITISH—FIRST CARNATIC WAR (1746 AD-1748 AD)

- A war between France and England.
- Nawab of Carnatic's army was defeated by the French under Dupleix in the battle at St. Thome. Then the French besieged Madras.

- The war ended with **Treaty of Aix-la-Chapelle** (1748 AD).

### ■ **SECOND WAR (1749 AD-1754 AD)**

- Dupleix aligned with Muzaffar Jung (Hyderabad) and Chanda Sahib (Carnatic).
- War ended with **Treaty of Pondicherry/ Treaty of Godehu.**

- The Siege of Arcot (1751 AD) made Clive a national hero in England.

### ■ **THIRD WAR (1758 AD-1763 AD)**

- French were defeated by British in the decisive **Battle of Wandiwash** in 1760 AD. Pondicherry was returned to France by the **Treaty of Paris.**
- Local version of “seven-year war” in Europe.



# MODERN INDIA

## EXPANSION OF BRITISH POWER

### BENGAL

#### **Murshid Quli Khan (1717 AD-1727 AD):**

In 1717 AD, Murshid Quli Khan was appointed Bengal's Subedar, i.e. governor by Mughal emperor Farrukhsiyar. He transferred the capital of Bengal from Dacca to **Murshidabad**.

#### **Shujauddin (1727 AD-1739 AD):** He was granted the governorship of Bihar by Mughal emperor Muhammad Shah Rangeela in 1733 AD.

#### **Sarfraz Khan (1739 AD-1740 AD):** He was murdered by Alivardi Khan, the Deputy Governor of Bihar in 1740 AD.

#### **Alivardi Khan (1740 AD-1756 AD):** He legalised his usurpation by receiving a farman from Mughal emperor Muhammad Shah Rangeela. He prevented the English and the French from fortifying their factories at Calcutta and Chandranagore, respectively.

#### **Shuja-ud-din (1724 AD-1739 AD):** He was granted governorship of Bihar by Mughal emperor Muhammad Shah Rangeela.

#### **Siraj-ud-Daula (1756 AD-1757 AD)**

Alivardi Khan was succeeded by his grandson Siraj-ud-Daula.

In 1756 AD, Siraj-ud-Daula seized the English factory at Kasimbazar and marched to Calcutta and occupied Fort William.

**Black hole tragedy** took place. Robert Clive recovered Calcutta and Treaty of Alinagar was signed on 2nd January, 1757 AD.

**Battle of Plassey:** On 23rd June, 1757 AD, English East India Company's forces under

Robert Clive won the battle against Siraj-ud-Daula, and compelled the Nawab to concede all the demands.

- Mir Zafar (Mir Bakhsh), Manik Chand, Officer in-charge of Calcutta, Aminchand, rich Sikh merchant Jagat Seth, banker Khadim Khan, Commander of Nawab's army, all were in the English side i.e. betrayed Nawab.
- Nawab was killed by Mir Zafar's son Miran.

#### **MIR JAFAR (1757 AD-1760 AD)**

- The company was granted undisputed right to free trade in Bengal, Bihar and Orissa.

#### **MIR QASIM (1760 AD-1764 AD)**

- He shifted his capital from **Murshidabad** to **Munger**.
- In 1760 AD, Mir Jafar was replaced by his son-in-law, Mir Qasim.
- Mir Qasim ceded Burdwan, Midnapore and Chittagong. He shifted his capital from Murshidabad to Monghyr (Munger).
- **Battle of Buxar:** Mir Qasim formed an alliance with Nawab of Awadh, Shuja-ud-Daula, and Mughal Emperor Shah Alam-II and fought with the British army at Buxar on 22nd October, 1764 AD.
- Mir Jafar was again put to throne by the Britishers.
- Robert Clive became the first Governor of Bengal in 1765 AD.
- After the Battle of Buxar, the Company gave Shah Alam-II a subsidiary of ₹ 26 lakhs and secured Diwani of Arrah and Allahabad.
- The important outcome was the Treaty of Allahabad in 1765.
- After the death of Mir Jafar, Nizam-ud-daulah was placed on the throne.

- Clive concluded two separate treaties of Allahabad with Shah Alam II and Shuja-ud-Daula.

## DUAL GOVERNMENT OF BENGAL (1765 AD-1772 AD)

- Dual system of Government in Bengal was started by Clive in 1765 AD.
- The Company acquired both Dimani and Nizamat rights from Nazm-ud-Duala, the Nawab of Bengal.
- Warren Hastings ended the dual system of government in 1772 AD.

## IMPACT OF VICTORY OF PLASSEY AND BUXTAR

- Victory of Plassey laid the foundation of British rule in India and made them a powerful factor in Bengal politics.
- Victory of Buxar established English supremacy over whole of North India as the emperor of Hindustan was defeated.

## TREATY OF ALLAHABAD (AUGUST 1765 AD)

- English got the Diwani right (right to collect revenue) of Bengal, Bihar and Orissa and gave Rupees 26 lakhs.

## TIPU SULTAN: (1782 AD-1799 AD)

- The Treaty of Mangalore (1784 AD) was signed by Tipu Sultan, which ended the Second Anglo-Mysore war.
- **Third Anglo-Mysore war (1790 AD-1792 AD):** By the Treaty of Srirangapatnam (1792 AD), Tipu ceded half of his territory.
- **Fourth Anglo-Mysore war (1799 AD):** Lord Wellesley attacked and Tipu Sultan died.
- Tipu established the embassies to France, Turkey, Iran and Pegu to develop foreign trade.

## ANGLO-MYSORE WARS

### FIRST WAR (1766 AD-1769 AD)

- Haider Ali defeated the British. The Treaty of Madras was signed.

### SECOND WAR (1780 AD-1784 AD)

- Warren Hastings attacked French port Mahe that was in Haider Ali's territory.
- In 1781 AD, Haider Ali was defeated at Porto Novo by Eyre Coote.

- **Treaty of Mangalore** (1784 AD) was signed by Tipu Sultan on the basis of all mutual restitution of conquests.

### THIRD WAR (1789 AD-1792 AD)

- Marathas and Nizam aided the British, Cornwallis captured Bangalore.
- **Treaty of Seringapatnam** Tipu ceded half of his territories.

### FOURTH WAR (1799 AD)

- Tipu, member of the Jacobin club was defeated by Wellesley.
- It placed England on the military supremacy in India.

## PUNJAB

- **Maharaja Ranjit Singh (1792 AD-1839 AD):** Founded Sikh rule in Punjab. He occupied Lahore in 1799 AD and made it his capital.
- **Successors of Ranjit Singh:** Kharak Singh (1839 AD-1840 AD), Naunihal Singh, Sher Singh (1841 AD-1843 AD) and Dalip Singh (1843 AD-1849 AD).

- **First Anglo-Sikh war (1845 AD-1846 AD):** Sikhs were defeated. The Treaty of Lahore (1846 AD) ended the war.

- **Second Anglo-Sikh war (1848 AD-1849 AD):** Dalhousie annexed Punjab. Sir John Lawrence became the first chief commissioner of Punjab.

## THE SIKHS (PUNJAB)

- **Guru Nanak** (1469 AD-1539 AD): Born in Talwandi, he was the first Sikh guru and established Nanak Panth.
- **Guru Angad** (1539 AD-1552 AD): Invented **Gurumukhi** script for Punjabi language.
- **Guru Amardas**: Mughal Emperor of Akbar visited him.
- **Guru Ramdas** (1575 AD-1581 AD): Founded the city of Amritsar. He dug a tank (sarovar) and constructed **Harmandir Sahib** in the midst of the tank.
- **Guru Arjun Dev** (1581 AD-1606 AD): He compiled the **Adi Granth**. He completed the construction of Amritsar and founded the city of Taran and Kartarpur. He was executed by Jahangir.
- **Guru Hargovind Raj** (1606 AD-1645 AD): Transformed Sikhs into a warrior class and

defeated the Mughal army at Sangrama. Fortified Amritsar and built **Akal Takht** at Golden Temple. Took the title of 'Padshah' and founded the city of Kiratpur in Kashmir.

- **Guru Har Rai** (1645 AD-1661 AD): He met Dara Shikoh, son of Aurangzeb.
- **Guru Harkishan** (1616 AD-1664 AD): Ramanaya established separate seat of Guru of Dehradun.
- **Guru Teg Bahadur** (1664 AD-1675 AD): Executed by Aurangzeb in Delhi. Sisganj Gurudwara marks the site of his martyrdom.
- **Guru Gobind Singh** (1675 AD-1708 AD) (born in Patna): He organised a community of warriors called **Khalsa** (on the Baisakhi Day in 1699 AD).
- The Sikhs were required to keep 5Ks, viz. Kesh, Kripa, Kachchha, Kanga and Kara. He compiled Dasveen Padshah ka Granth. He was stabbed to death by a Pathan in 1708 AD.

#### Anglo-Sikh Wars

##### First War (1845 AD-1846 AD)

- The Sikhs were defeated. **Treaty of Lahore (1846)** ended the war.

##### Second War (1848 AD-1849 AD)

- Dalhousie annexed Punjab in 1849.

## ANGLO-BURMESE WAR

- Burma was united by **King Alaungpaya** between 1752 AD and 1760 AD.

#### FIRST WAR (1824 AD)

- In 1824 AD, the British Indian authority declared war on Burma and occupied Rangoon, and reached the capital Ava. Peace came in 1826 AD by **Treaty of Yandabo**.

#### SECOND WAR (1852 AD)

- Annexation of Pegu, the capital province only remained free.

#### THIRD WAR (1885 AD)

- British attacked over Burma and Thibaw surrendered.
- In 1935 AD, Burma was separated from India. Movement of Burma reached a new height under the leadership of U Aung

San and Burma got independence on 4th January, 1948.

## THE CARNATIC WARS

- These were the Anglo-French conflicts.
- These wars were continued for 20 years from 1744 to 1763 A.D.

#### FIRST WAR (1744-1748)

- French captured Madras
- French defeated Nawab of Hyderabad at St. Thome.
- Treaty of Aix-La-Chapelle, (1748) ended the War of Austrian Succession.

#### SECOND WAR (1749-1754)

- Dupleix aligned with Muzaffar Jung (Hyderabad) and Chanda Sahib (Carnatic).
- After initial reverses, Robert Clive emerged victorious.
- Godeheau signed the treaty of Pondicherry in 1755 with the English.

#### THIRD WAR (1758-1763)

- French, Count de Lally captured 'Fort St. David'.
- French were defeated at Wandiwash (1760) under General Eyre Coote.
- Pondicherry was returned to French by the Treaty of Paris.

## ANGLO-MARATHA WARS

- First Anglo Maratha War was fought from 1775-1782 A.D.
- The Britishers signed Treaty of Surat with Raghunath Rao (1775).
- The Treaty of Purandhar was made in 1775.
- The Treaty of Salbai (1782) gave 20 years of peace.
- The Second Maratha war was fought from 1803-1806 A.D.
- The Primary cause was the Treaty of Bassein (1802).
- The Scindia and the Bhonsle were defeated.
- The Third Anglo Maratha War was fought in 1817-1818.
- Lord Hastings' moves against Pindaris transgressed the authority of the Marathas.
- The Maratha confederacy was completely destroyed.
- Peshwa Baji Rao-II was dethroned and pensioned off at Bithur near Kanpur.

### ANGLO-AFGHAN WARS

#### First War (1839 AD-1842 AD) or Auckland's Folly

- British had to restore the throne to Dost Muhammad. British occupied Kabul in 1842 AD.

#### Second War (1870 AD-1880 AD)

- Sher Ali was defeated by Lord Lytton and his sons signed the **Treaty of Gandamak** (Yakub Khan).

#### Third Anglo-Afghan War

- Durand line was reaffirmed between British India and Afghanistan.
- Treaty of Rawalpindi was signed.

## ECONOMIC IMPACT OF BRITISH RULE

### THREE STAGES OF BRITISH COLONIALISM

#### First Phase—The Mercantile Phase (1757 AD-1813 AD)

- Revenue of Bengal was used to finance exports to England.
- Act of 1813 AD 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 markets.
- Heavy import duty on Indian products to England discouraged them in the market.

#### Second Phase—The Industrial Phase (1813 AD-1858 AD)

- The British mercantile industrial capitalist class exploited India as Industrial Revolution in Britain completely transformed the British economy. Charter Act of 1813 AD allowed 'one-way free trade' for the British citizens, resulting in the Indian markets being flooded with cheap and machine-made imported goods from Britain.

#### Third Phase—The Financial Phase

#### (1860 AD onwards)

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

### DRAIN OF WEALTH

- Dadabhai Naoroji** cited it in his book **Poverty and Un-British Rule in India** (1867 AD). **R.C. Dutta**, in his **Economic History of India** (1901 AD), blamed the British policies for the Indian economic ills.
- 'Drain of Wealth' theory refers to an importation of national product of India, which was not available for consumption to its people.

### LAND REVENUE SYSTEMS

- Permanent Settlement/Istamarari (Sthayi) Bandobast**
- Introduced in **Bengal**, **Bihar** and **Orissa**, districts of **Banaras** and Northern districts of **Madras** by Lord Cornwallis in 1793 AD.
- John Shore planned this settlement.

### 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 **ryot** (cultivator).
- It was based on the Scientific Rent Theory of Ricardo.

### MAHALWARI SYSTEM

- Modified version of zamindari settlement was introduced in the Ganges valley; NWFP parts of Central India and Punjab.
- Revenue settlement was to be made by village or estates with landlords.

### CIVIL REVOLTS

- Sannyasi Revolt** (Bengal, 1780 AD): Led by religious monks.
- Kattabomman Revolt** (1792 AD-1798 AD): Led by Vira Pandya Kattabomman.
- Paik Revolt** (Orissa, 1804 AD-1806 AD): Led by Bakshi Jagabandhu.
- Velu Thampi** (Travancore, 1805 AD): Led by Velu Thampi.
- Kittur Revolt** (Karnataka, 1824 AD): Led by Chinnama and Ryappa.
- Pagal Pandits** (Maimansinh, 1825 AD-1833 AD): Led by Karam Shah and Tipu.
- Raju** (Vizag, 1827 AD): Led by Birabhadra Raju.

- **Satavandi** (Maharashtra, 1839 AD): Led by Phond Savant and Anna Sahib.
- **Kuka** (1840 AD): Led by Bhagat Jawahar Mal or Sian Saheb in Punjab.
- **Poligar** (Karnool, 1846 AD): Led by Narasimha Reddy.

### IMPORTANT SOCIO-RELIGIOUS REFORMERS

- **Swami Sahajananda** (1781 AD-1830 AD): Originally Gyanashyama founded the Swaminarayan sect in Gujarat.
- **Raja Rammohan Roy** (1772 AD-1833 AD): Born in 1772 AD, founded **Atmiya Sabha** in Calcutta in 1815 AD, which was named **Brahmo Sabha** and finally **Brahmo Samaj** in 1828 AD. His journal was named **Sabad Kaumudi**.
- **Debender** became the leader of the Brahmo Samaj after Raja Rammohan Roy. He founded **Tattvabodhini Sabha** in 1839 and published **Tattvabodhini Patrika**. He compiled selected passages from the Upanishads, which came to be known as **Brahma Dharma**.
- **Keshav Chandra Sen** (1838 AD-1884 AD): Keshav Chandra Sen was the leader of the Brahmo Samaj during the absence of Debendranath Tagore. He started **Bamabodhini Patrika**, a journal for women. He launched radical reforms such as giving up of caste names, inter-caste and widow remarriages, and launched movements against child marriages. These radical reforms led to the first schism in the Brahmo Samaj. The original Brahmo Samaj came to be known as **Adi Brahmo Samaj** and the other the **Brahmo Samaj of India** which was established by Keshav Chandra Sen in 1866 AD. Sen formed the **Indian Reform Association** in 1870 AD, which persuaded the British Government to enact the **Native Marriage Act of 1972** (popularly known as **Civil Marriage Act**).
- Anand Mohan Bose started **Sadharan Brahmo Samaj**.
- Justice M.G. Ranade founded the **Prarthna Samaj**.

## INDIAN RENAISSANCE

### ARYA SAMAJ

- The first Arya Samaj unit was founded by Swami Dayanand Saraswati in 1875 AD in Bombay.
- His original name was Mula Shankar.
- He looked on the Vedas as 'India's Rock and Ages'. His mottos were **Go back to Vedas and India for the Indians**.
- **Arya Samaj** stood for four-fold Varna system determined by merit and not by birth; for equal rights for men and women. Opposed untouchability, caste discrimination, child marriage and supported widow remarriage and intercaste marriages.
- He wrote three books—**Satyartha Prakash**, **Veda-Bhashya Bhumika** and **Veda Bhashya**.
- In 1886 AD, Lala Hansraj instituted Dayanand Anglo Vedic (DAV) School in Lahore. In 1902 AD, **Gurukul Pathshala** was established at Haridwar.
- The Arya Samaj started the **Shuddhi Movement** to convert non-Hindus to Hindus. Other prominent Arya Samajists were Lala Hansraj, Pt. Guru Dutt, Lala Lajpat Rai and Swami Shraddhananda.

### RAMAKRISHNA MISSION

- It was established by Swami Vivekananda to carry on relief and social work after death of his **Guru Rama Krishna Paramahansa** in 1897 AD.

### SWAMI VIVEKANANDA

- His original name was **Narendranath Dutt**.
- He attended the Parliament of Religions held at Chicago in 1893 AD and published two papers, **Prabhudhha Bharat** in English and **Udbodhana** in Bengali.
- He urged people to inculcate the spirit of liberty, equality and free thinking.
- He worked for the emancipation of women.
- He emerged as a preacher of Neo-Hinduism.
- He advocated the Doctrine of Service—the service of all human beings.
- He was considered as the spiritual father of the modern nationalist movement.

- Irish woman Margaret Noble (aka Sister Nivedita) popularised Ramakrishna Mission after Vivekananda's death.

### DHARMA SABHA

- The orthodox Hindus organised the Dharma Sabha under the leadership of **Raja Radhakant Dev** in 1830 AD to counter Brahmo Samaj.

### PARAMAHANSA MANDALI

- Founded by Dadoba Pandurang and Bal Shastri Jambhekar in 1849 AD. The Mandalis believed in one God.
- Members took food cooked by low-caste people. He believed in permitting widow remarriage and in education of women.

### VEDA SAMAJ

- It is called Brahmo Samaj of South. It was started by Sridharalu Naidu.

### THE PRARTHANA SABHA

- It was founded in 1867 AD by M.G. Ranade.
- Prominent leaders were Dr. Atmaram Pandurang and R.G. Bhandarkar and N.G. Chandavarkar.

### YOUNG BENGAL MOVEMENT

- It was founded by **Henry Louis** and **Vivian Derozio**.
- They believed in truth, freedom and religion. It supported women's education.
- Derozio edited the papers—**Calcutta Gazette** and **India Gazette**.

#### Swami Narayan Sampraday

- Founded by **Swami Sahajananda** in Gujarat. **Namdhari/Kuka Movement**
- It was founded by Bhai Balak Singh and Baba Ram Singh in the North-West frontier province, Ludhiana, in 1841 AD.

### INDIAN REFORM ASSOCIATION

- It was founded by **Keshab Chandra Sen** in Calcutta in 1870 AD.

### THEOSOPHICAL SOCIETY

- It was founded by Madam H.P. Blavatsky and Col. H.S. Olcott in New York in 1875 AD.

- The Theosophical Society India was founded by **Annie Besant**. She founded Central Hindu College in 1898 AD, which became Banaras Hindu University in 1916 AD.

### DECCAN EDUCATION SOCIETY

- Founded by **M.G. Ranade, V.G. Chidbonkar** and **G.G. Agarkar** in Pune in 1884 AD.
- The society founded the **Ferguson College**.

### SEVA SADAN

- Founded by **Behramji M. Malabari** in Bombay in 1885 AD.

### INDIAN NATIONAL SOCIAL CONFERENCE

- Founded by **M.G. Ranade** and **Raghunath Rao** in Bombay in 1887 AD.

### MADRAS HINDU ASSOCIATION

- Founded by **Viresalingam Pantulu** in Madras in 1892 AD.

### BHARAT DHARMA MAHAMANDALA

- Founded by **Pandit Madan Mohan Malaviya** and **Pandit Din Dayal Sharma** in Varanasi in 1929 AD.

### THE SERVANTS OF INDIA SOCIETY

- Founded by **Gopal Krishna Gokhale** in Bombay in 1905 AD.

### POONA SEVA SADAN

- Founded by G.K. Devdhar and Ramabai Pande in Pune.

### NISHKAM KARMA MATH

- Founded by **Dhondo Keshav Karve** in Pune.
- Founded India's first Women's University in Pune in 1916.

### THE BHARAT STRI MANDAL

- Founded by **Saralabala Devi Chaudharani** in Calcutta. It was the first All India Women Organisation.

### SEVA SAMITI (1914 AD)

- Founded in Allahabad by **Pandit Hridayanath Kunzru**.

### THE INDIAN WOMEN'S ASSOCIATION

- Founded by **Annie Besant** in Madras (1917 AD).

### RAHANUMAI MAZDAYASAN SABHA

- Founded in Bombay by **S.S. Bengali, Naoroji Furdonji** and **J.B. Nacha** (1831 AD).

### KHUDAI KHIDMATGAR MOVEMENT

- Started by **Khan Abdul Gaffar Khan** in NWFP (1929 AD).

### LOKAHITAWADI

- Started by **Gopal Hari Deshmukh**.

### RADHA SWAMI MOVEMENT

- Started by **Tulsi Ram (Shiv Dayal Saheb or Swami Maharaj)** in 1861 AD.

### DEVA SAMAJ

- Started by **Shiv Narain Agnihotri** in 1887 AD.

### ATMARAM PANDURAN (1823 AD-1898 AD)

- Atmaram Pandurang** founded **Prarthana Samaj** in 1867 AD in Bombay.

## THE REVOLT OF 1857 AD

- Occurred during the reign of Governor-General Lord Canning.

### CAUSES OF THE REVOLT

- 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.
- Socio-religious:** Abolition of sati in 1829 AD; legalisation of widow remarriage in 1856 AD, etc.
- Military:** Discrimination with Indian soldiers.
- Indian soldiers were paid low salaries.
- 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 AD, an Indian sepoy of 34 Native Infantry, **Mangal Pandey**, killed two British officers—**Hugeson** and **Baugh** on parade at Barrackpore (near Calcutta). He was arrested and hanged.

- The mutiny actually started at Meerut on May 10, 1857 AD. The soldiers broke open jails, murdered Europeans, burnt their houses and marched to Delhi after sunset.
- General Hewitt was the commanding officer at Meerut.
- 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 Shehanshah-e-Hindustan** (i.e. Emperor of India).
- Within a month of the capture of Delhi, the revolt spread to the different parts of India. South remained quiet, and Punjab and Bengal were only marginally affected.

☞ **Note:** Bahadur Shah II was deported to Rangoon, where he died in 1862 AD. Nana Sahib (original name, Dhundhu Pant), Begum Hazrat Mahal and Khan Bahadur Khan escaped to Nepal; Tantya Tope (original name being Ramchandra Panduranga) was captured and executed. Rani Lakshmi Bai died in the battlefield. Kunwar Singh was wounded and died on April 26, 1858 AD.

### CENTRES OF REVOLT AND THEIR LEADERS

- Delhi:** Bahadur Shah and General Bakhti Khan.
- Kanpur:** Nana Sahib/Dhondu Pant (adopted son of Baji Rao II), Tantya Tope and Azimullah Khan.
- Jhansi:** Rani Lakshmi Bai.
- Lucknow:** Begum Hazrat Mahal, her son Birjis Qadr.
- Faizabad:** Maulvi Ahmadullah.
- Bareilly:** Khan Bahadur Khan.
- Bihar:** (Arrah) Kunwar Singh, Zamindar of Jagdishpur.
- Delhi was seized by the rebels on May 12, 1857.
- Delhi was captured on September 20, 1857 AD by **John Nicholson** and Bahadur Shah II was deported to Rangoon, where he died in 1862 AD.
- Jhansi was captured by Hugh Rose on June 17, 1858 AD. Rani Lakshmi Bai died in the battlefield.

- **Kanpur** was recaptured on December 6, 1857 AD by **Colin Campbell**.
- **Lucknow** was recaptured on March 21, 1858 AD by **Colin Campbell, Havelock** and **Outram**.
- **Nana Sahib** and **Hazrat Mahal** both escaped to Nepal.
- **William Taylor** and **Edgre** suppressed the revolt at Arrah. English authority was re-established in India during July-December, 1858 AD.
- 6. Far-reaching changes were made in the administration and increase in the number of white soldiers in the army took place.
- 7. It soon became a symbol of challenge to the mighty British empire in India and remained a shining star for the rise and growth of the Indian national movement.
- 8. Total expense of the suppression was borne by India.

### Rani Laxmi Bai

Rani Laxmi Bai, nicknamed Manu was married to Raja Gangadhar Rao in 1842. The couple adopted a child in 1853 but lord. Dalhousie wished to annex Jhansi under the Doctrine of Lapse. Rani did not surrender and died fighting at Kalpi near Jhansi during the revolt of 1857.

### CAUSES OF FAILURE

1. Disunity of Indians and poor organisation.
2. Lack of complete nationalism. **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.
- All the classes of the society were not affected and also did not participate in the revolt.
- The military equipment of rebels were inferior.
- The most significant feature of the revolt was the exhibition of the Hindu-Muslim unity.
- Concentration on the Northern part of India.

### IMPACT OF THE REVOLT OF 1857 AD

1. In August 1857 AD, the British Parliament passed an Act which put an end to the rule of the Company. The control of the British Government in India was transferred to the British Crown.
2. A minister of the British Government called the Secretary of state for India was made responsible for the governance of India.
3. The British Governor-General of India was now also given the title of Viceroy.
4. Doctrine of Lapse was withdrawn.
5. After the revolt, the British pursued the policy of **divide and rule**.

## INDIAN NATIONAL MOVEMENT

### INDIAN NATIONAL CONGRESS (I.N.C.)

- The Indian National Union was formed in 1884 AD by A.O. Hume. He called for a conference in Pune in December 1885 AD.
- The conference venue was shifted to Bombay.
- 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**.
- It was attended by 72 delegates from all over India.
- Lord Dufferin was the Viceroy of India during the foundation of INC.
- The first two decades of INC are described in history as those of moderate demands and a sense of confidence in British justice and generosity. **Indian Council Act** in 1892 AD allowed some members to be indirectly elected by Indians.

#### Moderate leaders:

Dadabhai Naoroji, A.O. Hume, Badruddin Tyabji, M.G. Ranade, W.C. Bannerji, Ferozeshah Mehta, Surendra Nath Bannerji, Madan Mohan Malaviya, Tej Bahadur Sapru, Gopal Krishna Gokhale and Rash Behari Bose.

### SELECT OPINIONS ABOUT INC

- "INC represents only microscopic minorities." –**Lord Dufferin (1884 AD-1888 AD) (Contemporary Viceroy)**.
- "The Congress is tottering to its fall, and one of my great ambitions while in India, is to assist it to a peaceful demise". –**Lord Curzon (1899 AD-1905 AD) (Viceroy)**.

- “INC is a begging institute.”—**Aurobindo Ghosh** (Extremist Leader).
- “INC should distinguish between begging and claiming the rights”.

**Bal Gangadhar Tilak**  
(Extremist Leader).

### Facts

Ist President of INC	W. C. Bannerji
Ist Woman President	Annie Besant
Ist Muslim President	Badruddin Tyabji
Ist English President	George Yuke
Gandhi became President	1924, Belgaum

## ■ EXTREMIST PHASE (1905 AD-1917 AD)

### Reasons for the Emergence of Extremists

- Realisation that the true nature of British rule was exploitative.
- International influences and events which demolished the myth of White/European supremacy.
- Dissatisfaction with the achievements of Moderates.
- Reactionary policies of Curzon. Existence of a military school of thought and emergence of a trained leadership.

## ■ PROMINENT EXTREMIST LEADERS

- Bal Gangadhar Tilak:** He launched two newspapers—the **Kesari** (in Marathi) and the **Maratha** (in English). He organised **Ganpati Festival** (1893 AD) and **Shivaji Festival** (1895 AD). He was deported to **Mandalay Jail** (Burma) for writing seditious articles. He started the **Home Rule League** in 1916 AD. He wrote **Gita Rahasya**. Tilak asserted: **‘Swaraj is my birthright and I shall have it’**.

- He was awarded with the title of **Lokmanya**.
- He was called ‘Bal’, Lala Lajpat Rai was called ‘Lal’ and Bipin Chandra Pal was called ‘Pal’.
- He was a part of the trio of **‘Lal-Bal-Pal’** and the extremist group.
- He wrote the books **The Arctic Home of Vedas** and **Gita Rahasya**.

- Lala Lajpat Rai:** He founded the National School at Lahore. He presided over the

AITUC in 1920 AD. He boycotted the Simon Commission and demonstrated against it at Lahore, during which he was brutally assaulted by the police and he subsequently succumbed to his injuries.

- He was called the **Lion of Punjab**.
- He was inspired by Mahatma Hansraj.
- He was the President of the special session of the Congress at Calcutta, 1920 AD.
- He opposed the withdrawal of NCM in 1922 AD. He founded Swaraj Party with Motilal Nehru and C.R. Das.
- He was the editor of **Bande Matram**, **The Punjab** and **The People**.

- Sri Aurobindo Ghosh:** He started a Bengali Daily **Jugantar**. He wrote seditious articles in **Bande Matram**. He was put to trial for Maniktalla (Calcutta) Bomb Conspiracy Case. He finally retired to the life of Yoga at Pondicherry.

- Other Extremist Leaders:** Chakravarthy Vijayaraghavachariar, Ashwani Kumar Chidambaram Pillai, etc.

## ■ METHODS OF EXTREMISTS

- Passive, i.e. non-cooperating with the British Government, boycotting government service, courts, schools and colleges.
- Promotion of Swadeshi and boycott of foreign goods.

## THE PARTITION OF BENGAL (1905) AND BOYCOTT AND SWADESHI MOVEMENT (1905 AD-1908 AD)

- The Partition of Bengal came into effect on 16th October, 1905 AD, reducing the old province of Bengal in size by creating a new province of East Bengal.
- The government explained that it was done to stimulate growth in the underdeveloped Eastern region of Bengal. The main reason for partition of Bengal was to destroy the political influence of the uneducated middle class among whom the Bengali intelligentsia was the most prominent. The INC unanimously condemned the partition of Bengal.

- The Boycott and Swadeshi Movement had its genesis in the antipartition movement.
- The INC took up the Swadeshi call in the Benares Session, 1905 AD presided by G.K. Gokhale and supported the Swadeshi and Boycott Movement of Bengal Militant nationalism spearheaded by Trio of **Lal-Bal-Pal** (Lala Lajpat Rai, Bal Gangadhar Tilak and Bipin Chandra Pal), and Aurobindo Ghosh was, however, in favour of extending the movement to the rest of India.
- On 7th August, 1905 AD, a resolution to boycott British goods was adopted at a meeting of the INC held in Calcutta.
- Tilak** took the movement to different parts of India, especially in Pune and Bombay. **Ajit Singh** and **Lala Lajpat Rai** spread the Swadeshi message in Punjab and other parts of Northern India. **Syed Haider Raza** set up to agenda in Delhi. **Chidambaram Pillai** took the movement to Madras Presidency.

### FORMATION OF THE MUSLIM LEAGUE

- Set up in 1906 AD, under the leadership of Aga Khan, Nawab Salimullah of Dhaka and Nawab Mohsin-ul-Mulk.
- Vakar-ul-Mulk was the first president of Muslim League.
- It supported the partition of Bengal, opposed the Swadeshi Movement, and demanded special safeguards for its community and separate electorate for the Muslims.
- Calcutta Session of INC (1906 AD)-Swaraj:** In December 1906 in Calcutta, the INC, under the leadership of Dadabhai Naoroji, adopted Swaraj as the goal in Indian people. The differences between the moderates and the extremists, especially regarding the pace of the movement and the techniques of the struggle to be adopted led to split of Surat in 1907 AD at the Surat Session of the Congress.
- Surat Split (1907 AD):** The INC split into two groups, the extremists and the moderates at the Surat session in 1907 AD. The extremists were led by **Bal Gangadhar Tilak**, **Lala Lajpat Rai** and **Bipin Chandra Pal** and the moderates were led by **Gopal Krishna Gokhale**. This was the 23rd session of INC and Lord Minto was the Viceroy of India.

The government observing the opportunity launched a massive attack on the extremists but suppressing the newspaper and arresting their main leader **Tilak** and sending him to **Mandalay jail (Burma)** for six years. Aurobindo Ghosh gave up politics and left for Pondicherry. Bipin Chandra Pal also left politics temporarily. Lala Lajpat Rai left for Britain, After 1908 AD, the national movement as a whole declined.

### INDIAN COUNCIL ACT OF 1909 AD OR MORLEY-MINTO REFORMS

- Separate electorate introduced for Muslims.
- Lord Minto came to be known as the father of Communal Electorate.
- Non-officials to be elected indirectly. Thus, election introduced for the first time.
- For the first time, one Indian was to be on Viceroy's executive council. Satyendra Prasad Sinha was the first Indian to join the council as the Law member.
- Annulment of Partition in 1911 AD, the government announced annulment of the partition of Bengal.

### GHADAR PARTY (1913 AD)

- Formed by Lala Har Dayal, Tarak Nath Das and Sohan Singh Bhakna.
- The war period witnessed the growth of revolutionary movement not only in India but also outside India by the Indians.
- Indian revolutionary in the United States of America and Canada had established the **Ghadar (Rebellion) Party** in 1913 AD.
- The party was built around the weekly paper **The Ghadar**, which carried the caption **Angrezi Raj ka Dushman**.
- Headquarters were at **San Francisco**.
- Some of the prominent Ghadar leaders were Baba Gurumukh Singh, Kartar Singh Saraba, Sohan Singh Bhakna and Rahmat Ali Shah.
- To carry out other revolutionary activities, 'Swadesh Sevak Home' at Vancouver and United India House at Seattle was set up.

### Revolutionary Organisations in India

Organisation	Founder	Year	Place
Mitra Mela	Savarkar Brothers	1899	Poona
Anushilan Samiti I	Gayendranath Bose	1902	Midnapur
Abhinav Bharat	V.D. Savarkar	1906	Poona
Swadesh Bandhav Samiti	Ashwini Kumar Dutt	1905	Barisal
Anushilan Smiti II	Barindra Ghosh and Bhupendra Dutt	1907	Dhaka
Bharat Mata Society	Ajit Singh and Amba Prasad	1907	Punjab
Hindustan Republican Association	Jogesh Chandra Chatterji and Sachindranath Sanyal	1924	Kanpur
Naujawan Sabha	Bhagat Singh	1926	Lahore
Hindustan Socialist Republican Association	1928	1928	Delhi

### Revolutionary Organisation Formed outside India

Organisation	Founder	Year	Place
India House	Shaymji Krishna Verma	1905	London
Abhinav Bharat	V.D. Savarkar	1906	London
Indian Independence League	Tarak Nath Das	1907	U.S.A.
Ghadar Party	Lala Hardayal, Tarak Nath Das and Sohan Singh Bhakna	1913	San Francisco
Indian Independence League	Lala Hardayal and Birendra	1914	Berlin
Government Indian Independence League	Ras Bihari Bose	1942	Tokyo
Indian National Army	Ras Bihari Bose	1942	Tokyo

### KOMAGATA MARU SHIP INCIDENT (1914 AD)

- Komagata Maru was a Japanese steamship that carried the Sikh and Muslim immigrants from Punjab to Vancouver, Canada. It reached the port of Vancouver on May 22, 1914. But the ship was forced to return to India by the Canadian authorities. The ship was docked at Budge in Calcutta. The Britishers considered the passengers as dangerous political agitators and tried to arrest Baba Gurdit Singh from among them. Police opened fire on them and 19 passengers died in the incident.
- Rash Behari Bose and Sachin Sanyal led the movement.

### HOME RULE MOVEMENT (1916 AD)

- The Home Rule League was pioneered on the lines of a similar movement in Ireland. The Muslim League also supported the movement.

### TILAK'S HOME RULE MOVEMENT

- It started in April 1916 AD at Poona. Tilak's league was to work in Maharashtra, Karnataka, Central Province and Berar, excluding Bombay.
- Josef Baptista became the President and N.C. Kelkar secretary.
- He gave the slogan '**Swaraj is my birthright and I shall have it**'.
- Tilak's newspapers **Maratha** and **Kesari** were the organs for home rule.

### ANNIE BASANT'S HOME RULE MOVEMENT

- Started with Subramaniya Iyer in Adyar in September, worked in the rest of India.
- Annie Besant's newspapers **New India**, **Commonwealth** and **Young India** became important for this movement. She coined the term 'commonwealth'.

- The Congress Session at Allahabad in December 1921 decided to launch a **Civil Disobedience Movement**. But, before it could be launched, the angry peasants (mob) attacked a police station at **Chauri Chaura** in Gorakhpur district of Uttar Pradesh on 5th February, 1922. This changed the whole situation and Mahatma Gandhi was compelled to withdraw the Non-Cooperation Movement.

### LUCKNOW PACT (CONGRESS-LEAGUE PACT) (1916 AD)

The Anti-British feelings were generated among the Muslims following a war between Britain and Turkey, which opened the way for the Congress-Muslim League unity. Both the Congress and the Muslim League sessions were held at Lucknow in 1916 AD and thus concluded the famous Lucknow Pact. The Congress accepted the separate electorate and both the organisations jointly demanded a dominion status for the country.

**Montagu Declaration/August Declaration of 1917 AD:** The control over the Indian government would be transferred gradually to the Indian people.

## THE GANDHIAN ERA (1917 AD-1947 AD)

### MAHATMA GANDHI (1869 AD-1948 AD): CHRONOLOGICAL OVERVIEW

#### In South Africa (1893 AD-1914 AD)

- 1893 AD:** Departure of Mahatma Gandhi to South Africa.
- 1906 AD:** First Civil Disobedience Movement (Satyagraha) against Asiatic Ordinance in Transvaal.
- 1907 AD:** Satyagraha against compulsory registration and passes for Asians (The Black Act) in Transvaal.
- 1908 AD:** Trial and imprisonment-Johannesburg Jail (First Jail Term).
- 1914 AD:** Quits South Africa forever and returns to India. Was awarded **Kaisar-i-Hind** title for raising an Indian Ambulance Corps during Boer wars.

### IN INDIA: (1915 AD-1948 AD)

- 1915 AD:** Arrived in Bombay (India) on 9th January 1915 AD; Foundation of

Satyagraha. Ashram at Kocharab near Ahmedabad (20th May). In 1917 AD, Ashram was shifted at the banks of Sabarmati.

- 1916 AD:** He attended the **Lucknow Session** of INC held from 26th to 30th December, 1916 AD.
- 1917 AD:** Gandhi entered active politics with **Champaran campaign** redress grievances of the cultivators oppressed by Indigo plantation of Bihar (April 1917). Champaran Satyagraha was his first Civil Disobedience Movement in India.
- 1918 AD:** In February 1918, Mahatma 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, Mahatma Gandhi worked for the 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.

### Rowlatt Act (1919)

- In 1919 a Sedition Committee headed by justice Rowlatt led to the Rowlatt Act. This act authorised the government to imprison any person without trial and conviction by the Court of Law for 2 years. The law also enabled the government to suspend the right of Habeas Corpus which had been the foundation of civil liberties in Britain.
- 1919 AD:** Mahatma Gandhi gave a call for satyagraha against the **Rowlatt Act** on April 6, 1919 AD and took the command of the nationalist movement for the first time (first all-India Political Movement).
- Mahatma Gandhi returned the Kaisar-i-Hind title as a protest against the **Jallianwala Bagh massacre**-13th April, 1919 AD, **The All India Khilafat Conference** elected Mahatma Gandhi as its president (November 1919, Delhi).
- 1920 AD-1922 AD:** Mahatma Gandhi led the **Non-cooperation and Khilafat Movements**. Mahatma Gandhi calls off the Movement after the violent incident at **Chauri-Chaura** on February 5, 1922. Non-

Cooperation Movement was the first mass-based politics under Mahatma Gandhi.

- **1924 AD: Belgaum (Karnataka) session** of INC—for the first and the last time, Mahatma Gandhi was elected the president of the Congress.
- **1930 AD-1934 AD:** Mahatma Gandhi launched the **Civil Disobedience Movement** with his **Dandi March-Salt Satyagraha**.
- **1941 AD:** Mahatma Gandhi launched the **Individual Satyagraha Movement**.
- **1942 AD: Mahatma Gandhi raised the slogan 'Quit India Movement'.**
- **1943 AD:** Mahatma Gandhi kept in detention at the **Aga Khan Palace** near Pune.
- **1947 AD:** Mahatma Gandhi was deeply distressed by the **Mountbatten Plan/ Partition Plan** (3rd June, 1947 AD). While staying in Calcutta to restore communal violence, he observed complete silence on the dawn of India's Independence.
- **1948 AD:** Mahatma Gandhi was shot dead by **Nathu Ram Godse** while on his way to the evening prayer meeting at **Birla House, New Delhi** (30th January, 1948 AD).

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

#### Mahatma Gandhi

- **Date and Place of Birth:** 2nd October, 1869 at Porbandar, Gujarat.
- **Father:** Karamchand Gandhi; **Mother:** Putli Bai; **Political Guru:** Gopal Krishna Gokhale.
- **Literary Influences:** John Ruskin's **Unto This Last**, Leo Tolstoy's **The Bible** and **The Gita**.
- **Literary Works:** **Hind Swaraj** (1909 AD), **My Experiments with Truth** (Autobiography, 1927 AD) reveals the event as of Gandhi's life upto 1922 AD.

## MAIN EVENTS DURING THE GANDHIAN ERA

### Rowlatt Act (1919 AD)

The Rowlatt Act, 1919 AD gave unveiled powers to the government—arrest and imprison

suspects, without trial. Mahatma Gandhi decided to fight against this act and he gave a call of Satyagraha on 6th April, 1919 AD. He was arrested on 8th April, 1919 AD.

### Jallianwala Bagh Massacre (13th April, 1919 AD)

The arrest of **Dr. Saifuddin Kitchlu** and **Dr. Satyapal** on 10th April, 1919 AD, under the Rowlatt Act in connection with Satyagraha caused serious unrest in Punjab. A public meeting was held on 13th April, 1919 AD in a park called **Jallianwala Bagh** in **Amritsar**. As soon as the meeting started, **General Reginald Dyer** ordered indiscriminate heavy firing. The crowd of people had no way out to escape. As a result, hundreds of men, women and children were killed and more than 1,200 people wounded. Due to this massacre, R.N. Tagore returned 'Knighthood' and Shankaran Nair resigned from the Executive Council of Viceroy.

 **Note:** **Sardar Udham Singh**, an Indian patriot from Punjab, shot down General Reginald Dyer in London on March 13, 1940.

### Khilafat Movement (1920 AD-1922 AD):

**The Ali Brothers—Mohammad Ali and Shaukat Ali**—launched an anti-British movement in 1920 AD—the movement for the restoration of the Khilafat Movement. **Maulana Abul Kalam Azad** also led the movement. It was supported by **Mahatma Gandhi** and INC.

On October 17, 1919, 'Khilafat Day' was celebrated.

### Non-cooperation Movement (1920 AD-1922 AD):

At the **Calcutta session** in September 1920 AD, the Congress resolved in favour of the Non-cooperation Movement and defined **Swaraj** as its ultimate aim (according to Gandhiji). The movement envisaged: (i) Surrender of titles and honorary offices and resignation 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. Apart from educational boycott,

there was boycott of law courts, which saw major lawyers like **Motilal Nehru, C.R. Das, C. Rajagopalachari, Saifuddin Kitchlu, Vallabhbhai Patel, Aruna Asaf Ali**, etc. giving 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. City of Wales was greeted with empty streets and downed shutters wherever he went.

There was an attack on a local police station by angry peasants at **Chauri Chaura** in Gorakhpur district on 5th February, 1922 burning 22 policemen. Mahatma Gandhi, shocked by Chauri Chaura incident, withdrew the Non-Cooperation Movement on 12th February, 1922 AD. Gandhiji had launched this movement of August 1, 1920.

### SPREAD OF NON-COOPERATION MOVEMENT

- The United Province became a strong base for the Non-Cooperation Movement.
- Agrarian riots under the leadership of **Baba Ramchandra** and **Eka Movement** under **Madari Pasi**.
- In Punjab, **Akali Movement** was constituted for reform and control of Gurudwaras.
- Alluri Sitarama Raju** organised the tribals in Andhra and combined their demands with those of non-cooperation.

### THE SWARAJISTS

- Differences arose among the leaders after the withdrawal of the Non-Cooperation Movement. One school of thought headed by **C.R. Das** and **Motilal Nehru** advocated that the nationalists should end the boycott of the legislative council, enter them, obstruct their working according to official plans, expose their weaknesses, transform them into arenas of political struggle and, thus, use them to arouse public enthusiasm. They were 'pro-changers'. The pro-changers formed the Swaraj Party on January 1, 1923.
- Sardar Vallabhbhai Patel, Dr. Ansari, Babu Rajendra Prasad and others opposed council entry. They were known as **no changers**.
- In December 1922 AD, C.R. Das and Motilal Nehru formed Congress Khilafat Swarajya

Party with C.R. Das as the President and Motilal Nehru as the Secretary.

- Madan Mohan Malaviya and Lala Lajpat Rai founded the **Independent Congress Party** later in 1933 AD. It was recognised as the Congress Nationalist Party.

### SIMON COMMISSION (1927 AD)

- In 1927 AD, the British Government appointed the **Indian Statutory Commission** known popularly by its chairman Simon.
- Lord Irwin was the Viceroy of India at that time.
- The committee had to review the working of the dyarchy system introduced by Montagu-Chelmsford Reforms of 1919 AD and to report to what extent a representative government can be introduced in India.
- All the members of the commission were White.
- The National Congress decided to boycott the commission in its **Madras Session** in 1927 AD, presided over by Dr. Ansari.
- The **Muslim League** and **Hindu Mahasabha** decided to support the Congress.
- On 3rd February 1928 AD, the commission was greeted with Hartals and black flag demonstration under the slogan '**Simon Go Back**'.
- At Lahore, Lala Lajpat Rai was severely beaten in a lathicharge and he succumbed to his injuries on October 30, 1929.

### NEHRU REPORT (1928 AD)

- Nehru report was tabled in 1928 AD by **Motilal Nehru**.
- It remains memorable as the first major Indian effort to draft a constitutional framework for India.
- The recommendations evoked a debate concerning the goal of India-Dominion status of complete independence.
- Other members of the committee were Tej Bahadur Sapru, Ali Imam, M.S. Aney, Mangal Singh, Sohaib Qureshi, G.R. Pradhan and Subhash Chandra Bose.

### JINNAH'S 14 POINTS (9TH MARCH, 1929 AD)

- Jinnah, the leader of the Muslim League did not accept the Nehru Report and drew up

a list of fourteen demands, which became famous as 14 points of Jinnah.

### LAHORE SESSION (1929 AD)

- This session was presided over by Jawaharlal Nehru.
- This session passed a resolution of Poorna Swaraj (complete independence) as its ultimate goal.
- All members of legislature were asked to resign their seats.
- On 31st December, 1929, the newly adopted tricolour was hoisted and 26th January, 1930 was fixed as the **first Independence Day**.
- The Congress Session also announced a Civil Disobedience Movement under the leadership of Mahatma Gandhi.
- Congress decided to boycott the first Round Table Conference.

### DANDI MARCH/SALT SATYAGRAHA (1930 AD)

- Along with 78 followers, Mahatma Gandhi started his famous march from **Sabarmati Ashram** on 12th March, 1930 AD for the small village **Dandi** to break the Salt Law. On reaching the seashore on 6th April, he broke the law by picking up salt from the seashore. By picking up a handful of salt, Mahatma Gandhi inaugurated the Civil Disobedience Movement. It took the shape of a nationwide Civil Disobedience Movement in which ladies also participated.

### REGIONAL SPREAD ON CIVIL DISOBEDIENCE MOVEMENT

- Under the leadership of Abdul Gaffar Khan, popularly known as **The Frontier Gandhi**, the Pathans organised the society of **Khudai Khidmatgars** (servants of God) known popularly as **Red Shirts**.
- From North-East India, Manipur took a brave part in it and Nagaland produced a brave heroine named **Rani Gaidinliu**.
- Chittagong:** Army raised by Surya Sen in 1930 AD.
- Darshana:** It was led by Sarojini Naidu, Imam Saheb and Maneka Gandhi.

- In Madras, **Rajagopalachari** led a march from Trichinopoly to Vedaranyam along the Coromandel Coast.
- In Kerala, **K. Kelappan** marched from Calicut to Payyanur.
- Congress was declared illegal.**

### FIRST ROUND TABLE CONFERENCE (12TH NOVEMBER, 1930 AD)

- Congress boycotted the conference.
- Muslim League was represented by Mohammad Ali, Agha Khan, Fazlul Haq, M.A. Jinnah and Hindu Mahasabha by Moonje and Jayakar.
- Tej Bahadur Sapru, Chintamani and Srinivas Shastri (Liberals) appeared.
- Princes of Hyderabad, Mysore attended it.
- No result came out of the conference.
- Dalits were represented by B.R. Ambedkar.
- Moderate statesmen Jaikar, Sapru and Srinivas Shastri initiated efforts to break the ice between Mahatma Gandhi and the government. The negotiation between Irwin and Mahatma Gandhi on 5th March, 1931 AD came to be known as **Gandhi-Irwin Pact** or **Delhi Pact**.

**Gandhi-Irwin Pact/Delhi Pact (5th March, 1931 AD):** Moderate statesmen **Sapru** and **Jayakar** initiated efforts to bring about rapprochement between Mahatma Gandhi and the government. Six meetings with Viceroy Lord Irwin finally led to the signing of a pact between the two to join the Second Round Table Conference. Regarding Gandhi-Irwin Pact, Jawahar Lal Nehru remarked, '**This is the way the world ends, not with a bang but a whimper**'.

### KARACHI SESSION (1931 AD)

- It endorsed the Gandhi-Irwin Pact. This Session is also memorable for its resolution of Fundamental Right and National Economic Programme with the efforts of Jawaharlal Nehru and Subhash Chandra Bose.

### SECOND ROUND TABLE CONFERENCE

- Gandhiji went to England in September 1931 AD to attend the Second Round Table Conference presided by Ramsay Macdonald,

Prime Minister of Britain. The British Government refused to concede the basic nationalist demand for freedom on the basis of the immediate grant of dominion status with complete control over defence, external affairs and finance.

- The Congress officially suspended the movement in 1933 AD and withdrew it in 1934 AD. Mahatma Gandhi resigned from active politics.

### THE COMMUNAL AWARD/MCDONALD AWARD (16TH AUGUST, 1932 AD)

Announced by British Prime Minister **Ramsay McDonald** on communal representation on 16th August, 1932 AD. Besides containing millions for representation of Muslims, Sikhs and Europeans, it envisaged communal representation of oppressed classes also. Mahatma Gandhi underwent a fast in protest against this Award.

### POONA PACT (COMMUNAL AWARD)

- McDonald announced the proposal on minority representation, known as the **Communal Award** in 1932 AD. Under this, the depressed classes (Muslims, Sikhs, Indian Christians, Anglo Indians, Women and Backward Classes) were to be considered as minority and it would make them entitled to the right of separate electorate.
- Gandhiji restored to fast unto death in Yerwada Jail against this separate electorate for depressed class, which Ambedkar was insisting upon. This resulted into the Poona-Pact between **Gandhi** and **Ambedkar** on 25th September, 1932 AD.
- Gandhiji coined the word **Harijan** for the depressed classes and their upliftment became his prime concern. All India Anti-Untouchability League was started in September 1932 AD and a weekly *Harijan* in January 1933 AD.
- He started the Individual Civil Disobedience on 1st August, 1933 AD.

### THIRD ROUND TABLE CONFERENCE

- Held in London in November, 1932 AD.
- Congress did not participate.
- The discussion led to the Government of India Act, 1935 AD.

### THE GOVERNMENT OF INDIA ACT, 1935

The Simon Commission report submitted in 1930 AD formed the basis for the Government of India Act, 1935. The Act: (i) introduced provincial autonomy; (ii) abolished dyarchy in the provinces; (iii) made ministers responsible to the legislative and federation at the centre. The Act of 1935 was unanimously rejected by the Congress. Regarding the Government of India Act, 1935, Jawahar Lal 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 1st April, 1937 AD, and formed ministries first in six provinces and then in another.

### CONGRESS MINISTRIES RESIGN (22ND DECEMBER, 1939 AD)

The Second World War broke out in Europe on 3rd September, 1939 AD that brought Britain also within its fold. Without consulting the Indian leaders, the Viceroy declared India also as a belligerent country. Congress demanded that India should be declared an independent nation. Then only would the country help Britain in the war. The Viceroy in his reply dated 17th October, 1939 AD rejected the Congress demand as impracticable. The Congress condemned the Viceroy's reply and the Congress ministries everywhere resigned on 22nd December, 1939 AD, **Jinnah** designating the day of Congress ministries as '**the day of deliverance**'.

### PAKISTAN RESOLUTION/LAHORE RESOLUTION (24TH MARCH, 1940 AD)

It was in 1930 that **Iqbal** suggested the union of the Frontier Province-Baluchistan, Sindh and Kashmir-as a Muslim state within the federation. **Chaudhry Rehmat Ali** invented the term '**Pakstan**' (later '**Pakistan**') in 1935 AD. The Lahore Session of the Muslim League was held on 24th March, 1940 AD. Pakistan Resolution was passed and the Federal scheme was rejected as envisaged in the Government of India Act, 1935 AD.

## AUGUST OFFER/LINLITHGOW OFFER (8TH AUGUST, 1940 AD)

On this day, **Viceroy Linlithgow** came out with certain proposals known as **August Offer** declaring that the goal of the British Government was to establish **Dominion Status** in India. It accepted that the framing of a new constitution would be given to the views of minorities in the constitution. **Maulana Abul Kalam Azad**, President of the Congress, rejected the **August Offer**. The Muslim League welcomed the offer. In brief, the **August Offer** failed in gaining Indian's co-operation 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 (OCTOBER 1940 AD-DECEMBER 1941 AD)

The Congress Working Committee decided to individually fight disobedience on 17th October, 1940 AD. **Vinoba Bhave** was the first Satyagrahi, followed soon by many more, including **Nehru** and **Patel**. But the movement created little enthusiasm and Mahatma Gandhi suspended it.

## CRIPPS MISSION (MARCH, 1942 AD)

- The British Government's refusal of accepting immediately the Congress demand was the cause of failure of the mission.

## CONSTITUTIONAL PROPOSAL OF THE MISSION

- Dominion status to be granted after the war.
- Constitution-making body to be elected from the provincial assemblies and nominated by the rulers in case of princely states.
- Individual princes could sign a separate agreement with the British.
- British would, however, control the defence for war period.
- The British Government undertook to accept and implement the Constitution in two conditions:

- Any province (s) unwilling to accept the Constitution could form a separate union with a separate Constitution.
- The new Constitution-making body and the British Government would negotiate a treaty to sort out matters arising out of transfer of power to Indian hands.
- Gandhiji termed this proposal as **a post-dated cheque in a crashing bank**.
- Cripps proposal failed.

## QUIT INDIA MOVEMENT (1942 AD)

- The All India Congress Committee met at **Bombay** on 8th August, 1942 AD. It passed the famous **Quit India** resolution and proposed to the starting of a non-violent mass struggle under **Gandhiji's leadership**.
- It is also called **Vardha Proposal** and **Leaderless Revolt**.
- His message was '**Do or Die**'.
- Repressive policy of the government and indiscriminate arrest of the leaders provoked people to violence.
- Nehru was lodged in **Almora Jail**, Maulana Azad in **Bankura** and Mahatma Gandhi was kept in **Agha Khan's Palace** in Poona.
- Parallel governments were established.
- In Satara, **Pratisarkar** was set up under Nana Patil and in Baliya under Chittu Pande. Others were in Talcher and Bihar. In Bengal, Tamluk Jatiya Sarkar functioned in Midnapore.
- Underground revolutionary activity was also started by **Jaiprakash Narain**, and **Ramanandan Mishra** escaped from Hazaribagh Jail and organised an underground movement.
- In Bombay, the socialist leaders continued their underground activities under leaders like **Aruna Asaf Ali**. **Congress Radio** was established with **Usha Mehta** as its announcer and Raja Ram Manohar Lohia in Bihar.
- School and college students and women actively participated, workers went on strike.
- There were no communal clashes during the movement.
- The merchant community and capitalists did not participate. Muslim League kept

aloof and the Hindu Mahasabha condemned the movement. Communist Party did not support the movement.

- Rajagopalachari also did not participate.

### DEMAND FOR PAKISTAN

- In 1930 AD, Mohammad Iqbal, for the first time, suggested that the frontier province, Sind, Baluchistan and Kashmir be made the Muslim state within the federation.
- Chaudhry Rehmat Ali coined the term '**Pakstan**' (later '**Pakistan**') in 1933.
- Pakistan Resolution:** The Muslim League first passed the proposal of separate Pakistan in its Lahore Session in 1940 AD (called Jinnah's two-nation theory). It was drafted by Sikandar Hayat Khan, moved by Fazlul Haq and seconded by Chaudhry Khaliquzzaman.
- In December 1943, the Karachi Session of the Muslim League adopted the slogan '**Divide and Quit**'.
- Gandhiji's Fast (10th February-7th March, 1943 AD):** Mahatma Gandhi took to 21-day fasting in jail. 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**. Mahatma Gandhi not only refused to condemn people resorting to violence but also unequivocally held the government responsible for it.

### C.R. FORMULA (1944 AD)

He proposed to appoint a commission to demarcate the districts in North-West and East, where the Muslims were in majority. In such areas, a plebiscite was proposed to be held on 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. The Hindu leaders led by V.D. Savarkar condemned the plan.

**Wavell Plan and Shimla Conference (14th June-14th July, 1945 AD):** After consultation with the British Government on the Indian problem, **Lord Wavell**, the Viceroy of India, issued a statement known as **Wavell Plan**. The plan which 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 would be constituted giving a balanced representation to the main communities in it including equal representation to the Muslims and Hindus. A conference of 22 prominent Indian leaders, called in 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.

### THE INDIAN NATIONAL ARMY AND SUBHASH CHANDRA BOSE

- The idea of Indian National Army (INA) was first conceived in Malaya by **Mohan Singh**, an Indian officer of the British Indian Army.
- In March 1942, a conference of India was held in Tokyo and **Indian Independence League** was formed. At **Bangkok Conference**, Rash Behari Bose was elected as President of the League.
- Subhash Chandra Bose escaped to Berlin in 1941 AD and set up **Indian League** there.
- In 1943 AD, he arrived at Singapore. Earlier, he had left the Congress after having differences with Mahatma Gandhi and formed **Forward Bloc** in 1939 AD.
- In Singapore, he was assisted by Rash Behari Bose. In October 1943, he set up a provisional Indian Government with headquarters at **Rangoon** and **Singapore**.
- INA annexed Andaman and Nicobar with the Japanese help and named them **Shaheed** and **Swaraj**. Subhash Chandra Bose gave the call **Dilli Chalo**.

### INA TRIALS

- The INA commanders **P.K. Sehgal, Shah Nawaz** and **Gurbaksh Dhillon** were put on trial at the Red Fort.

- Defence of INA prisoners in the court was organised by **Bhulabhai Desai, Tej Bahadur Sapru, Kailash Nath Katju, Nehru and Asaf Ali.**
- Wavell used veto power and set them free.
- The Muslim League also joined the countrywide protest. 12th November, 1945 was celebrated as the INA Day.

### **ROYAL INDIAN NAVY (RIN)/RATINGS MUTINY (18TH FEBRUARY, 1946 AD)**

On this day, Bombay Ratings of HMS Talwar struck work. On 19th February, HMS Hindustan in Karachi also mutinied. **Vallabhbhai Patel** and **Jinnah** jointly persuaded the Ratings to surrender on 23rd February, 1946 AD.

### **CABINET MISSION (MARCH-JUNE, 1946 AD)**

The British Prime Minister **Lord Attlee** made a declaration on 15th March, 1946 AD that the British Cabinet Mission would visit India. The Cabinet Mission, which included **Lord Pethick Lawrence, Stafford Cripps** and **AV Alexander** visited India and met the representatives of different political parties. The Mission envisaged the establishment of a Constituent Assembly to frame the constitution as well as an interim government. The Muslim League accepted the plan.

**Direct Action Campaign (16th August, 1946 AD):** The Muslim League launched a direct action campaign on 16th August, 1946 AD, which resulted in widespread communal riots in the country.

### **INTERIM GOVERNMENT**

- Interim Government was headed by **Jawaharlal Nehru**.
- The **Constituent Assembly** begins its session on **9th December, 1946 AD** and Dr. Rajendra Prasad was elected its President, but the League did not attend. Liaqat Ali Khan of the Muslim League was made the Finance Minister.

### **ATTLEE'S STATEMENT (20TH FEBRUARY, 1947 AD)**

- A deadline of 30th June, 1948 AD was fixed for transfer of power.

- **Mountbatten** would replace Wavell as the Viceroy.
- Partition of the country was implicit in the provision that if the Constituent Assembly was not fully representative, then the power would be transferred to more than one central government.

### **MOUNTBATTEN PLAN (3RD JUNE, 1947 AD)**

- **3rd June Plan:** In case of partition, two dominions and two Constituent Assemblies would be created. The plan declared that power would be handed over by 15th August, 1947 AD.
- The Legislative Assemblies of Punjab and Bengal decided in favour of partition of these two provinces. Thus, East Bengal and West Punjab joined Pakistan. West Bengal and East Punjab remained with India.
- Referendum in Sylhet resulted in the incorporation of that district in East Bengal.
- The referendum in NWFP decided in favour of Pakistan.
- Princely states were given the option to join either of the two dominions or remain independent.
- Mountbatten's formula was to divide India but retain maximum unity.

### **INDIA INDEPENDENCE ACT, 1947 AD**

- On 18th July, 1947 AD, the British Parliament ratified the Mountbatten Plan as the **Independence of India Act, 1947**.
- The Act provided creation of two independent dominions of India and Pakistan.
- On 15th August, 1947, India got independence. Jinnah became the first Governor-General of Pakistan. India requested Mountbatten to continue as the Governor-General of India.
- Assembly and councils of the states were to be automatically dissolved.
- For the transitional period, i.e., till a new Constitution was adopted by each dominion, the governments of the two dominions were to be carried on in accordance with the Government of India Act, 1935.

**Integration of States:** By 15th August, 1947 AD, all the states except **Kashmir**, **Junagadh** and **Hyderabad** had signed the Instrument of Accession with India. **The Maharaja of Kashmir** acceded to India in October, 1947 AD when the irregular Pakistani troops invaded his state. **The Nawab of Junagadh** was a Muslim, whereas most of its people were Hindus. In February 1948 AD, through a referendum, the people

of this state decided to join India. **The Nizam of Hyderabad** was forced to accede to the Indian Union in September 1948 AD.

**French Colonies**, by the end of 1954 AD, the French colonies in Pondicherry–Chandranagar, Mahe, Karaikal and Yanam–came to an end.

**Portuguese Colonies:** In 1954 AD, Dadra and Nagar Haveli and Diu constituted the Portuguese colonies in 1961 AD.

### Caste Movements and Organisations

Movements	Locations	Leaders
Satya Shodhak Samaj (1873)	Maharashtra	Jyotiba Phule
Shri Narayan Dharma Paripalan Yogam Movement (1902–03)	Kerala	Shri Narayan Guru
Bahujan Samaj (1910)	Satara, Maharashtra	Mukundro Patil
Harijan Sevak Sangh (1932)	Pune	Mahatma Ghandhi
Dravid Monnetra Kazhagam (1949)	Madras	C. N. Annadurai

### Muslim Socio-Religious Movements

Movements	Locations	Leaders
Fairazi Movement (1804)	Faridpur (Bengal)	Haji Sharitullah Dudhi Miyan
Deoband Movement (1867)	Deoband	Mohammad Qasim Nanutavi, Rashid Ahmed Ganghoi
Aligarh Movement (1875)	—	Sir Syed Ahmed Khan
Ahmadiya Movement (1889–90)	Faridkot	Mirza Ghulam Ahmed of Qadiyan
Ahrar Movement	—	Riza Khan and Ali Brothers

## GROWTH OF MODERN EDUCATION IN INDIA

### ■ EARLY PHASE (1758 AD-1812 AD)

- **Calcutta (Kolkata)** and **Madras (Chennai)** Universities were established by **Warren Hastings** in 1781 AD for the study of the Muslim law.
- **Sanskrit College** was established by **Jonathan Duncan** at Benares in 1791 AD for the study of Hindu law and philosophy.
- **Fort William College** was established by **Wellesley** in 1800 AD.

### ■ SECOND PHASE

- The greatest importance of the 1813 Act was that for the first time, the company

acknowledged the state responsibility for the promotion of education in India.

- Establishment of **Calcutta College** in 1817 AD with the efforts of **Raja Ram Mohan Roy** for imparting Western education.
- Bethune School was founded by **J.E.D. Bethune** at **Kolkata** (1849 AD).

### ■ DOWNWARD FELLATIO THEORY (THIRD PHASE)

- In 1854 AD, **Charles Wood** prepared a dispatch on an Educational System for India, which came to be called the **Magna Carta of education** in the country.
- In 1882 AD, **Lord Ripon** appointed the **Hunter Commission** under **Sir W.W. Hunter**. The Commission's views were restricted to primary and secondary education.

- The **Punjab** (1882) and **Allahabad** (1887) universities were established.

### ■ FOURTH PHASE (1901 AD-1920 AD)

- **Lord Curzon** appointed **University Commission** under **Sir Thomas Rayleigh**. Based on his report, **Indian Universities Act** was passed in 1904 AD.

### ■ SERGEANT PLAN, 1944 AD

- The **Sergeant Plan**, worked out by the **Central Advisory Board of Education** in 1944 AD, called for elementary and higher secondary schools, universal, free and compulsory education for children in the 6-11 age-group and a six-year school course for the 11-17 age-group.

## IMPORTANT FOREIGN TRAVELLERS/ENVOYS

**Megasthenes (302 BC-298 BC):** An ambassador of **Seleucus Nikator**, he visited the court of **Chandragupta Maurya**. He wrote an interesting book '**Indica**'.

**Fa-Hien (405 AD-411 AD):** He came to India during the reign of **Chandragupta II Vikramaditya**. He was the first Chinese pilgrim to visit India.

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

**I-tsung (671 AD-695 AD):** A Chinese traveller, he visited India in connection with Buddhism.

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

**Al-Beruni (1024 AD-1030 AD):** His real name was **Abu Rehan Muhammad** and he came to India along with **Mahmud of Ghazni** during one of his Indian raids. He wrote a book '**Tahriq-i-Hind**'.

**Marco Polo (1292 AD-1294 AD):** A Venetian traveller, he visited South India in 1294 AD. [during the reign of Pandyan ruler of Madurai, Maravarman Kulasekhara (1272 AD-1311 AD)].

**Ibn Batuta (1333 AD-1347 AD):** A Morroish traveller, he visited India during the reign of **Muhammad-bin-Tughlaq**. His book '**Rehla**' throws light on the reign of **Muhammad-bin-**

**Tughlaq** and the geographical, economic and social conditions in India.

**Shihabuddin al-Umari (1348 AD):** He gives a vivid account of India in his book '**Masalik Albsar Fi-Mamalik al Amsar**'.

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

**Abdur Razzaq (1443 AD-1444 AD):** He was a Persian traveller, stayed in the court of the Zamorin at Calicut. He has given a vivid account of the Vijayanagar Empire, especially of the city.

**Athanasius Nikitin (1470 AD-1474 AD):** He was a Russian merchant. He described the condition of the Bahamani kingdom under **Muhammad III** (1463 AD-1482 AD).

**Buarte Barbosa (1500 AD-1516 AD):** He was a Portuguese traveler. He had given a valuable narration of the government and the people of the Vijayanagar Empire.

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

**Fornao (1535 AD-1537 AD):** A Portuguese merchant, who visited the Vijayanagar Empire.

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

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

**Peter Mundy (1630 AD-34 AD):** He was an Italian traveller to the Mughal Empire in the reign of Shahjahan.

**Jean Baptiste Tavernier (1638-1663 AD):** He was a French traveller. His account covers the reign of **Shahjahan** and **Aurangzeb**.

**Nicolao Manucci (1653 AD-1708 AD):** He was French physician and philosopher. Danishmand Khan a noble of **Aurangzeb** was his patron.

## IMPORTANT SAYINGS

'Back to Vedas'-**Dayanand Saraswati**.

'Dharma Chakra Pravartana'-**Mahatma Buddha**.

**Dilli Chalo’-Subhash Chandra Bose.**

‘Do or Die.’—**Mahatma Gandhi** (while launching Quit India movement in 1942 AD).

‘Give me blood and I will give you freedom.’—**Subhash Chandra Bose** (in his address to soldiers of Azad Hind Fauj).

‘My ultimate aim is to wipe every tear from every eye’—**Jawaharlal Nehru**.

‘Swaraj is my birthright and I shall have it’—**Bal Gangadhar Tilak**.

‘Every blow that is hurled on my back will be a nail in the coffin of the British Empire’—**Lala Lajpat Rai**.

‘The Congress is tottering to its fall and one of my greatest ambitions while in India is to assist it to a peaceful demise’—**Lord Curzon**.

### Major Tribal Movements

Tribe	Year	Leader	Area
Chuars	1768–1832		W. Bengal
Bhilis	1818–1848	Sevaram	Khandesh
Hos	1820–1832		Chhotanagpur
Kolis	1824–48		Sahyadri hills
Kharies	1829–32	Tirut Singh	Khasi hills
Kols	1831–32	Budho Bagat	Chhotanagpur
Kayar	1840–1924	Alluri Sitaram Raju	Andhra Pradesh
Kachnagar	1882	Sambudhan	Assam
Ahom	1828–33	Gomdhar Konovar	Assam
Khonds	1846–1914	Chattre Bisayi	Orissa
Santhals	1855–56	Sidhu and Kanhu	Rajmahal Hills
Naikadas	1858–68	Jogia Bhagat	Gujarat
Mundas	1899–1900	Birsa Munda	Chhotanagpur
Bhilis	1913	Govind Guru	South Rajasthan
Oraons	1914–1915	Jatra Bhagat	Chhotanagpur
Kukis	1917–19	Rani Gaidinlue	Manipur
Rampa	1916	Alluri Sitaram Raju	Andhra Pradesh

### Early Associations

Year	Organisation	Founder	Place
1838	Landholders Society	Dwarkanath Tagore	Calcutta
1839	British India Society	William Adams	London
1851	British India Association	Devendranath Tagore	Calcutta
1862	London India Committee	C.P. Mudaliar	London
1866	East India Association	Dadabhai Naoroji	London
1867	National Indian Association	Mary Carpenter	London
1872	Indian Society	Anand Mohan Bose	London
1876	Indian Association	Anand Mohan Bose and S.N. Banerjee	Calcutta
1883	Indian National Society	Shishir Chandra Bose	Calcutta
1884	Indian National Conference	S.M. Banerjee	Calcutta
1885	Bombay Presidency Association	Mehta and Telang	Bombay
1888	United India Patriotic Association	Sir Syed Ahmed Khan	Aligarh
1905	Servants of India Society	G.K. Gokhale	Bombay
1920	Indian Trade Union Congress	N.M. Joshi (founder)	Lucknow
1923	Swaraj Party	Moti Lal Nehru and C.R. Das	Delhi

1924	All India Communist Party	Satyabhakta	Kanpur
1928	Hindustan Socialist Republican Association	Bhagat Singh, B.K. Singh and Vohra	Delhi
1928	Khudai Khidmatgar	Abdul Gaffar Khan	Peshawar
1936	All India Kisan Sabha	Sahajananda and N.J. Ranga	Lucknow
1939	Forward Bloc	Subhash Chandra Bose	Calcutta
1940	Radical Democratic Party	M.N. Roy	Calcutta
1942	Revolutionary Socialist Party	Satyendra Nath Tagore	Calcutta

### Important Congress Sessions

Year	Place	Importance
1885	Bombay	at Gokuldas Tejpal Sanskrit College, 72 delegates
1886	Calcutta	436 delegates
1887	Madras	Tayabji became first Muslim President.
1888	Allahabad	George Yule became first English President
1890	Calcutta	Decision taken to organise a session of Congress.
1907	Surat	Congress split
1908	Madras	Constitution for the Congress.
1916	Lucknow	Congress merger. Pact with Muslim League,
1917	Calcutta	Annie Besant became 1st women President.
1922	Gaya	Formation of Swaraj Party.
1924	Belgaum	Gandhi became President.
1925	Kanpur	Sarojini Naidu became 1st Indian women President.
1927	Madras	Nehru and S.C. Bose moved resolution for independence and it was passed for the 1st time.
1928	Calcutta	First All India Youth Congress.
1929	Lahore	'Poorna Swaraj' (Complete Independence) resolution pledge for Independence day on 26th January, 1930.
1931	Karachi	Resolution for Fundamental Rights and National Economic Policy.
1934	Bombay	Formation of Congress Socialist Party.
1937	Faizpur	Demand for Constituent Assembly.
1939	Tripura	S.C. Bose resigned due to difference with Gandhiji's resignation Rajendra Prasad became of INC President.

### Newspapers/Magazines/Weeklies

Newspapers/Magazines	Author/Editor
Harijan Bandhu, Harijan Sevak	Mahatma Gandhi
Samvad Kaumudi, Mirat-al-Akhbar	Raja Ram Mohan Roy
Tattvabodhini Patrika, Indian Mirror	Maharishi Devendranath Tagore
Banga Darshan	Bankim Chandra Chattopadhyay
Maratha (English) and Kesari (Marathi)	Lokmanya Bal Gangadhar Tilak
The Punjabi, 'The Pupil' (English)	Lala Lajpat Rai
New India	Bipin Chandra Pal
Bande Mataram	Bipin Chandra Pal (edited by Aurobindo Ghosh)
The Comrade	Mohammad Ali (during Khilafat movement)
Nation	G.K. Gokhale
Karmyogi	Aurobindo Ghosh

Prabudha Bharat, Udbodhava	Vivekananda
Darpan	Bal Shastri Jambekar
Socialist	S.A. Dange
Yugantar	Barindra Kumar Ghose and Bhupendra Dutta (Anushilan Samiti)
Talwar	Verendranath Chattopadhyay
New India, Common Will	Annie Besant
Indian Sociologist (London)	Shyamji Krishnaverma
Bandi Jivan	Sachindranath Sanyal
Al-Hilal	Maulana Abul Kalam Azad (during Khilafat)

### Events/Acts/Reforms

Events/Acts/Reforms	Viceroy/Governor Generals
Permanent Settlement (1793)	Lord Cornwallis
Subsidiary Alliance (1798)	Lord Wellesley
Abolition of Sati (1829)	Lord William Bentinck
Introduction of Civil Service	Lord Cornwallis
Doctrine of Lapse	Lord Dalhousie
Railways started in India	Lord Dalhousie
Post and Telegraph	Lord Dalhousie
English Education in India	Lord William Bentinck
Vernacular Press Act (1878)	Lord Lytton
Arms Act (1878)	Lord Lytton
Local Self-government (1882)	Lord Rippon
Ryotwari System	Lord Munro
Partition of Bengal (1905)	Lord Curzon
Rowlatt Act (1919)	Lord Chelmsford
Simon Commission (1928)	Lord William Bentinck
Sepoy Mutiny (1857)	Lord Canning
Queen's Proclamation (1858)	Lord Canning
Factory Act (1881)	Lord Ripon
Repeal of Vernacular Press Act (1881)	Lord Canning
Indian Councils Act/Minto-Morley Reforms (1909)	Lord Minto
Partition of Bengal revoked (1911)	Lord Hardinge
Transfer of Capital to Delhi (1911)	Lord Hardinge
Dyarchy in province (1919)	Lord Chelmsford
Jallianwala Bagh Tragedy (1919)	Lord Chelmsford
Non-co-operation	Lord Chelmsford
Poorna Swaraj Resolution (Lahore 1929)	Lord Irwin
First Round Table Conference (1930)	Lord Irwin
Gandhi-Irwin Pact (1931)	Lord Irwin
Communal Award (1932)	Lord Wellington
Poona Pact (1932)	Lord Wellington
2nd Round Table Conference (1931)	Lord Wellington
3rd Round Table Conference (1932)	Lord Wellington

Separate Electorates (1932)	Lord Wellington
Government of India Act (1935)	Lord Wellington
Provincial Autonomy (1937)	Lord Linlithgow
Cripps Mission (1942)	Lord Linthgow
Quit India Movement	Lord Linlithgow
Cabinet Mission (1946)	Lord Wavell
INA Trial (1945)	Lord Wavell
Indian Independence Act (1947)	Lord Mountbatten
Partition of India (1947)	Lord Mountbatten

### Famous Conspiracy Cases

Case	Date	Accused
Nasik	1909–10	Vinayak Savarkar Conspiracy
Alipore	1908	Aurobindo Ghosh
Howrah case	1910	Jatin Mukherjee
Dacca case	1910	Pulin Das
Delhi case	1915	Amirchand, Awadh Bihari and Bal Mukund
Lahore case	1929–30	Bhagat Singh, Rajguru and Sukhdev
Banaras case	1915–16	Sachindranath Sanyal
Kakori case	1925	Rama Prasad Bismil and Ashfaq

### Some Socio-Religious Reform Movements and Organisations

Movement/ Organisation	Year	Place	Founder
Brahmo Samaj (earlier Atmiya Sabha)	1828	Calcutta	Raja Ram Mohan Roy
Young Bengal Movement	(1826–1831)	Calcutta	Henry Louis Vivian Derozio
Dharma Sabha	1830	Calcutta	Radha Kanta Deva
Namdhari/ Kuka Movement	1841–1871	N.W.F. Province and Bhaini (Ludhiana)	Bhai Balak Singh and Baba Ram Singh
Rahanumai Mazdayasan Sabha	1851	Bombay	S.S. Bangali, Dadabhai Naoroji Naoroji Furdonji, J.B. Nacha, etc.
Radha Swami Satsang	1861	Agra	Tulsi Ram also known as Shiv Dayal Saheb
Prarthana Samaj	1867	Bombay	Atmaram Pandurang Govind Ranade
Indian Reform Association	1870	Calcutta	Keshab Chandra Sen
Arya Samaj	1875	Bombay	Dayanand Saraswati (originally founder Mool Shankar)
The Theosophical Society	1875	New York (In India Adyar, Madras)	Madam H.P. Blavatsky, Col. H.S. Olcott (In India-Annie Besant)
Deccan Education Society	1884	Pune	M.G. Ranade, V. G. Chidlonkar, G. G. Agarkar, etc.

Seva Sadan	1885	Bombay	Behramji M. Malabari
Indian National Social Conference Deva Samaj	1887	Lahore	Shiva Narain Agnihotri
Madras Hindu Association	1892	Madras	Viresalingam Pantalu
Ramakrishna Mission	1897	Bengal	Vivekananda
Bharat Dharma Mahamandala	1902	Varanasi	Pandit Madan Mohan Malaviya and Pandit Din Dayal Sharma
The Servants of India Society	1905	Bombay	Gopal Krishna Gokhale
Poona Seva Sadan	1909	Pune	G.K. Devadhar and Ramabai Ranade (wife of M.G. Ranade)
Nishkam Karma Math	1910	Pune	Dhondo Keshav Karve
Social Service League	1911	Bombay	Narayan Malhar Joshi

### Peasant Movements

Movement	Place	Year	Leaders
Titu Mir's Movement	Bengal	(1782-1831)	Mir Nithar Ali/Titu Mir
Indigo Revolt	Bengal	1859	Bishnu and Digambar Biswas
Pabna	Bengal	1870	Ishwar Roy, Sabu Pal, Khoodi Mollah
Deccan Riots	Maharashtra	1875	Vasudev Balwant Phadke
Ramosi Movement	Maharashtra	1879	Vasudev Balwant Phadke
Bijolia	Rajasthan	1913	Sitaram Das, Vijay Pathak Singh
Champaran	Bihar	1917	Gandhiji
Kheda	Gujarat	1918	Vallabh Bhai Patel and Gandhiji
Awadh Kisan Sabha	Uttar Pradesh	1920	Baba Ramchandra
Eka Movement	Awadh	1921	Madari Pasi
Moplah	Kerala	1921	Sayyad Ali and Saiyed Fazl
Bardoli/Borsad	Gujarat	1928	Vallabh Bhai Patel
Forest Satyagrah	South India	1931	N V Rama Naidu, N G Ranga
Tebhaga	Bengal	1946	—
Telangana	Andhra	1946	Puchalpalli Sundarayya

### Secret Revolutionary Societies

Society/Organisation	Year	Founder	Features
Anushilan Samiti (Dacca)	1902	Pulin Das	Earliest Secret Society in Bengal
Mitra Mela (Maharashtra)	1902	V. D. Savarkar	Earliest Secret Society in Maharashtra
Abhinav Bharat (Maharashtra)	1904	Ganesh Savarkar	Ganesh was the elder brother of V.D. Savarkar
Anushilan Samiti (Calcutta)	1907	Barindra Kumar Ghosh & P. Mitra	—
Hindustan Republican	1924	Sachindra Sanyal, Chandrashekhar Azad	It was an all India level organisation

## GOVERNOR-GENERALS AND VICEROYS

### ROBERT CLIVE

Governor of Bengal during 1757 AD-1760 AD and again during 1765 AD-1767 AD. Also established Dual Government in Bengal from 1765 AD-1772 AD.

### VANSITTART (1760 AD-1765 AD)

The Battle of Buxar (1764 AD).

### CARTIER (1769 AD-1772 AD)

Bengal Famine (1770 AD).

### WARREN HASTINGS (1772 AD-1774 AD)

Abolished Dual Government (1772 AD).

### WARREN HASTINGS (1774 AD-1785 AD)

- He became Governor of Bengal in 1772 AD and first Governor-General of Bengal in 1773 AD, through the **Regulating Act**.
- Established India's first Supreme Court in Calcutta.
- He founded **Asiatic Society of Bengal** with William Jones in 1784 AD and wrote introduction to the first English translation of the **Gita** by Charles Wilkins.
- A translation of code in Sanskrit appeared under the title 'Code of Gentoo laws'.
- First Anglo-Maratha War during his period, which ended with **Treaty of Salbai** (1776 AD-1782 AD).
- Second Anglo-Mysore War (1780 AD-1784 AD) ended with the **Treaty of Mangalore**.
- Rohilla War in 1774 AD.
- Pitt's India Act, 1784.
- Impeachment proceedings started against him in Britain on the charges of taking bribe. After a trial of 7 years, he was finally acquitted.

**Revenue Reforms:** Divided Bengal into districts and appointed Collectors other revenue officials.

**Judicial Reforms:** Started **Diwani** and **Faujdari Adalats** at the district level and **Sadar Diwani** and **Nizamat Adalats** at Calcutta appeared in 1776 AD under the title of 'Code of Gentoo laws'.

### LORD CORNWALLIS (1786 AD-1793 AD)

- First person to codify laws (1793 AD).
- He introduced Izaredari System in 1773 AD.
- He started the **permanent settlement of Bengal**.
- He created the post of **District Judge**. He is called Father of Civil Services in India.
- Third Anglo-Mysore War and the **Treaty of Srirangapatnam**.
- He undertook police reforms.

### SIR JOHN SHORE (1793 AD-1798 AD)

- Introduced **First Charter Act** (1793 AD).
- Famous for his policy of non-interference.
- Battle of Kharda** between Nizam and Marathas (1795 AD).

### LORD WELLESLEY (1798 AD-1803 AD)

- Introduced the system of Subsidiary alliance. Madras Presidency was formed during his tenure.
- Fourth Anglo-Mysore** war in 1799 AD, Tipu Sultan died.
- First subsidiary treaty with Nizam of Hyderabad.
- In 1800 AD, he set up Fort William College in Calcutta. He was famous as Bengal Tiger.
- He brought the censorship of Press Act, 1799 AD.
- Treaty of Bassein in 1802 AD.

#### Subsidiary Alliance

- The Peshwa, the Bhonsle, the Scindia and Rajputs of Jodhpur, Jaipur accepted the subsidiary alliance.

### SIR GEORGE BARLOW (1805 AD-1807 AD)

- Vellore mutiny (1806 AD, by soldiers).
- Second Anglo-Maratha War ended.

### LORD MINTO (1807 AD-1813 AD)

- Treaty of Amritsar (1809 AD) with Ranjit Singh.
- Charter Act of 1813 AD ended the monopoly of East India Company in India.

### LORD HASTINGS (1813 AD-1823 AD)

- Adopted the policy of intervention and war.
- Anglo-Nepal War (1813 AD-1823 AD).
- Third Anglo-Maratha War (1817 AD-1818 AD).
- Introduced the Ryotwari settlement in Madras by Thomas Munro, the Governor.
- **Treaty of Sangli** with Gorkhas (1816 AD).
- **Treaty of Poona** (1817 AD) with Peshwa.
- Suppression of Pindaris (1817 AD-1818 AD).

### LORD AMHERST (1823 AD-1828 AD)

- First Anglo-Burmese War (1824 AD-1826 AD), signed **Treaty of Gandaboo** in 1826 AD.
- Acquisition of Malaya Peninsula and Bharatpur (1826 AD).

## GOVERNOR-GENERALS OF INDIA

### LORD WILLIAM BENTINCK (1828 AD-1834 AD)

- Regarded as the 'Father of Modern Western Education in India'.
- Abolition of Sati in 1829 AD.
- Suppression of Thugi (1830 AD), curbed by colonel Sleeman.
- Deposition of Raja of Mysore and annexation of his territories (1831 AD).
- He was First Governor-General of India.
- **First Medical College** was opened in Calcutta in 1835 AD.
- Treaty of Friendship with Ranjit Singh (1831 AD).

### SIR CHARLES METCALFE (1834 AD-1836 AD)

Passed the famous Press Law, which liberated the press in India. He is known as **liberator of press**.

### LORD AUCKLAND (1836 AD-1842 AD)

1st Anglo-Afghan War (1836 AD-1842 AD).

### LORD ELLENBOROUGH (1842 AD-1844 AD)

Abolished slavery (1843 AD). Annexation of Sindh (1843).

### LORD HARDINGE (1844 AD-1848 AD)

- First Anglo-Sikh War (1845-46) and the Treaty of Lahore.
- Prohibition of female infanticide.

### LORD DALHOUSIE (1848 AD-1856 AD)

Abolished Titles and pensions, Widow Remarriage Act (1856 AD).

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

- Santhal uprisings (1855 AD-1856 AD).
- Nationalist Educational Institutions were founded.

**Administrative Reforms:** Raised Gurkha regiments.

**Educational Reforms:** Wood's Educational Despatch of 1854 AD. An Engineering College was established at Roorkee.

**Public Works:** Started the first railway line in 1853 AD; Started electric telegraph service. Laid the basis of the modern Postal System (1854 AD); A separate public works department was set up for the first time.

**Lord Canning (1856 AD-1858 AD):** The last Governor General of India; Revolt of 1857 AD; Withdrawn Doctrine of Lapse.

### VICEROYS OF INDIA

The Universities of Calcutta, Bombay and Madras founded in 1857 AD.

### Lord Canning (1858 AD-1862 AD)

The Indian Councils Act of 1861 AD was passed; Indian Penal Code of Criminal Procedure (1859 AD) was passed; The Indian High Court Act (1861 AD) was enacted; Income-tax was introduced for the first time in 1858 AD.

### Lord Elgin I (1862 AD-1863 AD):

Suppression of Wahabi Movement (Plan-Islamic Movement).

### Sir Johan Lawrence (1864 AD-1869 AD):

High Courts were established at Calcutta, Bombay and Madras in 1865 AD; Bhutan War (1865 AD); Created the Indian Forests Department and reorganised the native judicial service.

### LORD MAYO (1869 AD-1872 AD)

- He established the Department of Agriculture and Commerce.
- In 1872 AD, first Census was done in India.
- He was the only **Viceroy to be murdered** in office by a convict in the Andaman in 1872 AD.

### LORD NORTHBROOK (1872 AD-1876 AD)

- He resigned over Afghanistan question.
- Kuka Movement of Punjab (1872)
- Visit of Prince of Wales in 1875.

### LORD LYTTON (1876 AD-1880 AD)

- Most infamous Governor-General; Arranged the Grand Darbar in Delhi; Royal Title Act (1876 AD) was passed and Queen Victoria was declared the Kaisar-a-Hind.
- Arms Act (1878 AD) made it mandatory for Indians to acquire license for arms; passed the infamous **Vernacular Press Act** (1878 AD) and lowered the maximum age of ICS from 21 to 19 years.

### LORD RIPPON (1880 AD-1884 AD)

- Repeal the Vernacular Press Act in 1882 AD.
- The first Factory Act came in 1881 AD, to improve the labour condition.
- He was famously known as "Father of Local Self-Government".
- First Official Census in India (1881 AD).
- Appointed **Hunter Commission** for education reforms in 1882 AD.
- The Illbert Bill** controversy (1883 AD-1884 AD).

### LORD DUFFERIN (1884 AD-1888 AD)

- Formation of **Indian National Congress** (INC) in 1885 AD.
- Dufferin called INC as 'microscopic minority'.
- Third Burmese war, Burma annexed.

### LORD LANSDOWNE (1888 AD-1894 AD)

- Civil Services were classified-Imperial, Provincial and Subordinate services.
- Appointment of Durand Commission to define the line between British India and Afghanistan.

### LORD ELGIN II (1894 AD-1899 AD)

- The Munda uprising (Birsa Munda) of 1899 AD, Great famine in 1896-1897, Lyell Commission appointed after famine (1897 AD).

### LORD CURZON (1899 AD-1905 AD)

- Appointed a Police Commission in 1902 AD under Andrew Frazer.
- Indian Universities Act passed in 1904 AD.
- Famine Commission under MacDonnell.
- Introduction of Ancient Monuments Preservation Act 1904.
- Partition of Bengal in 1905.

### LORD MINTO II (1905 AD-1910 AD)

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

### LORD HARDINGE (1910 AD-1916 AD)

- Annulment 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).
- In 1911, Bihar and Orissa separated from Bengal and, became a new state.
- Gandhiji came back to India from South Africa (1915).

### LORD CHELMSFORD (1916 AD-1921 AD)

- Home Rule Movement launched by Tilak and Annie Besant (1916); Lucknow Pact between Congress and Muslim League (1916); Champaran Satyagraha (1917); Montague's August Declaration (1917); Constitutional Reforms of 1919; Repressive Rowlatt Act (1919); Jallianwala Bagh Massacre (April 13, 1919), appointment of Hunter Commission

to probe Jallianwala Bagh Massacre, Khilafat Movement (1920–1922); Non-Cooperation Movement (1920–1922).

### LORD READING (1921 AD-1926 AD)

- Rowlatt Act was repealed along with Press Act of 1910.
- Holding of the simultaneous examination for the ICS in England and India from 1923.
- Chauri-Chaura incident and withdrawal of Non-Cooperation Movement.
- Formation of Swaraj Party by CR Das and Motilal Nehru (1923).
- Kakori Train Conspiracy (1925).
- Lee Commission (1924) for public services.
- RSS** founded in 1925.

### LORD IRWIN (1926 AD-1931 AD)

- Simon Commission visited India in 1928.
- Nehru Report, 1928.
- Lahore Session of the Congress, (1929) and Poorna Swaraj, declaration.
- Civil Disobedience Movement, 1930 started.
- Dandi March** (12 March 1930).
- Gandhi-Irwin Pact, 5 March 1931.
- Sharda Act, 1929, under which marriageable age of girls (14 years) and boys (18 years) was raised.
- Jawaharlal Nehru and Subhash Chandra Bose founded **Independence of India League**.

### LORD WILLINGDON (1931 AD-1936 AD)

- Civil Disobedience Movement (1932); Announcement of MacDonald. Communal Award (1932); Foundation of Congress Socialist Party-CSP (1934); Burma Separated from India (1935), All India Kisan Sabha (1936).

### LORD LINLITHGOW (1934 AD-1944 AD)

- First General Election (1936–37) Congress Ministries.
- Deliverance day by Muslim League 1939.
- Lahore Resolution of Muslim League (1940) demand of Pakistan.
- August Offer, 1940.
- Cripps Mission, 1942.
- Quit India Movement, 1942.

- “Divide and Quit” at the Karachi Session (1940).
- In Haripura Session (1939) of Congress complete Independence was declared.

### LORD WAVELL (1943 AD-1947 AD)

- C.R. Formula, 1944; Wavell Plan and Shimla Conference in 1945; INA Trials in 1945; Navsari mutiny in 1946; Cabinet Mission 1946; Direct Action Day by the Muslim League on 16th August, 1946. Formation of Interim Government by the congress in September, 1946.

### LORD MOUNTBATTEN (MARCH-AUGUST 1947)

- Announced the 3rd June, 1947 Plan.

## GOVERNOR GENERALS OF FREE INDIA (1947 AD-1950 AD)

### LORD MOUNTBATTEN (1947–1948)

The first Governor General of free India Kashmir Acceded to India (Oct. 1947); Murder of Gandhi (Jan. 30, 1948).

### C. RAJAGOPALACHARI (JUNE 1948–JANUARY 25, 1950)

The last Governor General of free India; The only Indian Governor General.

## IMPORTANT NATIONAL LEADERS

### ANNIE BESANT (1847 AD-1933 AD)

- She founded the Theosophical Society in India and started the Home Rule League.
- She established Central Hindu School and College at Banaras (Later BHU).
- She was elected the President of the Calcutta Session of INC, 1917.
- She edited famous newspapers—new India and Commonwealth.
- She prepared—The Lotus Song, a translation of *Gita* into English.

### BHAGAT SINGH (1907 AD-1931 AD)

- He was a member of Hindustan Socialist Republican Association.
- He started the ‘Militant Naujawan Bharat Sabha’ in Punjab.

- He killed British official Saunders in 1928 and was involved in Lahore Conspiracy and bombed the Central Legislative Assembly.
- He was executed on 23rd March, 1931.

### BANKIM CHANDRA CHATTOPADHYAY (1833 AD-1894 AD)

- Best known for the composition of the hymn **Bande Mataram**.
- His first novel was **Durgeshnandini**, published in 1864 and he started the journal Bangadarsan.

### BIPIN CHANDRA PAL (1858 AD-1932 AD)

- He was awarded with the title of the **Mightiest Prophet of Nationalism** by Aurobindo Ghosh.
- He started Newspapers—Paridashak (weekly); Public Opinion and Tribune (editor); Swaraj (English weekly in London); Hindu Review (English monthly); Independent (daily); Democrat (weekly).

### CHAKRAVARTHI RAJAGOPALACHARI (1879 AD-1972 AD)

- He started the CDM in Tamil Nadu.
- He prepared the CR Formula for Congress-League Cooperation.
- He was the first and last Indian Governor General of India (1948-1950).
- He became the Minister of Home Affairs in the country's first Cabinet.
- He founded the Swatantra Party in 1959.
- His rational ideas are reflected in the collection **Satyameva Jayate**.
- He was awarded the **Bharat Ratna** in 1954.

### DADABHAI NAOROJI (1825 AD-1917 AD)

- He was the first Indian to demand *Swaraj* in the Calcutta Session of INC, 1906.
- He was also known as the **Indian Gladstone** and **Grand Old Man of India**.
- He was first Indian to be selected to the **House of Commons** on Liberal Party ticket.
- He highlighted the draining of wealth from India by the British and its effect in his book **Poverty and Unbritish Rule in India (1901)**.

### DR. BHIMRAO AMBEDKAR (1891 AD-1956 AD)

- He founded the Depressed Classes Institute (1924) and Samaj Samata Sangh (1927).
- He participated in all the Three Round Table Conferences and signed the Poona Pact with Mahatma Gandhi in 1932.
- He was in the Governor-General's Executive Council from 1942 to 1946 and organised the Indian Labour Party and Scheduled Caste Federation.
- He became the Chairman of the Drafting Committee of Indian Constitution.
- As the first Law Minister of the independent India, he introduced the Hindu Code Bill.
- He started **The Republican Party** in 1956.
- Towards the end of his life, he embraced Buddhism.

### DR. RAJENDRA PRASAD (1884 AD-1963 AD)

- He founded the National College at Patna.
- He was elected as the Minister in-charge of Food and Agriculture in the Interim Government (1946).
- He was the President of the Constituent Assembly.
- He became the first President of the Indian Republic. He was honoured with *Bharat Ratna* in 1962.
- He edited the newspaper—Desh (Hindi weekly).

### GOPAL KRISHNA GOKHALE (1886 AD-1915 AD)

- Gandhiji regarded him as his political guru.
- He was the President of the Banaras Session of INC, 1905, supported the Swadeshi Movement.
- He was the founder of the Servants of Indian Society in 1905.

### JAWAHARLAL NEHRU (1889 AD-1964 AD)

- The Independence resolution was passed under his Presidentship at the Lahore Session.
- He was the first Prime Minister of Republic India (from 1947 to 1964), also known as architect of Modern India. He authored the Doctrine of Panchsheel and believed in the policy of non-alignment.

- Books—**Discovery of India**, **Glimpses of World History**, **A Bunch of Old Letters**, **Unity of India**, **Independence and After**, **India and the World**, etc.
- His autobiography was entitled as *Auto-biography*.

### RABINDRANATH TAGORE

- His first poem was published in the ‘Amrita Bazar Patrika’ and then he wrote ‘Banaphul’ (story) and ‘Bhanusinher Padavali’ (series of lyrics).
- He founded Shantiniketan near Bolpore on 2nd December, 1901.
- He wrote **Gitanjali**, which fetched him the Nobel Prize in 1913.
- He inaugurated Raksha Bandhan festival to oppose the Partition of Bengal (1905).
- He founded the Vishwa Bharati University.
- In 1915, British Crown granted him a *knighthood*, which he renounced after the Jallianwala Bagh Massacre.
- His compositions were chosen as National Anthem by two nations
  - i. India—Jana Gana Mana
  - ii. Bangladesh—Amar Sonar Bangla

### SUBHASH CHANDRA BOSE

- He founded the Independence for India League with Jawaharlal Nehru.

- He was elected as the President of INC at its Haripura Session (1938) and Tripuri Session (1939), but resigned from Tripuri due to differences with Gandhiji.
- He founded the Forward Bloc (1939) and Kisan Sabha.
- He took the charge of Indian Army (Azad Hind Fauj) in 1943 in Singapore and set up Indian Provisional government there.
- He addressed Mahatma Gandhi as the *Father of the Nation*.
- He gave the famous slogans—Dilli Chalo and *Jai Hind*.
- The India Struggle was his autobiography.

### SAROJINI NAIDU (1979–1949)

- Popularly known as the Nightingale of India she became the first woman to participate in the India’s struggle for independence.
- She participated in the Dandi March with Mahatma Gandhi and presided over the Kanpur Session of Congress in 1925.
- She was the first woman to become the Governor of Uttar Pradesh State.
- Her famous books include—**The Golden Threshold** (1905). **The Feather of the Dawn**; **The Bird of Time** (1912) and **The Broken Wing** (1917).





## ART AND CULTURE

# ART AND CULTURE OF INDIA

## RELIGION IN INDIA

### HINDUISM

- There is no specific founder of the Hindu religion.
- Its roots can be traced to the historical Vedic religion of the Iron Age India.
- Hinduism is the third largest religion in the world after Islam and Christianity.
- Prominent texts are Vedas, Ramayana and Mahabharata.

### ISLAM

- Prophet Mohammed is the founder of Islam.
- Quran is the Holy book of Islam.
- Most muslims belong to two denominations; Shia and Sunni.

### CHRISTIANITY

- **Jesus** is the founder of Christianity.
- **Bible** is the Holy book of the Christians.
- Holy texts of Christianity are the **Old Testament** and the **New Testament**.

### SIKHISM

- Guru Nanak is the founder of Sikhism.
- **Guru Granth Sahib** is the Holy book of Sikhs.
- Sikhism is the third largest religion of India.

### BUDDHISM

- **Mahatma Buddha** is the founder of Buddhism.
- Buddhism is the indigenous religion of India.
- **Tripitaka** is the Holy book of Buddhists.

### JAINISM

- **Swami Mahavira** is the founder of Jainism.
- **Kalpa Sutras** is the Holy book of Jainism.
- The main doctrines of Jainism are **Anekantavada**, **Syadvada** and **Nayavada**.

- The two sects of Jainism are **Svetambaras** and **Digambaras**. Jain holy texts consist of **Purvas**, **Agamas**, **Angas** and **Upangas**.

## INDIAN LITERATURE AND LANGUAGES

### SANSKRIT

- **Sanskrit** is the mother of many Indian languages.
- **Vedas**, **Upanishads**, **Puranas** and **Dharmasutras** are all written in Sanskrit.
- **Dharmasutra**, **Manusmriti**, **Arthashastra** and **Gita Govindam** are all famous books in Sanskrit.

### PALI

- **Pali** is an Indo-Aryan language, which was used for the earliest Buddhist scriptures. Pali literature is mainly concerned with **Theravada Buddhism**.

### TELUGU

- The **Vijayanagara period** was the golden age of **Telugu literature**.
- There are eight Telugu literary luminaries popularly known as **Ashtadiggajas**.
- **Ramakrishna** was the author of **Panduranga Mahatmayam**, which was considered one of the greatest poetical works of Telugu literature.

### KANNADA

- The earliest known literary work in Kannada is **Kavirajamarga** written by the **Rashtrakuta King Nrupatunga Amoghavarsha I**.
- **Pampa**, known as the father of Kannada, wrote his great poetic works **Adi Purana** and **Vikramajiva Vijaya** in the 10th century AD.

## MALAYALAM

- The **Malayalam** language emerged around the 11th century AD. By 15th century AD, Malayalam was recognised as an independent language.
- Bhasha Kautilya**, a commentary on **Arthashastra** and **Kokash Nisam** are the two great works.
- Rama Panikkar** and **Ramanujan Ezhuthachan** are the well-known authors of the Malayalam literature.

## TAMIL

- Tamil** is the mother-tongue of the Dravidian family.
- The Sangam literature is a collection of long and short poems composed by various poets in praise of numerous heroes and heroines.

## PERSIAN AND URDU

- Urdu** as a language was born out of the interaction between **Hindi** and **Persian**.
- The earliest Urdu poet is supposed to be **Khusro**.
- Urdu has given a new form of poetry called **nazm**.

## HINDI

- Hindi** is the direct descendant of the **Sanskrit** language through **Prakrit** and **Apabhramsha**.
- The evolution of Hindi literature can be better understood through four stages: **Adi Kal**, **Bhakti Kal**, **Riti Kavya Kal** and **Adhunik Kal**.

## LANGUAGES IN THE 8TH SCHEDULE

- |              |              |
|--------------|--------------|
| 1. Assamese  | 13. Punjabi  |
| 2. Bengali   | 14. Sanskrit |
| 3. Gujarati  | 15. Sindi    |
| 4. Hindi     | 16. Tamil    |
| 5. Kannada   | 17. Telugu   |
| 6. Kashmiri  | 18. Urdu     |
| 7. Konkani   | 19. Bodo     |
| 8. Malayalam | 20. Santhali |
| 9. Manipuri  | 21. Maithili |
| 10. Marathi  | 22. Dogri    |
| 11. Nepali   |              |
| 12. Oriya    |              |

## LITERATURE OF INDIA

- Indian literature is one of the oldest languages in the world. India has 22 officially recognised languages and a huge body of literature is produced in each of these languages.
- In Indian literature, oral and written forms are both important and Hindu literary traditions dominate a large part of early literature.

## SANSKRIT LITERATURE

- The old Indo-Aryan language, Sanskrit is the classical literary language of Hinduism.
- Sanskrit literature traces its roots back to the Vedic period.
- The earliest forms of theatrical arts could have existed in the form of dance dramas evidenced by iconography from the Indus Valley Civilisation.
- This form of theatre died a natural death along with the Indus Valley Civilisation and was later replaced by the dramatic forms of the Vedic Age.
- Many dramatists based their works around the plot of Ramayana and Mahabharata.
- Kalidas is a pioneer of Sanskrit literature—Shakuntala and Meghdutum are his famous plays.
- Other playwrights like Sudraka wrote Mricchakatika; Bhasa composed Svapna Vasavadattam; Chanakya wrote Arthashastra and Vatsyayana wrote Kamasutra. These are also the landmarks of Sanskrit. The most well-known Sanskrit dramatists are Sudraka, Bhasa, Asvaghosha and Kalidasa.

## HINDI LITERATURE

- Hindi literature is broadly divided into four prominent forms or styles, being Bhakti (devotional—Kabir, Raskhan); Shringar (beauty—Keshav, Bihari); Veer-Gatha (extolling brave warriors); and Adhunik (modern).
- It contains literature in all Hindi languages, including its dialects like: Brij Bhasha, Bundeli, Awadhi, Kannauji, Marwari, Maithili, Magahi, Bhojpuri and Bihari languages and Khari boli (Modern Standard

Hindi) in Devnagari script, the dialect which is one of India's official languages.

## TAMIL LITERATURE

- The history of Tamil literature dates back to the pre-Christian era.
- Sangam literature comprises some of the oldest extant Tamil literature, and deals with love, war, governance, trade and bereavement.
- Unfortunately, much of the Tamil literature belonging to the Sangam period had been lost.
- After the eighth century AD, Jain scholars translated some Sanskrit works into Tamil while certain other works were based on Sanskrit.
- It was then that some scholars realised that both Tamil and Sanskrit scholars function as two distinct groups within a single cultural milieu.
- They attempted to bring them together by innovating a new style of hybrid writing called manipravala, where equal amount of Sanskrit and Tamil words were used like pearl and coral.

## KANNADA LITERATURE

- Kannada literature is the body of literature of Kannada, a Dravidian language spoken mainly in the Indian state of Karnataka and written in the Kannada script.
- The literature, which has a continuous tradition from the 9th century AD to the present, is usually divided into three linguistic phases: Old (850–1200 AD), Middle (1200–1700 AD) and Modern (1700–present).
- Its literary characteristics are categorised as Jain, Veerashaiva and Vaishnavayana symbolising the three dominant faiths that both gave form to and fostered it until the advent of the modern era. Although much of the literature before 1700 was religious, some secular works were also created.

## URDU LITERATURE

- Urdu literature has a long and colourful history that is inextricably tied to the development of that very language, Urdu, in which it is written.

- While it tends to be heavily dominated by poetry, the range of expression achieved in the voluminous library of a few major verse forms, especially the ghazal and nazm, has led to its continued development and expansion into other styles of writing, including that of the short story, or afsana.
- It is most popular today in the countries of India and Pakistan and is finding interest in foreign countries, primarily through South Asians.

## PUNJABI LITERATURE

- Punjabi is an ancient language, but started its literary career pretty late.
- During medieval times, Punjab repeatedly bore the brunt of Afghan invaders and internal battles, and these warring times were not exactly feasible for any sort of literary or cultural expansion.
- Punjabi literature as such came into existence only from the end of the 16th century when Punjabi was already in its Middle Period.
- The script is Gurmukhi, which is based on Devanagri.
- Some of the early writings, such as those of the first Sikh Guru, Nanak (late 15th and early 16th centuries), are in Old Hindi rather than true Punjabi.
- The first work identifiable as Punjabi is the Janam-sakhi, a 16th-century biography of Guru Nanak.

## BENGALI LITERATURE

- Bengali literary heritage originates from and is neatly intertwined with the classical Indo-Aryan Sanskrit language and literature.
- But the influence of other non-Aryan languages on Bengali cannot be ignored.
- It is now more or less accepted that Bengali and languages of the neighbouring states belong to the Austric (or Austro-Asiatic) family of languages.
- Whilst Bengali carries the distinct mark of the Indo-Aryan social and cultural values, expressions or syntactic and grammatical constraints, according to Professor Sunitikumar Chatterjee, there is, of course, the preserve of Kol and Dravidian

(the Santals, the Malers, the Oraons) in the western fringes of the Bengal area, and of the Boda and Mon-Khmer speakers in the northern and eastern frontiers.

### MALAYALAM LITERATURE

- Malayalam is a language of the Dravidian family.
- It is very close to Tamil, one of the major languages of the same family.
- This was due to the extensive cultural synthesis that took place between the speakers of the two languages.
- Tamil, in Kerala was, for long, the language of administration.
- This has resulted in Tamil being used in literature too. In addition, Malayalam was influenced by Sanskrit also.
- Malayalam absorbed a lot from Sanskrit, not only in the lexical level, but also in the phonemic, morphemic and grammatical levels of language.
- Looking back, we see that early Malayalam literature consists of three streams, namely Folk Literature, Early Tamil Literature and Manipravalam Literature.

### MARATHI LITERATURE

- Marathi can be traced back far beyond the 10th century.
- It descends from Sanskrit through Pali, Maharashtri and Maharashtra-Apabhramsa. Marathi literature first made its appearance in the 10th century AD and can be grouped into two ages: Ancient or Old Marathi Literature (1000–1800) and Modern Marathi Literature (1800 onwards).
- The former consisted mainly of poetry composed in metres and restricted to the poet's choice of words and rhythms.
- It was particularly devotional, narrative and pessimistic for old Marathi poets had not been able to develop satire, parody, irony and humor into their poetry.

### GUJARATI LITERATURE

- Gujarati is an Indian language spoken in the state of Gujarat.
- Gujarati literature may be traced to the sultanate days.

- Literature flourished during the period. Well-known literatures during that period were Akho, Vallabh, and Shamal.
- The poet Dalpatram is considered to be the father of modern Gujarati literature.

### ORIYA LITERATURE

- Oriya is an official language of the state of Orissa, India, a region known at different stages of history as Kalinga, Udra, Utkala, or Koshala.
- The earliest written texts in the language are about thousand years old.
- Orissa was a vast empire in the ancient and medieval times, which extended from the Ganges in the north to the Godavari in the south.
- Oriya is classified as a member of the Indo-Aryan language superfamily; it is a descendent of Odri Prakrit and Ardha Magadhi.
- This form of Prakrit was, in turn, derived from Sanskrit via the transitional Bibhasas.

### SINDHI LITERATURE

- Sindhi language is ancient and rich in literature.
- Its writers have contributed extensively in various forms of literature both in poetry and prose.
- Sindhi literature is very rich and oldest literature in the world's literatures.

### TELUGU LITERATURE

- Telugu literature is the literature of the Telugu people, an ethnic group based in southern India.
- Telugu literature prior to Nannayya Bhattacharaku's Andhra Mahabharatamu was not preserved, except by royal grants and decrees.
- It was almost the end of the eleventh century by the time the original Telugu literature came to exist. So, Nannayya is known as Aadi Kavi (the first poet).

### ASSAMESE LITERATURE

- Assam has an unbroken heritage of written literature starting from at least the 13th century.

- The earliest known patronage of such efforts had come from the Kamata royal court since two of the earliest Assamese poets Harivara Vipra and Hema Saraswati wrote benedictory verses in praise of the Kamata King Durlabh Narayan.
- Great Sanskrit scholars, Sankaradeva and Madhavadeva took Assamese language and literature to unprecedented heights of artistic excellence.
- What is more, the high spiritual and artistic ideals combined with a wholesome sense of direction, held aloft first by Sankaradeva and then by Madhavadeva, inspired a whole lot of creative writers, both during their lifetimes and after.
- As a result, Assamese Vaishnavite literature is exceptionally rich in volume, range and flavour. Literature of Shakta affiliation as well as works on various secular subjects also equally developed through the centuries.

## INDIAN WRITING IN ENGLISH

- Indian English Literature (IEL) refers to the body of work by writers in India who write in the English language and whose native or co-native language could be one of the numerous languages of India.
- It is also associated with the works of members of the Indian diaspora, especially people like Salman Rushdie, who was born in India. It is frequently referred to as Indo-Anglian literature.
- As a category, this production comes under the broader realm of postcolonial literature—the production from previously colonised countries, such as India.

## INDIAN ARCHITECTURE

### INDUS VALLEY CIVILISATION

- India's cultural history dates back to about 3200 BC to the times of the Indus Valley Civilisation or what is also called the Harappan Culture.
- It flourished for about a thousand years.
- This civilisation came to light in 1922 while archaeologists were carrying on excavations at Mohenjodaro and Harappa, now in

Pakistan. Since then, many other Harappan sites and artifacts, such as seals, toys, weapons, sculptures and jewellery have been discovered along the river Indus up to the river Ganges in the East.

- Archaeologists believe that a number of communities lived here in villages, towns and sea-ports.
- The sea-port of Lothal on the Gulf of Cambay has an enclosed shipping dock more than 216 metres long and 37 metres wide.
- It was controlled by a sluice-gate and ships could be loaded at both high and low tides.
- Other buildings unearthed in the citadel are the Great Bath, Granaries, residential houses and the Assembly Hall.

### THE MAURYAN PERIOD

- In Mauryan period, most of the shapes and decorative forms employed were indigenous in origin; some exotic forms show the influence of Greek, Persian and Egyptian cultures.
- The famous city of Pataliputra was described in detail by Megasthenes, references of which are found in the writings of Strabo, Arian and other Greek writers.
- It stretched along the river Ganga. It was enclosed by a wooden wall and had 64 gates. Excavations have brought to light remains of palaces and the wooden palisade.
- The Mauryan wooden palace survived for about 700 years because at the end of the 4th century AD, when Fa Hien saw, it was astounding.
- The palace and also the wooden palisade seem to have been destroyed by fire. The burnt wooden structure and ashes have been found from Kumrahar.
- Seven rock-cut caves in the Barabar and Nagarjuni hills show that the tradition of rock-cut caves in India began with the Mauryas.
- These caves were caused to be excavated by Ashoka and his grandson Dasaratha for the abode of Ajivika monks.
- The most extraordinary object of Mauryan period was monolithic stone pillars of up to 15 m height with a capital.

- The pillars comprised two parts a shaft tapering from the base with a diameter from about 90 cm to 125 cm.
- These pillars had a capital at the top which was adorned with animal figurines.
- The main animal figurines were lions, horses, bulls and elephants.
- The pillars and the capitals were made of sandstone near Chunar in Mirzapur district.
- They were all polished which gave them a shine.
- Some Yaksha and Yakshini figures have been found from Mathura, Pawaya and Patna.
- They are large-sized statues representing folk art of the period.

### THE STUPAS

- In the period between the Mauryas and the Guptas, the older stupas were greatly enlarged and beautified.
- The Bharhut Stupa, perhaps in its present form dating from the middle of the 2nd century BC, is important for its sculpture, as the stupa itself has now vanished.
- In the days of the Mauryan emperor, Ashoka, a brick stupa measuring about 68 feet in diameter and covered with plaster was constructed at Bharhut.
- During the reign of the Sungas, who were in power in the second century BC and reigned till the year 72 BC, a richly decorated stone railing, 88 feet in diameter, was added to enclose the mound.
- The representation of Buddha in human as well as in symbolic form is an important feature of Bharhut art.
- The Sanchi stupa is, of course, famous. Sanchi is unique in having the most perfect and well-preserved stupas, and Buddhist art and architecture pertaining to a period of about thirteen hundred years, from the third century BC to the twelfth century AD—almost covering the whole range of Buddhism.
- The foundation of the great religious establishment of Sanchi was probably laid by Ashoka (c. 273–236 BC), when he built a stupa and erected a monolithic pillar here. It was enlarged to twice its original size, becoming a hemisphere of about 120 feet in diameter, in the 2nd century BC, under the Sungas.

- It was then faced with well-cut masonry laid in regular courses, and an upper terraced path was added. The old wooden railings were replaced by stone ones, tenoned and mortised in imitation of carpentry.
- Towards the end of the first century BC, under the Satavahanas, four gateways (torana) were added at the four cardinal points. The gateways are remarkable for their carved ornamentation.
- The Amaravati stupa, which is in its final form, was completed around 200 AD, had carved panels telling the story of the life of the Buddha.
- The sculpture, beautiful and idealistically treated, showed for the first time, Buddha as a divinity, receiving worship.
- The stupa must have covered about 600 sq. m.

## THE SCHOOLS OF ART

### GANDHARA SCHOOL OF ART

(50 BC TO 500 AD)

- It is the region extending from Punjab to the borders of Afghanistan.
- It was an important centre of Mahayana Buddhism up to the 5th century AD.
- It imbibed all kinds of foreign influences, like Persian, Greek, Roman, Saka and Kushan.
- During the reign of Kanishka this art received great patronage.
- It was also known as the Graeco-Buddhist School of Art since Greek techniques of Art were applied to Buddhist subjects.
- The most important contribution—evolution of beautiful images of the Buddha and Bodhisattvas, which were executed in blackstone and modelled on identical characters of Graeco-Roman pantheon.
- ‘Gandhara artist had the hand of a Greek but the heart of an Indian.’
- The most characteristic trait—depiction of Lord Buddha in the standing or seated positions.
- Typical feature-rich carving, elaborate ornamentation and complex symbolism.
- Tallest rock-cut statue of Lord Buddha-Bamiyan (Afghanistan) 3–4 century AD.

## MATHURA SCHOOL OF ART (50 BC TO 500 AD)

- The School was established at the holy city of Mathura between 1 and 3 AD.
- Buddha's first image can be traced to Kanishka's reign (about 78 AD.).
- They strongly built-right hand raised in protection and left hand on the waist.
- The figures do not have moustaches and beards as in the Gandhara Art.
- It not only produced beautiful images of the Buddha but also of the Jain Tirthankaras and gods and goddesses of the Hindu pantheon.
- Guptas adopted, further improvised and perfected Mathura School of Art. Observed at-Sarnath, Sravasti and even as far as Rajgir in Bihar.

## AMRAVATI SCHOOL OF ART (200 BC TO 200AD)

- The school was established on the banks of the Krishna River in modern Andhra Pradesh.
- Largest Buddhist stupa of South India.
- Construction began in 200 BC and was completed in 200 AD.
- Stupendous stupa could not withstand the ravages of time.
- Its ruins are preserved in the London Museum.

## TEMPLE ARCHITECTURE OF INDIA

### NAGARA STYLE—NORTH INDIA

- Nagara temples have two distinct features:
- In plan, the temple is a square with a number of graduated projections in the middle of each side giving a cruciform shape with a number of re-entrant angles on each side.
  - In elevation, a Sikhara, i.e., tower gradually inclines inwards in a convex curve.

### PRATIHARAS—UJJAIN (8TH TO 9TH CENTURIES AD)

- Mahakaleshwar temple is known as one of the 12 Jyotirlingas of India.
- Kal Bhairava temple, finds a mention in the Skanda Purana, and Mangalnath temple, regarded as the birthplace of Mars, according to the Matsya Purana.

## PALAS—BENGAL AND BIHAR (8TH TO 13TH CENTURIES AD)

- The Pala Empire was a Buddhist dynasty in the control of Bengal from the 8th to the 12th century.
- Nalanda was its most active centre, whose influence was spread to Nepal, Myanmar and even Indonesia.
- During the Pala-period, a number of monasteries and religious sites that had been founded in earlier periods grew into prominence.
- The large cruciform stupa at Paharpur (ancient Somapura) in Bengal (now Bangladesh), for example, measures more than one hundred meters from North to South.
- It was built around the late eighth or early ninth century.
- The walls of the courtyard contain 177 individual cells that served as shrines.

### CHANDELAS—BUNDELKHAND (10TH-11TH CENTURY AD)

- Khajuraho justly famous for its graceful contours and to erotic sculptures.
- These 22 temples (out of the original 85) are regarded as one of the world's greatest artistic wonders.
- Khajuraho Temples were built within a short period of hundred years from 950 to 1050 AD.
- Kendriya Mahadev temple is the largest and most beautiful of the Khajuraho Temples.
- Shiva Temple at Visvanath and Vishnu Temple at Chaturbhuj are other important temples at Khajuraho.

### DRAVIDIAN STYLE—SOUTH INDIA

- Dravidian style temples consist almost invariably of the four following parts:
- The principal part, the temple itself, is called the Vimana (or Vimanam). It is always square in plan and surmounted by a pyramidal roof of one or more stories. It contains the cell where the image of the god is placed.
  - The porches or Mandapas, which always cover and precede the door leading to the cell.

- Gate-pyramids or Gopurams, which are the principal features in the quadrangular enclosures that surround the more notable temples.
- Pillared halls or Chaultris—properly Chawadis—used for various purposes, and which are the invariable accompaniments of these temples.

### VESARA STYLE—DECCAN

- Vesara is a combination of NAGARA & DRAVIDIAN temple styles.
- Hoysala temples at Belur, Halebidu and Somnathpura are supreme examples of this style.

## CAVE ARCHITECTURE OF INDIA

### AJANTA CAVES (2<sup>ND</sup> CENTURY BC TO 7<sup>TH</sup> CENTURY AD)

- The Ajanta caves depict the story of Buddhism, spanning the period from 200 BC to 650 AD.
- The caves at Ajanta served as secluded retreats to the Buddhist monks.
- Beautiful wall frescos and sculptures speak volumes of the advancement of Indian art in the ancient period.
- Some of the caves at Ajanta house panels depicting stories from the Jatakas, stories about several incarnations of the Buddha.
- Cave number one contains wall frescos that include two great Bodhisattvas, Padmapani and Avalokiteshvara. Other wonderful paintings in Ajanta are the flying apsara, dying princess and Buddha in preaching mode.

### ELLORA CAVES (5<sup>TH</sup>-13<sup>TH</sup> CENTURY AD)

- At Ellora, the caves are 34 in number.
- The Ellora caves are carved into the sides of a basaltic hill.
- The caves at Ellora contain some of the finest specimens of cave-temple architecture and exquisitely adorned interiors.
- Structures in the Ellora caves represent the three faiths of Hinduism, Buddhism and Jainism and were carved during 350 AD to 700 AD.

- The nobility, serenity and grace of Buddha are visible in the Buddhist caves of Ellora.
- Ellora caves also contain images of Vishwakarma, the patron saint of Indian craftsmen.
- The Kailasha temple in Cave 16 is indeed an architectural wonder, the entire structure having been carved out of a monolith.

### BHIMBETAKA CAVES

- Bhimbetaka caves are located in the Raisen District, Madhya Pradesh.
- It was discovered in 1958 by V.S. Wakanker.
- It is the biggest prehistoric art depository in India.
- Atop the hill, a large number of rock-shelters have been discovered, of which more than 130 contain paintings.
- Excavations revealed history of continuous habitation from early stone age (about 10,000 years) to the end of stone age (c. 10,000 to 2,000 years).

### ELEPHANTA CAVES

- During 6th century, Shiva temple in the Elephanta caves is one of the most exquisitely carved temples in India.
- Central attraction here is a twenty-feet high bust of the deity in three-headed form.
- The Maheshamurti is built deep into a recess and looms up from the darkness to fill the full height of the cave.
- Aghori is the aggressive form of Shiva where he is intent on destruction.
- Mahayogi posture symbolises the meditative aspect of the God.
- Ardhanarishvara depicts Lord Shiva as half-man/half-woman signifying the essential unity of the sexes.

### MAHAKALI CAVES

- Rock-cut Buddhist caves situated in Udayagiri hills, Mumbai.
- They were excavated during 200 BC to 600 AD and are now in ruins.
- These comprise of 4 caves on the southeastern face and 15 caves on the northwestern face.
- Cave 9 is the chief cave and is the oldest and consists of a stupa and figures of Lord Buddha.

## JOGESHWAR AND KANHERI CAVES

- The second largest known cave after the Kailasa cave in Ellora.
- It was excavated between the 1st and 2nd centuries AD.
- Kanheri is a 109-cave complex located near Borivili National Park in Mumbai.
- The Kanheri caves contain illustrations from Hinayana and Mahayana Buddhism and show carvings dating back to 200 BC.

## KARLA AND BHAJA CAVES

- Karla and Bhaja caves are situated about 50–60 kms away from Pune.
- These are rock-cut Buddhist caves dating back to the 1st and 2nd centuries BC.
- These consist of several viharas and chaityas.

## RAJPUT ARCHITECTURE

- Rajput palaces—built as inner citadels surrounded by the city and enclosed by a fortified wall as at Chittorgarh and Jaisalmer.
- Man Mandir, the largest palace in Gwalior, was built by Raja Man Singh Tomar (1486–1516).
- Some forts, such as those at Bharatpur and Deeg, were protected by wide ditch filled with water surrounding the fort.
- Palaces of Jaisalmer, Bikaner, Jodhpur, Udaipur and Kota represent the maturity of the Rajput style.
- City of Bikaner is encircled by 5.63-km-long stone wall in rich pink sandstone. There are five gates and three sally ports.
- Jodhpur Fort dominates the city, which is surrounded by a huge wall with 101 bastions, nearly 9.5 km long.
- Meherangarh fort stands on a cliff with a sheer drop of over 36 metres.
- Built by Jai Singh, Jaipur represents a fusion of Eastern and Western ideas of town planning.
- In Jaipur Hawa Mahal, or Palace of Winds (1799) has a five-storeyed symmetrical facade composed of 953 small casements in a huge curve each with a projecting balcony and crowning arch.
- Jantar Mantar, the largest of five observatories built by Jai Singh II in the

early 18th century, others being Ujjain, Mathura, Varanasi and New Delhi.

## DELHI STYLE OF ARCHITECTURE

- The Delhi or the Imperial Style of Indo-Islamic architecture flourished between 1191 and 1557 AD and covered Muslim dynasties, viz., Slave (1191–1290), Khilji (1290–1320), Tughlaq (1320–1414), Sayyid (1414–1444) and Lodi (1451–1556).
- The earliest construction work was begun by Qutubuddin Aibak, who started erecting monumental buildings of stone on Qila Rai Pithora, the first of the seven historical cities of Delhi associated with Prithviraj Chauhan.
- The Qutub Mosque (1192 AD) is one such building, whose arcaded aisles were composed of pillars carved in the Hindu style. Named as the Quwwat-ul-Islam Masjid, it is considered as the earliest mosque in India.
- Qutub-ud-din Aibak also started the construction of Qutub Minar in 1192 (which was eventually completed by Iltutmish in 1230). The Qutub Minar, built to commemorate the entry of Islam, was essentially a victory tower, decorated with several calligraphic inscriptions.
- Adhai-din-ka-Jhopra was located beyond the Ajmer dargah in Rajasthan. It was constructed in 1153 AD and converted into a mosque in 1198 AD.
- Allauddin Khilji established the second city of Delhi at Siri, built the Alai Darwaza near the Qutub Minar and dug a vast reservoir at Hauz Khas around 1311 AD.
- Ghiyasuddin Tughlaq (1320–1325 AD) built Tughlaqabad, the third city of Delhi. Tomb of Ghiyasuddin Tughlaq, built of red sandstone, is an irregular pentagon in its exterior plan and its design is of the pointed or 'Tartar' shape and is crowned by a finial resembling the kalasa and amla of a Hindu temple.
- Delhi's fourth city Jahanpanah was built by Mohammad-bin-Tughlaq in mid-14th century. Firoz Shah Kotla ground is the only remnant of its past glory. He is also

credited with founding the fortified cities of Jaunpur, Fatehabad and Hissar.

- Kali Masjid, Khirki Masjid and Kalan Masjid also belong to this period, the last two being raised on a tahkhana or sub-structure of arches.
- The Tombs of Mubarak Sayyid (d. 1434 AD), Muhammad Sayyid (d. 1444 AD) and Sikander Lodi (d. 1517 AD) are all of the octagonal type.
- The square tombs are represented by such monuments as the Bara Khan Ka Gumbad, Chhota Khan Ka Gumbad, Bara Gumbad (1494 AD), Shish Gumbad, Dadi Ka Gumbad and the Poli ka Gumbad.
- The Tomb of Isa Khan (1547 AD), the Tomb of Adham Khan (1561 AD), Moth ki Masjid (c. 1505 AD), Jamala Masjid (1536 AD) and the Qila-i-Kuhna Masjid (c. 1550 AD) belong to the final phase of the Delhi style of architecture.

## PROVINCIAL STYLE OF ARCHITECTURE

### JAUNPUR

- Under the Sharqi dynasty, Jaunpur became a great centre of art, culture and architectural activity.
- During the rule of Shamsuddin Ibrahim (1402–1436 AD), Atala Masjid was built in 1378.

### GUJARAT

- Gujarat witnessed significant architectural activity for over 250 years starting from Muzaffar Shah's declaration of independence from Delhi and the formation of the Sultanate of Gujarat in 1307 AD until the conquest of Gujarat by the Mughal Emperor Akbar in 1500 AD.
- Ahmedabad is a city full of architectural masterpieces which include Sayyid Alam's Mosque (1412), Teen Darwaza (1415), Tomb of Ahmed Shah (1440), Rani-ka-Hujra (1440), the Jami Masjid (built by the city's founder Sultan Ahmed Shah in 1423), Qutubuddin's Mosque (1454), Rani Sipri Mosque (1505), Sidi Bashir's Mosque

(1510), which is famous for its 'shaking minarets', Rani Rupmati Masjid at Mirzapur (built between 1430 and 1440) and the Kankaria Lake, constructed in 1451 by Sultan Qutub-ud-Din.

### DECCAN

- Earliest period of architectural development started in 1347 when Allauddin Bahman Shah constructed the Gulbarga Fort and the Jami Masjid at Gulbarga.
- The second phase is represented by the architecture of Bidar initiated by Ahmed Shah (1422–1436), which includes the Bidar Fort, Mahmud Gawan's Madrassa and the Ali Barid's Tomb.

### HYDERABAD

- Qutub Shahi and Nizam Shahi dynasties contributed greatly towards the development of the Deccan style of architecture.
- Charminar (1591) was built by Mohammed Quli Qutb Shah.
- Mecca Masjid: Started in 1614 by Abdulla Shah and completed in 1687 by Aurangzeb.
- Golconda Fort (1525):** By Mohammed Quli Qutub Shah, was an impregnable fort of great strategic importance to most of the rulers.
- Falaknuma Palace (1870):** By Nawab Vikar-Ul-Ulmarai, is a rare blend of Italian and Tudor architecture.

### BIJAPUR

- Gol Gumbaz built by Mohammad Adil Shah, which is the largest masonry dome in the world.

### KASHMIR

- In Kashmir architecture, we find the use of woodwork.
- Log construction using deodar trees for the construction of wooden bridges called kadals or the wooden shrines called ziarats.
- Mosque of Shah Hamdan in Srinagar and the Jami Masjid at Srinagar built by Sikandar Butshikan (1400 AD)—examples of the wooden architecture.
- Fort of Hari Parbat, the Pattar Masjid (1623) and the Akhun Mulla Shah's Mosque

(1649) are illustrations of the art of stone building in Kashmir.

## MUGHAL STYLE OF ARCHITECTURE

### BABUR

- Babur built buildings at Dholpur, Gwalior, Sikri, etc. and mosques at Kabuli Bazar of Panipat, Sambhal and Agra.
- Mosque at Kabuli Bagh of Panipat and Jami Masjid at Sambhal near Delhi, both constructed in 1526, are the surviving monuments of Babur.

### HUMAYUN AND SHERSHAH

- Humayun built mosques at Fatehabad in Hissar. Sher Shah built monuments, inns, miners and educational centres. His Purana Quila is a unique blend of Hindu, Jain, Buddhist and Muslim School of Art.
- Persian influence:** Result of Humayun's observance at the court of Shah Tahmasp during the period of his exile.
- Humayun's Tomb at Delhi (1564):** By his widow Haji Begum as a mark of devotion, eight years after his death.

### Cultural Heritage

Site	State
Mahabodhi Temple	Bihar
Red Fort	Delhi
Qutub Minar	Delhi
Humayun's Tomb	Delhi
Champaner Acheological Park	Gujarat
Churches of Old Goa	Goa
Jantar Mantar	Jaipur
Hampi	Karnataka
Pattadakal	Karnataka
Ajanta Caves	Maharashtra
Ellora Caves	Maharashtra
Sanchi Stupa	Madhya Pradesh
Khajuraho	Madhya Pradesh
Rock Shelters of Bhimbetka	Madhya Pradesh
Elephanta Caves	Maharashtra

### Site

### State

Konark Sun Temple	Odisha
Mahabalipuram	Tamil Nadu
Chola Temples	Tamil Nadu
Agra Fort	Uttar Pradesh
Taj Mahal	Uttar Pradesh

### AKBAR

- Akbar's time saw a further improvement. A fusion of Indo-Persian style was seen in Humayun's Tomb.
- In Agra Fort, importance was given to Gujarat and Bengal Architectural School.
- Fatehpur Sikri, the greatest creation of Akbar houses Diwan-i-Khas, Diwan-i-Am, Panch Mahal, Jodhabai's Palace, Birbal's Palace, Buland Darwaja and the Tomb of Salim Chisti outside the enclosure.
- Massive sandstone ramparts of the Red Fort, New Delhi.

### JEHANGIR

- Jehangir devoted more time to miniature painting and his architectural contributions are poorer than that of Akbar.
- Itimad-ud-Daula's tomb at Agra was made by him.
- Shalimar Bagh on the banks of Lake Dal in Kashmir was built by Jehangir.
- Akbar's Tomb at Sikandra near Agra, was completed in 1613.
- Jehangir's Tomb at Shadera near Lahore, was built by his wife Nur Mahal.

### SHAHJAHAN

- The Mughal architecture in Shahjahan's time reached its final glory. Shahjahan replaced Akbar's red stone structures in Agra and Lahore and rebuilt them in white marble. His additions were seen in Diwan-i-Khas, Diwan-i-Am, Seesh Mahal, Musamman Burj and Moti Masjid.
- The Red Fort built of red sandstone and marble has exquisite and vast gateways, Diwan-i-Am and Diwan-i-Khas. In the Diwan-i-Khas, where the emperor gave audience to the royal princess, nobles and other dignitaries had the gem studded Peacock Throne placed.

- Jama Masjid at Delhi was one of the most elegant buildings of his time. Shahjahan has immortalized his name by building the Taj Mahal in the memory of his beloved queen Mumtaz Mahal. Aurangzeb, a staunch Sunni Muslim was averse to art and culture. His period was marked by decline in art and architecture.

### AURANGZEB

- Bibi-ka-Maqbara, tomb of Aurangzeb's wife Begum Rabia Durani, a poor replica of the famous Taj Mahal.
- A fine example of Mughal architecture in the Deccan region.

## POST-MUGHAL STYLE OF ARCHITECTURE

### AVADH (OUDH) STYLE

- Safdarjung's tomb was built in honour of Safdarjung (1739–1753), who was the nephew of the first Nawab of Oudh.
- Bara Imambara was built by the Nawab in 1784. Absence of pillars in the main hall and simplicity of style and symmetry are its unique features.
- Kaiser Bagh is a quadrangular park with a baradari (pavilion) and yellow-coloured buildings on three sides.

### PUNJAB STYLE

- It was developed under the influence of the Mughal style.
- It is characterised by certain indigenous features like the multiplicity of chattris/kiosks, use of fluted dome generally covered with copper or brass-gilt and enrichment of arches by numerous foliations.
- Golden Temple at Amritsar (1764) built by the fourth Sikh Guru Ramdas.

## COLONIAL ARCHITECTURE

### PORTUGUESE

- Portuguese adapted to India the climatically appropriate Iberian galleried patio house and the Baroque churches of Goa.

- Se Cathedral and Arch of Conception of Goa were built in the typical Portuguese-Gothic style.
- St. Francis Church at Cochin (1510) is believed to be the first church built by the Europeans in India.
- Fort of Castella de Aguanda near Mumbai and added fortifications to the Bassein Fort built by Bahadur Shah, the Sultan of Gujarat, in 1532 AD.
- Bassein Fort is famous for the Matriz (Cathedral of St. Joseph), the Corinthian pillared hall and the Porte da Mer (sea gate).

### FRENCH

- French gave a distinct urban design to its settlement in Pondicherry by applying the Cartesian grid plans and classical architectural patterns.
- Church of Sacred Heart of Jesus (Eglise De Sacre Coeur De Jesus), Eglise de Notre Dame de Angesand, Eglise de Notre Dame de Lourdes at Pondicherry have a distinct French influence.

### BRITISH

- British followed various architectural styles—Gothic, Imperial, Christian, English Renaissance and Victorian being the essentials.
- Church of St. John at Calcutta (1787) inspired by St. Stephens Church at Walbrooks.
- St. Mary's Church in Fort St. George in Chennai.
- Law Courts, Presidency College and Senate House of Chennai.
- Victoria Memorial Hall, Calcutta (1921), designed by Sir William Emerson.
- Gateway of India in Mumbai, Maharaja's Palace at Mysore and M.S. University and Lakshmi Villas Palace at Baroda.
- New Delhi—systematically planned city after being made capital in 1911.
- Sir Edward Lutyens made responsible for the overall plan of Delhi and constructed India Gate and Rashtrapati Bhawan.
- Herbert Baker added South Block and North Block, which flank the Rashtrapati Bhawan.

- Englishman called Robert Tor Tussell built the Connaught Place.

## PAINTINGS OF INDIA

### WALL PAINTINGS OF INDIA

Painting expresses human thoughts and feelings through the media of line and colour.

### METHODS OF PAINTING

#### *True Fresco Method*

The paintings are done when the surface wall is still wet so that the pigments go deep inside the wall surface.

#### *Tempora or Fresco-Secco*

Method of painting on the lime-plastered surface which has been allowed to dry first and then drenched with fresh lime water.

### CAVE PAINTING

- **Cave** paintings of India date back to the prehistoric times.
- The finest examples of these paintings comprise of the murals of Ajanta, Ellora, Bagh, Sittanavasal, etc., which reflect an emphasis on naturalism.
- Ancient cave paintings of India serve as a window to our ancestors, who used to inhabit these caves.

### MINIATURE PAINTINGS

- Miniature paintings are beautiful handmade paintings, which are quite colourful but small in size.
- The highlight of these paintings is the intricate and delicate brushwork, which lends them a unique identity.

### MUGHAL PAINTING

- Mughal painting reflects an exclusive combination of Indian, Persian and Islamic styles.
- As the name suggests, these paintings evolved as well as developed during the rule of Mughal Emperors in India, between 16th century and 19th century.

### MADHUBANI PAINTING

- Madhubani painting originated in a small village, known as Maithili, of the Bihar state of India.
- Initially, the womenfolk of the village drew the paintings on the walls of their home, as an illustration of their thoughts, hopes and dreams.
- With time, the paintings started becoming a part of festivities and special events, like marriage.

### RAJPUT PAINTING

- Rajput painting originated in the royal states of Rajasthan, somewhere around the late 16th and early 17th century.
- The Mughals ruled almost all the princely states of Rajasthan at that time and because of this, most of the schools of Rajput Painting in India reflect strong Mughal influence.

### PAHARI PAINTING

- Pahari painting is the name given to Rajput paintings, made in the Himachal Pradesh and Jammu & Kashmir states of India.
- These paintings developed as well as flourished during the period of 17th to 19th century. Indian Pahadi paintings have been done mostly in miniature forms.

### mysore painting

- Mysore painting is a form of classical South Indian painting, which evolved in the Mysore city of Karnataka.
- During that time, Mysore was under the reign of the Wodeyars and it was under their patronage that this school of painting reached its zenith.

### TANJORE PAINTING

- Tanjore painting is one of the most popular forms of classical South Indian painting.
- It is the native art form of Thanjavur (also known as Tanjore) city of Tamil Nadu.
- The dense composition, surface richness and vibrant colours of Indian Thanjavur paintings distinguish them from the other types of paintings.

### KANGRA PAINTING

- This style originated in Guler state, in the first half of the 18th century and reached its zenith during the reign of Maharaja Sansar Chand Katoch.

## CLASSICAL DANCE OF INDIA

### 1. BHARATNATYAM—TAMIL NADU

- The Bharatnatyam dance flourished in the Hindu temples of South India.
- The temple dancers (called Devadasis or servants of god) flourished under royal patronage and religious devotion.
- The Devadasi system became an integral part of South Indian temple ritual. Slowly and gradually, the Devadasi system went into disrepute due to economic and social conditions attached to it.
- In Bharatnatyam dance, one dancer takes on many roles in a single performance.
- As a solo dance, Bharatnatyam leans heavily on the abhinaya or mime aspect of dance—the nritya, where the dancer expresses the sahitya through movement and mime.
- Bharatnatyam performance ends with a tillana which has its origin in the tarana of Hindustani music.

### 2. KATHAK—UTTAR PRADESH

- Kathak is one of the most important classical dances of India.
- Kathak is said to be derived from the word ‘katha’, meaning ‘the art of storytelling’.
- The Kathak dance form originated in north India and was very similar to the Bharatnatyam dance form.
- In ancient India, there were Kathakars or bards who used to recite religious and mythological tales to the accompaniment music, mime and dance.
- It probably started as an oral tradition. Mime and gestures were perhaps added later on to make the recitation more effective.
- Vaishnavite cult which swept North India in the 15th century and the resultant bhakti movement contributed to a whole new range of lyrics and musical forms.

### 3. KUCHIPUDI—ANDHRA PRADESH

- Kuchipudi derives its name from the Kuchipudi village of Andhra Pradesh.
- Kuchipudi exhibits scenes from the Hindu Epics, legends and mythological tales through a combination of music, dance and acting.
- Like other classical dances, Kuchipudi also comprises pure dance, mime and histrionics but it is the use of speech that distinguishes Kuchipudi’s presentation as dance-drama.
- ‘At times, even though the dramatic situation did not demand, solo dancing was being presented to punctuate the presentation and to enhance the appeal. One such number is tarangam inspired by the Krishna-leela tarangini of Teerthanarayana Yogi.
- There are now two forms of Kuchipudi –the traditional musical dance-drama and the solo dance.

### 4. KATHAKALI—KERALA

- The word ‘Kathakali’ literally means ‘Story-Play’.
- Kathakali is known for its heavy, elaborate makeup and costumes.
- In fact, the colourful and fascinating costumes of Kathakali have become the most recognised icon of Kerala.
- Kathakali is considered as one of the most magnificent theatres of imagination and creativity. Kathakali dance presents themes derived from the Ramayana, the Mahabharata and other Hindu epics, mythologies and legends.
- Chakiarkoothu, Koodiyattam, Krishnattam and Ramanattam are few of the ritual-performing arts of Kerala, which have had a direct influence on Kathakali in its form and technique.
- The face of the artist is painted over to appear as though a mask is worn.

### 5. ODISSI—ODISHA

- Odissi is one of the famous classical Indian dances from the Odisha state.
- The state of Odisha has a great cultural history.
- The rulers of this region built magnificent temples, which became the centre of art and culture.

- It was around these temples that Odissi, one of India's scintillating dance-forms was born, nurtured and nourished.
- The maharis, who were originally temple dancers, came to be employed in royal courts, which resulted in the degeneration of the art form. Around this time, a class of boys called gotipuas were trained in the art. They danced in the temples and also for general entertainment. Many of today's gurus of this style belong to the gotipua tradition.
- Facial expressions, hand gestures and body movements are used to suggest a certain feeling, an emotion or one of the nine rasas.

## 6. SATTRIYA—ASSAM

- The Sattriya dance of Assam is a classical form of dance, which is highly devotional in character with the spiritual aspect being predominant.
- The word 'Sattriya' is derived from 'Sattra' which means 'monastery'. Since the dance developed and grew within the Satras, it is named after these religious institutions. Specifically, it emerges from a 500-year-old comprehensive theatre tradition nurtured in the Vaishnav Monasteries of Assam.
- There were two dance forms prevalent in Assam before the neo-Vaishnava movement, such as Ojapali and Devadasi with many classical elements.
- As far as Devadasi dance is concerned, resemblance of a good number of rhythmic syllables and dance postures along with footwork with Sattriya dance is a clear indication of the influence of the former on the latter.
- Sattriya dance tradition is governed by strictly laid-down principles in respect of hastamudras, footworks, aharyas, music, etc.

## 7. MANIPURI—MANIPUR

- Manipuri is one of the six major classical dances of India.
- Manipuri dance is indigenous to Manipur, the north-eastern state of India.
- The Manipuri dance style is inextricably woven into the life-pattern of Manipuri people.

- The most striking part of Manipur dance is its colorful decoration, lightness of dancing foot, delicacy of abhinaya (drama), lilting music and poetic charm.
- The Manipuri dance form is mostly ritualistic and draws heavily from the rich culture of the state of Manipur.
- Costumes used in the Manipur dance are colourful and the music carries a quaint charm.

## 8. MOHINIATTAM—KERALA

- Mohiniattam is a classical dance form of Kerala. Mohiniattam is derived from the words 'Mohini' (meaning 'a beautiful woman') and 'attam' (meaning 'dance').
- Thus, Mohiniattam dance form is a beautiful feminine style with surging flow of body movements.
- Mohiniattam dance in Kerala developed in the tradition of Devadasi system, which later grew and developed a classical status.
- Mohiniattam is a solo female dance (in a single costume), where musical melody and the rhythmical swaying of the dancer from side to side and the smooth and unbroken flow of the body movement is the striking feature.
- The Mohiniattam dance focusses mainly on feminine moods and emotions.

## Various Indian States' Dance Forms

State	Name of the dance
Andhra Pradesh	Kuchipudi, Kolattam, Dhimsa, Veeranatyam
Arunachal Pradesh	Bardo Chham
Assam	Bihu, Jumar, Bagurumba, Ali Ai Ligang
Bihar	Paika, Kajari, Bidesia, Jhijhian
Chhattisgarh	Panthi, Raut Nacha
Gujarat	Raas, Tippani, Padhar, Garba
Haryana	Dhamal, Daph, Phag, Ghoomar, Jhumar, Loor
Himachal Pradesh	Kinnauri Nati, Namgen

State	Name of the dance
Jharkhand	Karma
Jammu and Kashmir	Kud, Dumhal, Rouf, Bhand Pather, Bachha Nagma, Hafiza Dance, Bhand Jashan, Wuegi-Nachun
Karnataka	Yakshagna, Bayalata, Dollu Kunitha, Veeragaase dance
Kerala	Mohiniattam, Kathakali, Padayani
Madhya Pradesh	Tertali, Charkula, Jawara, Matki dance, Phulpati dance, Maanch, Gaur Maria, Grida
Maharashtra	Pavri Nach, Lavani, Dangi, Koli
Manipur	Thang Ta, Dhol Cholom
Mizoram	Cheraw Dance
Nagaland	Chang Lo or Sua Lua
Odisha	Ghumura, Chau, Goti Pua, Nacni, Odissi, Dhap, Dalkhai, Baag Naach
Punjab	Bhangra, Jhumar, Karthi, Kikkli, Malwai Giddha, Sammi, Jindua
Rajasthan	Ghoomar, Kalbelia, Bhavai, Chirami, Gair, Tera Tali
Sikkim	Singh Chaam
Tamil Nadu	Bharata Natyam, Devarattam, Kamandi, Kummi, Karagattam, Mayil Attam, Paampu attam, Oyilattam
Telangana	Perini Thandavam, Lambadi, Dappu, Tappeta Gullu, Burra Katha, Pagati Vesham
Tripura	Hojagiri
Uttar Pradesh	Charkula, Kathak, Karma, Dadra

State	Name of the dance
Uttarakhand	Barada Nati, Botiya, Cancheri, Chhapelia, Choliya, Jagars, Jhora, Romala
Goa	Dekhnni, Fugdi, Corridinho, Dashavatara
Meghalaya	Nongkrem, Shad Suk mynsiem, Behdienkhalm, Lahoo
West Bengal	Gambhira, Kalikapatadi, Nanci, Alkap, Domni

### Puppet Dances

Assam	Pudda Nach
Bihar	Yampuri
Karnataka	Gombeyatta
Kerala	Talpavakootu; Pava Kathakali
Maharashtra	Malasutri Bahuly
Odisha	Sakhi Kundhei; Kundeinachchha; Kathikundhei; Ravanchhaya
Rajasthan	Kathaputli
West Bengal	Putul Nachch

### Martial Dances

Kerala	Kalaripayattu; Parichakali
Manipur	Thag Ta
Odisha	Pika
Punjab	Gatka
Sikkim	Pang Lhabosol
Uttarakhand	Choliya

## LIST OF INDIAN MUSICAL INSTRUMENTS

### WIND INSTRUMENTS

**Harmonium:** Harmonium usually belongs to the family of free-reed aerophones. The instrument is a small, tabletop size organ which

has bellows at the back that is pumped by one hand while the other hand plays the keyboard. **Shehnai:** Shehnai the wind instrument is believed to have been introduced in India by the Muslims. Shehnai is the predominant double-reed wind instrument used in North Indian music.

**Bansuri:** Bansuri is basically a folk instrument, invariably linked to the lives and playfulnesses of Krishna. However, it was during the Bhakti movement that Bansuri raised to prominence.

## PERCUSSION INSTRUMENTS

**Dholak:** Dholak is a very popular folk drum of northern India, Pakistan and Bangladesh as well. It is barrel shaped, at times a cylindrical drum, with skins on both sides.

**Dumroo:** Dumroo is probably the oldest and traditional form of percussion instrument in India. Dumroo is the only remaining form of hour-glass drums which are seen in ancient Indian statues.

**Ghatam:** Ghatam replicates or conveys the meaning of the pot in Sanskrit. It is an ancient percussion instrument and ancient like other musical instruments mridangam, veena, etc.

**Ghungroos:** Ghungroos are very famous Musical Instrument in India. Ghungroos are usually the small brass bells. It is a musical accessory used by performers of all classical dances.

**Kanjeera:** The Kanjeera is a very old and traditional instrument which is very popular in South Indian classical performances. Kanjeera is secondary percussion which is played as an accompaniment with the mridangam.

**Kartal:** Kartal literally means rhythm of the hand which is made of wooden blocks with holes for the fingers and circular copper plates, pairs of Kartals are played with both hands.

**Khol:** Khol is usually used traditionally for accompanying Bhajans and Kirtans. Its high skin is relatively small with a diameter of about 9–10 cm, which gives it a particularly high, piercing sound.

**Manjeera:** Manjeera is basically a set of small cymbals and is a ubiquitous component of dance, music and bhajans. It is a very ancient instrument seen on ancient temple walls. Manjeera is the most inexpensive and easy to play Instrument.

**Mridangam:** The Indian Musical Instrument Mridangam is one of the most popular classical instruments of South India. Mridangam accompanies vocal, instrumental and dance performances.

**Pakhawaj:** The Pakhawaj in India is also called Mardal, Pakhawaj, Pakuaj, Pakhvaj, Pakavaj or Mardala, as it is a barrel-shaped, two-headed drum.

**Tabla:** Tabla is the most popular pair of drums in the Indian Sub-continent. Tabla is a pair of drums which consists of a small right hand drum called Dayan and a larger metal one called bayan.

## STRING INSTRUMENTS

**Sarangi:** Sarangi has a hollow body and made of teak wood adorned with ivory inlays. It consists of forty strings of which thirty seven are sympathetic.

**Sarod:** Sarod is a popular Indian classical musical instrument which is similar to the Western lute in structure. Among the followers and connoisseurs of Hindustani classical music Sarod is one of the most important musical instruments.

**Sitar:** Sitar is one of the most popular Indian classical instruments and it comes under the category of a chordophone in the lute family. Sitar has neck crafted from toon or teakwood and a resonator carved from a large seasoned gourd.

**Tanpura:** Tanpura in India is a drone instrument that accompanies Dhrupad singing and is the most fundamental of all instruments of Indian Classical Music.

**Veena:** Veena the traditional instrument of India is also known as Saraswati Veena which is a musical instrument of South India. Veena is a classical instrument basically plucked stringed instrument that is used to accompany Carnatic music.

## Musical Instruments and Instrumentalists

Instruments	Instrumentalists
<b>Stringed Instruments</b>	
Rudra Veena	Asad Ali Khan, Zia Moin-ud-din Dagar
Santoor	Shiv Kumar Sharma
Sarangi	Ustad Binda Khan
Sarod	Buddhadev Dasgupta, Ali Akbar Khan, Amjad Ali Khan, Bahadur Khan, Sharan Rani
Surb Ahar	Sajjad Hussain, Annapurna
Veena	Doraiswamy Iyengar, Chittibabu Emani, Sankara Shastri, Dhanammal S. Bala Chandran
Sitar	Ravi Shankar, Nikhil, Banerjee, Vilayat Khan, Mustaq Annapurna
Violin	Ganjan Rao Joshi, Ms. Gopal Krishnan, T. N. Krishnan, Baluswamy, Dikshitar Dwaran Venkataswamy
<b>Wind Instruments</b>	
Flute	T. R. Mahalingam, N. Ramani, Hari Parsad Chaurasia, Pannalal Ghosh
Nadaswaram	Sheikh Chinna Moola, Neeruswamy Pillai, Rajaratnam Pillai
Shehnai	Bismillah Khan
<b>Percussion (Striking/thumping) Instruments</b>	
Mridangam	(Palaghat Mani Iyer, Karakudi R Mani, Palaghat Raghu
Pakhawag	Pt. Ayodhya Prasad, Gopal Das, Babu Ram Shankar
Tabla	Zakir Hussain, Nikhil Ghosh, Kishan Maharaj, Alla Rakha Khan, Pandit Santa Prasad, Kumar Bose, Latif Khan

## MUSIC

The two distinct styles, Hindustani and Carnatic, came into vogue after the advent of the Muslims, particularly during the reign of the Mughal Emperors of Delhi. Both the

systems of music received their nourishment from the same original source. Whereas the Indian music of the Northern part of India assimilated some features of the music of the Persian and Arabic musicians, who adorned the courts of the Mughal rulers of Delhi, the music of the South continued to develop along its own original lines.

### HINDUSTANI MUSIC

There are 10 main forms of styles of singing and compositions: Dhrupad, Dhamar, Hori, Khayal, Tappa, Chaturang, Ragasagar, Tarana, Sargam and Thumri. Nowadays, Ghazals have become very popular as the 'light classical' form of music.

#### Dhrupad

Dhrupad is the oldest and perhaps the grandest form of Hindustani vocal music. Dhrupad is essentially a poetic form incorporated into an extended presentation style marked by precise and orderly elaboration of a raga. The exposition preceding the composed verses is called *alap*, and is usually the longest portion of the performance. Dhrupad is in decline since the 18th century.

#### Khayal

Khayal literally means 'a stray thought', 'a lyric' and 'an imagination'. This is the most prominent genre of Hindustani vocal music depicting a romantic style of singing. Khayal is dependent to a large extent on the imagination of the performer and the improvisations he is able to incorporate. A Khayal is also composed in a particular raga and *tala* and has a brief text. The Khayal texts range from praise of kings or seasons, description of seasons to the pranks of Lord Krishna, divine love and sorrow of separation.

There are six main *gharanas* in khayal: Delhi, Patiala, Agra, Gwalior, Kirana and Atrauli-Jaipur. Gwalior Gharana is the oldest and is also considered the mother of all other *gharanas*.

### **Thumri**

Thumri originated in the Eastern part of Uttar Pradesh, mainly in Lucknow and Benares, around the 18th century AD.

It is believed to have been influenced by *hori*, *kajri* and *dadra*. Thumri is supposed to be a romantic and erotic style of singing and is also called ‘the lyric of Indian classical music’. The song compositions are mostly of love, separation and devotion. Its most distinctive feature is the erotic subject matter picturesquely portraying the various episodes from the lives of Lord Krishna and Radha.

Thumri is usually performed as the last item of a Khayal concert. There are three main *gharanas* of thumri—Benares, Lucknow and Patiala.

### **Dadra**

Dadra bears a close resemblance to Thumri. The texts are as amorous as those of Thumris. The major difference is that *dadras* have more than one *antara* and are in *dadra tala*. Singers usually sing a *dadra* after a *thumri*.

### **Dhamar-Hori**

These compositions are similar to Dhrupad but are chiefly associated with the festival of Holi. Here the compositions are specifically in praise of Lord Krishna. This music, sung in the *dhamar tala*, is chiefly used in festivals like Janmashtami, Ramnavami and Holi. The compositions here describe the spring season. These compositions are mainly based on the love pranks of Radha-Krishna.

### **Tappa**

The *tappa* is said to have developed in the late 18th century AD from the folk songs of camel drivers. Tappa literally means ‘jump’ in Persian. They are essentially folklore of love and passion and are written in Punjabi.

### **Ragasagar**

Ragasagar consists of different parts of musical passages in different ragas as one song composition. These compositions have 8 to 12 different ragas and the lyrics indicate

the change of the ragas. The peculiarity of this style depends on how smoothly the musical passages change along with the change of ragas.

### **Tarana**

Tarana is a style consisting of peculiar syllables woven into rhythmical patterns as a song. It is usually sung in faster tempo.

### **Chaturang**

Chaturang denotes four colours or a composition of a song in four parts: Fast Khayal, Tarana, Sargam and a ‘Paran’ of Tabla or Pakhawaj.

### **Ghazal**

The *ghazal* is mainly a poetic form than a musical form, but it is more song-like than the *thumri*. The *ghazal* is described as the ‘pride of Urdu poetry’. The *ghazal* originated in Iran in the 10th century AD. The *ghazal* never exceeds 12 *shers* (couplets) and, on an average, *ghazals* usually have about 7 *shers*. The *ghazal* found an opportunity to grow and develop in India around 12th century AD, when the Mughal influences came to India, and Persian gave way to Urdu as the language of poetry and literature. It developed and evolved in the courts of Golconda and Bijapur under the patronage of Muslim rulers. The 18th and 19th centuries are regarded as the golden period of the *ghazal* with Delhi and Lucknow being its main centres.

## **CARNATIC MUSIC**

The Tamil classic of the 2nd century AD, titled ‘Silappadikaram’ contains a vivid description of the music of that period. The Tolkaappiyam, Kalladam and the contributions of the Saivite and Vaishnavite saints of the 7th and 8th centuries AD. also serve as resource material for studying musical history.

It is said that South Indian Music, as known today, flourished in Deogiri, the capital city of the Yadavas in the middle ages, and that after the invasion and plunder of the city by the Muslims, the entire cultural

life of the city took shelter in the Carnatic Empire of Vijayanagar under the reign of Krishnadevaraya. Thereafter, the music of South India came to be known as Carnatic Music.

In the field of practical music, South India had a succession of brilliant and prolific composers who enriched the art with thousands of compositions. After Purandaradasa, Tallapakam Annamacharya Narayana Tirtha, Bhadrachalam Ramdas and Kshetranja made contributions to the wealth of compositions.

The birth of the Musical Trinity—Tyagaraja, Muthuswami Dikshitar and Syama Sastri at Tiruvarur between the years 1750 and 1850 AD. ushered in an era of dynamic development in Carnatic music.

The outstanding feature of Carnatic music is its raga system and highly developed and intricate tala system. Though clear-cut demarcations in the style of musical presentation, similar to the gharanas of Hindustani music, are not seen in Carnatic music, yet we do come across different styles in rendering compositions.

The ancient musical forms like Prabandhas, etc. gradually gave way to the different musical forms that are in use in the present-day music, though the basic elements of the ancient Prabandhas are still retained in the modern forms.

The following musical forms offer interesting study:

### **Gitam**

Gitam is the simplest type of composition. Taught to beginners of music, the gitam is very simple in construction, with an easy and melodious flow of music.

### **Suladi**

Very much like the gitam in musical structure and arrangement, the Suladis are of a higher standard than the gitam.

### **Varnam**

The Varnam is a beautiful creation of musical craftsmanship of a high order, combining in

itself all the characteristic features of the raga in which it is composed. Practice in Varnam singing helps a musician to attain mastery in presentation and command over raga, tala and bhava.

### **Svarajati**

This is learnt after a course in gitams. More complicated than the gitas, the Svarajati paves the way for the learning of the Varnams. The theme is either devotional, heroic or amorous.

### **Jatisvaram**

Very similar to the svarajati in musical structure, this form—Jatisvaram—has no sahitya or words. The piece is sung with solfa syllables only.

### **Kirtanam**

The Kirtanam had its birth about the latter half of the 14th century. It is valued for the devotional content of the sahitya. Clothed in simple music, the kirtanam abounds in Bhakti bhava. It is suited for congregational singing as well as individual presentation.

### **Kriti**

The Kriti is a development from the Kirtana. It is a highly evolved musical form. The highest limit of aesthetic excellence is reached in the Kriti composition. The raga bhava is brought out in all the rich and varied colours in this form.

### **Pada**

Padas are scholarly compositions in Telugu and Tamil. Though they are composed mainly as dance forms, they are also sung in concerts, on account of their musical excellence and aesthetic appeal. The music is slow-moving and dignified.

### **Javali**

A javali is a composition belonging to the sphere of light classical music. Sung both in concert programmes and dance concerts, the javalis are popular because of the attractive melodies in which they are composed. In contrast to the padas which portray divine love, javalis are songs which are sensuous in concept and spirit.

## Tillana

The Tillana, corresponding to the Tarana of Hindustani music, is a short and crisp form. It is mainly a dance form, but on account of its brisk and attractive music, it sometimes finds a place in music concerts as a conclusion piece.

## Pallavi

This is the most important branch of creative music. It is in this branch of manodharma sangeeta that the musician has ample opportunities of displaying his or her creative talents, imaginative skill, and musical intelligence.

## Tanam

This is a branch of raga alapana. It is raga alapana in Madhyamakala or medium speed. There is perceptible rhythm in this. The rhythmical flow of music, flowing in fascinating patterns, makes tanam singing the most captivating part of raga exposition.

## RAGAS, TIMING AND MOODS

1. Bhairava – Dawn – Awe and Fear
2. Kaushika – Night – Joy
3. Hindola – Night – Laughter
4. Dipak – Afternoon – Love
5. Megh – Morning – Calm
6. Sriraga – Evening – Peace

## GHARANA AND THEIR FOUNDERS

- Gwalior Gharana–Nathan Pir Baksh, Nathu Khan
- Agra Gharana–Ghagghe Khudabaksh
- Kirana Gharana–Nayak Gopal
- Bhendi Bazaar Gharana–Chhajju Khan, Nazeer Khan, Khadim Hussain Khan
- Jaipur Atrauli Gharana–Alladiya Khan
- Patiala Bada Fateh Gharana–Ali Khan, Ali Baksha Khan
- Rampur–Inayat
- Sahaswan Gharana–Hussain Khan
- Indore Gharana–Amir Khan
- Jodhpur Mewali Gharana–Nazir Khan
- Sham Chaurasia Gharana–Miyan Chand Khan, Miyan Suraj Khan

## PUPPETRY

Puppetry is an art ancient to India. Before other modes of entertainment were developed, they were the ones popular among all, rich and poor alike, and a major part of the village folk culture. Even Mahabharata refers to the art of puppetry and shadow theatre. When the princess Uttara and her friends urged Arjuna to bring back (after his campaign against Kaurava clan) the fine, gaily coloured, delicate and soft garments for their dolls, the allusion was to puppets. Here we present you some interesting facts about puppetry in India:

### GLOVE PUPPETS

Glove puppets, also known as hand puppets, are one of the most recognisable styles of puppets. The puppeteer inserts his hand through the bottom of the puppet and uses his index finger to move the head and his thumb and smallest finger or middle finger to move the hands of the puppet. In India, they are most common in areas like Kerala and West Bengal.

### ROD PUPPETS

Rod puppets are manipulated by having a main rod run through the body of the puppet to keep it upright, and two rods inserted into the arms of the puppet's body which are then moved by the puppeteer. This style of puppet is limiting in the puppet's movement. They are extremely common in the eastern regions, Bengal and Odisha, and are known by the name Putul Naach.

### SHADOW PUPPETS OR SHADOW THEATRE

Perhaps the most primitive type of puppets, shadow puppets consist of a desired shape cut out, then held between a light and a canvas screen, with the intent to cast the shadow of the puppet onto the canvas screen. Through manipulation of the puppet by a perpendicular rod adhered to the back and various lights, the illusion of movement is achieved. Shadow theatre is still common

in some parts, like Karnataka and Andhra Pradesh.

### STRING PUPPETS

The string puppet, or ‘marionette’, is the most difficult puppet to maneuver and master for a puppeteer and consists of a main body, with the arms, legs and head held up by strings attached to rods above the puppet. Through movement of these rods, a puppeteer may position and exercise the puppet however they choose. The string puppet may also be as large as a puppeteer can lift. They are the most common kind and most notable in western India, in states like Rajasthan and Gujarat.

### CHARACTERS AND DECORATION

A puppet’s decorative features depend on the role it was made to play. A puppet with large eyes, and darker colours represents an evil or immoral character, while a puppet with lighter colours, brighter clothing, and a mustache represents the hero or royalty. Women are portrayed with their hair in braids or flowing, while the men wear their hair in a turban.

Puppetry is an art which has remained popular for more than a thousand years. Even this day, puppet theatres are very sought after. That is why attempted to demystify it so the next time you witness one, you can appreciate it fully.

### Art and Culture

Institution	Headquarters
Institute of National Museum	New Delhi
History for Art Conservation and Science Museum	
Asiatic Society	Kolkata
Indian National Archives	New Delhi
Central High Tibetean Educational Institute	Varanasi
Cultural Institute and Training Centre (1979)	New Delhi
Gandhian Recollection and Philosophy Recollection	New Delhi
Indian Museum	Kolkata

Indira Gandhi National Human Museum	Bhopal
Kala Chitra Foundation	Chennai
Lalit Kala Academy (1954)	New Delhi
National Drama Vidyalaya (1959)	New Delhi
National Modern Art Technique (1954)	Kolkata
National Museum	New Delhi
National School of Drama	New Delhi
Nehru Memorial Museum and Library	New Delhi
Rama Krishan Mission Sanskrit Institute (1938)	Kolkata
Sahitya Academy (1954)	New Delhi
Sangeet Natak Academy	New Delhi
Allahabad Museum	Allahabad
Victoria Memorial Hall	Kolkata
Salarganj Museum	Hyderabad
Rampur Raja Library	Rampur
Raja Rammohan Rai Library Foundation	Kolkata
Nav-Nalanda Mahabihar	Bihar
National Research Laboratory for Conservation of Cultural Heritage	Lucknow
National Library (1948)	Kolkata
National Science Museum Parishad	Kolkata
Maulana Abdul Kalam Azad Asian Studies Institute	Kolkata
Khudabaksh Oriental Public Library	Patna
Jawahar Lal Nehru Manipur Dance Academy (1954)	Imphal
Indira Gandhi National Art Centre	New Delhi
Institute of Indian Diamond	Surat
Delhi Public Library	New Delhi
Central Secretariat Library (1981)	New Delhi
Central Buddha Education Institute	Leh
Indian Anthropology Survey	Kolkata

## IMPORTANT PLACES IN INDIA

**Ahichhatra:** Originally **Ahikshetra** in Bareilly district of Uttar Pradesh was one of the capitals of the **Panchals**.

**Aihole:** In **Karnataka**, contains chief sites of the **Chalukya** architecture.

**Ajanta Caves:** Situated 66 miles north of **Aurangabad** in the **Maharashtra State**. These are rock-cut Buddhist caves, 29 in number.

**Amaravati:** It is the legendary **capital of Swarga**.

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

**Ayodhya:** It was the capital of **Kosala** and the **Solar kings** of ancient India.

**Badami (or Vatapi):** In **Karnataka**, is well-known for the **Chalukyan sculpture** founded in the cave temples here. The famous **Malegitti Shivalaya temple** is also situated here.

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

**Bhubaneswar:** Known for **ancient temples**, viz. **Radharani Lingaraj** and **Brahmeshvara**.

**Bodh Gaya:** It is situated 6 miles south of **Gaya** in the **Bihar state**. It is famous as the place where **Buddha** got enlightenment.

**Chidambaram:** A town **150 miles south of Chennai**, known as **Tillai** in ancient times. It was once the **capital** of the **Chola kingdom**. It is known as an **abide of Nataraja, the Dancing Shiva**.

**Elephanta Caves:** These are the **rock-cut caves** of the **7th and 8th centuries**.

**Ellora Caves:** About **15 miles north-west of Aurangabad** in **Maharashtra**. There are about **34 caves** excavated in the face of a hill.

**Fatehpur Sikri:** Situated **23 miles** away from **Agra** in **Uttar Pradesh**, it was the city established by **Akbar** in 1571 AD. The place contains a number of palaces, shrines and mosques.

**Halebid:** 10 miles away from Belur in Karnataka, is well-known for its sculptured temples of the **Hoysala period**.

**Hampi:** In the Montgomery district of Punjab, now in Pakistan, known for excavations carried out here showing signs of the **Indus Valley Civilisation**.

**Junagadh:** In Gujarat state, it is one of the most ancient cities of India.

**Kalibangan:** In Hanumangarh district of Rajasthan, where excavations brought to light the varied achievements of the Indus Valley Civilisation.

**Kannauj:** Capital of Harshavardhana.

**Kanchipuram:** Also called the '**Golden City**', is known for the **Kailashnath temple**.

**Kanheri:** is known for its Buddhist caves dating back to the 1st century AD.

**Kanyakubja**, or modern Kannauj, is an ancient city.

**Kapilavastu** is associated with Mahatma Buddha.

**Khajuraho:** In **Chhatarpur** in Madhya Pradesh, is famous for its group of highly ornate medieval Hindu temples.

**Kusinagar:** In the district of modern **Deoria**, is the place where Buddha died.

**Lothal:** The excavation made here to represent the Indus Valley Civilization.

**Madurai:** Popularly known as the '**City of Festivals**', was the capital of the Pandyan kingdom till the 14th century. It is famous for the **Minakshi temple**.

**Mammalapuram** (now **Mahabalipuram**): It is known for rock-cut temples, monolithic figures and the carvings of the 7th and 8th centuries AD.

**Mandu:** In Madhya Pradesh, it is one of the largest medieval cities.

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

**Mohenjodaro:** In the **Larkana** district of Sindh (now in Pakistan), is the site of excavation revealing the Indus Valley Civilisation.

**Nalanda:** In Bihar, it was the part of an ancient Buddhist University.

**Palitaana:** In Saurashtra, is famous for its holy hill **Shatrunijaya**. It is the most sacred place for the Shvetambaras.

**Pandharpur:** It is in the Sholapur district (Maharashtra).

**Prabhaspatan (or Somnath):** In Gujarat state, it is the site of the famous Somnath temple, which was destroyed by **Mahmud Ghazni**.

**Pragjyotishpur:** It was the capital of an ancient tribal kingdom in Kamarupa or modern Assam.

**Rajgir:** It was the capital of **Bimbisara** in ancient times. **Buddha** preached at Rajgir and also did **Mahavira**.

**Sanchi:** In Madhya Pradesh, is famous for the largest and the most well-preserved Buddhist stupa.

**Sarnath:** Near Varanasi, is the place where **Buddha** delivered his first sermon after he became the '**Enlightened One**'.

**Srirangapatnam:** In Karnataka, it was the ancient capital of **Tipu Sultan**.

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

**Sravabelagola:** In Karnataka, is famous for its Jain temples and the colossal statue of **Gomateshwara (Bahubali)**, the tallest monolithic in the world.

**Srirangam:** It contains one of the largest temples in south India of the Vijayanagara period.

**Sringeri:** In Karnataka, it is a place of pilgrimage, where the great philosopher **Sankara** founded one of the principal peethas (monasteries).

**Tamralipti:** A flourishing sea-port in ancient India.

**Tanjore:** It was the capital of **Cholas**. It is also known for the **Brihadeshwara temple**.

**Taxila:** Ancient capital of **Gandhara**.

**Tirupati:** In the Andhra Pradesh state, it is one of the holiest places in South India.

**Ujjain:** It is known to be the seat of king **Vikrama**. It is one of the seven sacred cities, also known as **Avanti**. **Mahakaleshwar temple** here is known as a pilgrimage centre.

**Vaishali:** It was the capital of the famous **Vajji kingdom** in ancient times.

**Vatapi:** See **Bandami**.

**Vikramshila** was a great **Tantrik University** established by **King Dharampala** in 810AD.





## WORLD HISTORY

## ANCIENT WORLD

### MESOPOTAMIAN CIVILISATION

- **Hammurabi** (C. 2100 BC), the greatest Babylonian ruler united the whole of what is now called Iraq into a single kingdom.
- 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 Sumerians were the first to evolve a proper writing. This system is called **Cuneiform**.
- The Mesopotamian system of counting is known as **sexagesimal**.
- In geometry the Mesopotamians had discovered what was later called the Pythagoras theorem.
- Mesopotamians 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.

### EGYPTIAN CIVILISATION

- Egypt is called the 'Gift of the Nile'.
- 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 sun was their most important god.
- The Egyptians believed that after death both the body and the soul be reunited with each other after body was buried. So Egyptians took great care in preserving the

body of the dead. The body was embalmed in spice 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 **Sphinx** is a mythological animal with the body of a lion and the head of a man.
- The Egyptian script was known as **hieroglyphic**.

### CHAMPOLLION

- The Egyptians developed a decimal system of numeration.
- The crowning achievement of the Egyptians was the solar calendar.

### CHINESE CIVILISATION

- The earliest Chinese Civilization is the **Shang** Civilisation.
- The Shang dynasty was overthrown by the **Chou** dynasty.
- The Chinese script is a pictographic script.
- 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; he began construction of a wall known as the **Great Wall**.
- The Han dynasty followed the Chin dynasty in 202 BC. The Chinese was the first

civilisation in history to have a system of selecting public officials on the basis of education and competitive examination.

- Under the Hans silk was a principal item of export.
- The two major religions of ancient China are Taoism and Confucianism. Confucius was a contemporary of Mahavira and Buddha.
- Buddhism was brought into China by Indians 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 meters and extending over 2,400 kms.
- In the 1st century AD, Paper was invented in China.
- The water clock, abacus umbrella were invented by Chinese.
- In the 2nd century AD, Chinese invented a seismograph.

### IRANIAN CIVILISATION

- 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 Pasaragadae.
- 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, and north-western India. He built a new capital at Persepolis.
- **Alexander** dealt the empire a final blow during the reign of **Darius III**.
- In the 3rd century AD, the Sassanid Empire was founded by **Ardashir** in 226 AD.
- The Achaemenids had introduced the use of money—coins of gold and silver—on a large scale throughout the empire.
- The main religion of the ancient was Zoroastrianism. This religion was founded by **Zarathustra** or **Zoroaster** (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 Parsis. Both Judaism and Christianity were indebted to Zoroastrianism.
- During the Achaemenid Empire the official language was **Aramaic**. The Sassanids

revived Old **Persian** and made it the official language of their empire. But then a new Script called **pahlavi** had also developed.

### GREEK CIVILISATION

- The main occupations are agriculture and herding.
- **The Battle of Marathon (490 BC)**: The Greek defeated the Iranian (Persian) 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 years following Athens' defeat.
- Then his son, **Alexander** set out at age of 20, to conquer the world.
- As a result of Roman attacks almost the entire territory of the Greeks and their empire became a part Roman Empire.

### CONTRIBUTIONS OF GREEK CIVILISATION

- The Olympic Games were first held in 776 BC by the Greek in honour of God Zeus at mount Olympus (Olympia) in Greece.
- It was the French Baron **Pierre de Coubertin** who (nearly over 1,500 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 years.
- **Homer**'s 'Iliad' and 'Odyssey' are among the best epics of the world.
- The founder of Greek tragedy was **Aeschylus**, author of Prometheus Bound.
- Greece 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).
- 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 known as the father of medicine.

- The temple of Athena the Parthenon is the best example of Greek architecture. Myron and Phidias are best known sculptors of ancient Greece.

## ROMAN CIVILISATION

- The centre of the Roman civilisation was Italy, the peninsula that projects in to the Mediterranean Sea in the west of Greece.
- The city of Rome was founded about 1000 BC by **Romulus** in the district of Latium. The language of the ancient Romans, **Latin** gets its name from Latium.
- The early Romans had a king, an assembly and a senate.
- Towards the end of the 6th century BC the King was overthrown and a republic was established.
- By the beginning of the 1st century BC, the Romans had conquered Greece and Asia Minor and established a protectorate over Egypt.
- Rivalry for power grew between two Generals **Pompey** and **Julius Caesar**. War followed between them and Pompey was murdered by his enemies in Egypt.
- In 37 BC, **Octavian** became the most powerful in the Roman Empire.
- The period of Roman history beginning with his rule up to 284 AD is called the principate.
- In 284 AD, **Diocletian** became the ruler and from this time on, the Roman civilisation declined more rapidly. One of Diocletian successors, Constantine built a new capital called **Constantinople** on the site of ancient Byzantium in 330 AD.
- The Romans worshipped as many gods and goddesses as the Greeks. **Jupiter** sent rain for the crops; **Mars** helped them in war; **Mercury** carried their messages; **Neptune** the god of sea; **Vesta** guarded the home; **Juno** protected their women.

## CONTRIBUTIONS OF THE ROMAN CIVILISATION

- Roman laws and principles of governance are Rome's greatest contribution to the world.

- The Romans developed their own alphabet and the **Latin** language became the language of all educated people in Western Europe.
- Lucretius**, **Cicero**, **Marcus Aurelius** and **Seneca** were the famous Roman philosophers.
- Horace** (Odes) and **Virgil** (Aeneid) were the famous Roman poets.
- Tacitus** (Annals and Histories) was the 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 to architectural improvements—the arch and cupolas or domes.
- Fights between gladiators or between a gladiator and a wild animal were a popular Roman amusement.

## 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 Ottoman Turks conquered the Byzantine territories in 1453 AD.

### FEUDALISM

- Feudalism originated in the 8th and 9th centuries.
- First of all in Western Europe the feudal system developed.

### CRUSADES (1095 AD-1291 AD)

- Crusades mean 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 Christians to liberate **Jerusalem** from Seljuk Turks (Muslims) who did not permit Christian pilgrims to enter the holy land.

### ARAB CIVILISATION

- 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.
- He forbade the worship of idols and made many enemies. Ultimately he had to leave Mecca and take refuge in Medina. This event took place in 622 AD and is known as the year of **Hijira** or migration and from it Muslims date their era (**Hijira Samvat**).
- The **Quran**, the holy book of Islam, is divided into a number of sutras or chapters and contains the teachings of Muhammad. Besides the Quran the life of a Muslim is guided by the **Sunna**, the practices of Muhammad and the **Hadees**, the sayings of Muhammad.
- After his death (632 AD), his successors were known as Caliphs or Khalifas, who held both religious and political authority.
- From Arabia, Islam spread very fast to many other parts of the world.

### CONTRIBUTIONS OF ARAB CIVILISATION

- The Arabs made all knowledge their own and developed it further.
- Al Razi (Rhazes)**, an Arab scientist, discovered the true nature of small pox and **Ibn Sina (Avicenna)** discovered that tuberculosis is infectious.
- Some of the famous literary works of the Arab civilisation are the **Rabaiyat** by **Omar Khayyam**, **Shahnama** by **Firdausi** and the **Arabian Nights**, a collection of 1,001 stories.
- The Arabs developed their own decorative designs. Their buildings had bulb-like 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.

### MEDIEVAL CHINA

- From the early 7th century, China was ruled by the **Tang** dynasty.
- The rule of Tang dynasty was followed by the **Sung** dynasty.
- 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.

- 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.
- The Chinese made iron-chain suspension bridges as early as the 10th century.
- The Chinese invented the first method of printing in 10th century.

### MEDIEVAL JAPAN

- Japan consists of hundreds of small islands, of which four are major islands—Hokkaido, Honshu, Kyushu and Shikoku.
- 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**.
- The important contribution of medieval Japan to art was **Ikenana** or the art of flower arrangement.
- 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 open distinct schools of Buddhism the most famous of which is **Zen Buddhism**.

### MODERN WORLD (1500 AD ONWARDS)

#### RENAISSANCE

- The 16th century is commonly designated as the Age of Renaissance, also called the Revival of learning.
- Italy** practically became the home of the Renaissance.
- Great writers of the Italian Renaissance included **Dante**, **Patriarch**, **Boccaccio** and **Machiavelli**. The great painters of Italian Renaissance included **Leonardo da Vinci** (Famous Painters; The Last Supper and Mona Lisa) **Michelangelo** (The Last

Judgement and the Fall of Man) and **Raphael** (Madonna) Great astronomers of Italian Renaissance included **Bruno and Galileo**.

- The Renaissance movement was enormously, helped by the invention of the printing press (in 1454 AD by **Gutenberg** of Germany; Gutenberg Bible 1456—the first printed book).

## REFORMATION

- It was started by **Martin Luther** in **Wittenberg**, Germany in 1517 AD by publicly protesting against the sale of letters of **Indulgence**.
- It was a revolt against the control of conscience by the priests.
- 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 and 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 Protestants. Reformation was known as **Counter Reformation Movement**.

## GEOGRAPHICAL DISCOVERIES

- During 1288 AD-1293 AD Marco Polo (1256 AD-1326 AD) Venetian traveller travelled from Venice to China and Japan. He was the 'first European to visit China'.
- In 1487 AD, **Bartholomew Diaz**, reached the pointed 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 AD.
- Italian sailor **Columbus**' trip was financed by Spain from where he sailed in 1492 AD. When he has reached land, he thought he had reached India; so he called the islands the Indies; but it was America.
- Magellan** was the first to sail round the world.

## GLORIOUS REVOLUTION: 1688 AD, ENGLAND

- James II** was Roman Catholic. His tactless attempt to secure freedom of worship for

Catholics united the Whigs and Tories of the Anglican Church against him.

- 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.
- This event known as **Glorious or Bloodless Revolution** in England.

## MAGNA CARTA (OR THE GREAT CHARTER), 1215 AD

- It was the Charter of liberties which **King Johan II** of English was forced to sign in 1215 AD at Runnymede. Magna Carta was said to be the foundation-stone of rights and liberties of the English people.

## INDUSTRIAL REVOLUTION

- The process of change that transformed Britain first and then other countries from agricultural to industrial economics.
- Capitalism:** Economic system in which a country's trade and industry are organised and controlled by the owners of capital the chief elements being competition, profit, supply and demand.
- The American Revolution started in 1775 AD and lasted until 1781 AD.
- On July 4, 1776 AD, the **Declaration of Independence** was issued. Its author was **Thomas Jefferson**.
- The colonies won the war against England. The American Revolution made possible the establishment of a new nation the United States of America (USA).
- In 1783 AD, England acknowledged American independence in the **Treaty of Paris** and **George Washington** was elected the first President of USA.

## FRENCH REVOLUTION (1789 AD-1793 AD)

- It gave to humanity new ideas of '**Liberty, Equality** and **Fraternity**'.
- The French Revolution started with the **fall of Bastille Fort**.
- In France the Revolution established the political supremacy of the middle class in the towns and transferred the bulk of landed

property to the peasantry in the countryside. For Europe and the world it represented an ideal of popular sovereignty and equality before the law.

### UNIFICATION OF ITALY (1848 AD-1870 AD)

- The struggle for Italian independence and unification was organised by the two famous revolutionaries—**Mazzini** and **Garibaldi**. The movement led by them is known as the ‘Young Italy’ movement.
- Rome was still outside the kingdom of Italy. It was ruled by the Pope. Italian soldiers liberated the city of Rome in 1870 AD and in 1871 AD. Rome became the capital of United Italy.

### UNIFICATION OF GERMANY: (1848 AD-1871 AD)

- Bismarck described a policy of unification as one of ‘**blood and iron**’. The Policy of blood and iron meant a policy of war.
- The unification of Germany was completed as a result of Prussia-France War (1870) in which the French emperor Louis Bonaparte was defeated and captured. This war enabled Bismarck to absorb the remaining German states into a united Germany.

### FIRST WORLD WAR: (AUG. 4, 1914 AD-NOV. 11, 1918 AD)

**Causes:** The causes of First World War were as under:

1. Militarism.
2. Narrow Nationalism or Competitive Patriotism.
3. Economic imperialism.
4. Anglo-German Rivalry and the Charter of William II.
5. Lack of an international organisation.

**Immediate Cause:** The immediate cause of the war was the murder of Archduke Ferdinand, who was the heir to the Austrian throne. The Austrians held the 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:** Germany, Austria, Hungary, Turkey and Bulgaria were on one side. They were called **Central Powers**. On the other side were England, France, Serbia, Belgium, Japan and Russia. They were called the **Allied Powers**. The Allied powers joined by Italy in 1915 and USA in 1917. The war started on August 4, 1914 and ended on November 11, 1918.

**Peace Settlement (1919 AD-1920 AD):** The Central Powers were completely defeated by the Allied Power and an Armistice was signed on November 11, 1918 followed by a Peace Conference at Paris. After prolonged discussions, the **Treaty of Versailles** was signed between the allies and Germany on June 28, 1919.

At the instance of **Woodrow Wilson**, the President of America, the **League of Nations** officially came into existence of January 10, 1920. Its headquarters were fixed at Geneva in Switzerland.

### RUSSIAN REVOLUTION (1917 AD)

- It established the ideology of Marxism.
- The great revolution in Russia took place in two stages. The first stage of Russian Revolution overthrew of the **Czar Nicholas II**. The second stage in November of the same year led to the establishment of the world's first communists by Bolsheviks under Lenin.
- Russian Revolution began with **March Revolution**. Disorders broke out in Petrograd.
- The Bolsheviks led by **Lenin** seized power in Petrograd on November 7, 1917 AD—**November Revolution**.
- In the period between 1917 AD and 1920 AD, 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 was killed.
- In 1923 AD, the Union of Soviet Socialist Republic (USSR) came into being.

☞ **Note:** In 1991 AD, 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 25th December, 1991 AD. In the same month, the **Commonwealth of Independent States (CIS)**, a looser organisation with responsibility for economic and military co-operation was formed by Russia, Ukraine and Belarus. Nine other former Soviet republics joined later. Now CIS is a community of 12 independent states. Three former Soviet republics (Baltic States)—Estonia, Latvia and Lithuania—are fully independent states. It is notable that Soviet Union was a federal state consisting of 15 separate republics.

## CHINESE REVOLUTION

### 1911 AD (*Republican Revolution*) and 1949 AD (*Communist Revolution*)

- In October 1911, a revolution under the leadership of Sun-yat-sen ousted the Manchu or Ching Dynasty and a republic was set up.
- The Chinese Communist Party (CCP) was founded in 1921.
- The Communists under their leader **Mao-tse-tung (Mao Zedong)** embarked on the **6000-mile long march (October 1934 AD-October 1935 AD)** to form a new power base in northern China.
- Mao-tse-tung quickly established control over the whole of China and he remained leader until his death in 1976.

## TURKISH REVOLUTION (1923 AD)

- Turkey was called **Sick man of Europe**.
- The disintegration of Ottoman Empire began in the 19th century and was completed after Turkey's defeat in the First World War.
- The treatment meted out to Turkey by the Allies had led to a mass upsurge in India directed against Britain. This upsurge is known as the **Khilafat Movement**.
- Turkey was proclaimed a republic in October 29, 1923 AD and Kemal became the first President of Turkey. The Turkish Sultan had carried the title if Caliph (Khalifa) the

new government abolished the institution of Caliph (Khalifa) in 1924 AD.

- Mustafa Kemal Pasha is known as the 'founder of modern Turkey and Ataturk' (the father of the Turks).

## ECONOMIC DEPRESSION OF THE WORLD (1929 AD-1934 AD)

- The Great Depression of 1929 AD-1934 AD was worldwide starting with an agricultural recession followed by financial panic and collapse known as the **Wall Street Crash (October, 1929 AD)** in the USA.

## FASCISM IN ITALY

- The unification of Italy was only completed in 1870 AD.

## MILITARISM IN JAPAN

- In Japan the democratically elected government, increasingly embarrassed by economic, financial and political problems fell under the influence of the army in the early 1930s.
- The military soon involved Japan in war with China and later took the country into the Second World War with its attack on **Pearl Harbour (1941 AD)**.

## SECOND WORLD WAR

### (SEP. 3, 1939 AD-AUG. 14, 1945 AD)

**Causes:** The causes of Second World War were as under—

1. The Treaty of Versailles (1919 AD).
2. Nationalist Movements of Germany and Italy.
3. Conflict of ideology between Dictatorship and Democracy.
4. Inefficiency of League of Nations.
5. Colonial and Commercial Rivalry.
6. Aggressiveness of Berlin-Rome-Tokyo Axis.
- The immediate cause of the war was the refusal of Poland to surrender, so Germany invaded Poland on Sep. 1, 1939 AD, Britain and France as they were under treaty obligations to aid Poland declared war against Germany on Sep. 3, 1939 AD.
- On one side were Germany, Italy and Japan called the **Axis Powers** (or **Central Powers**)

and others were Great Britain, France USSR, USA, China etc. called the **Allied Powers** (or **Allies**).

Germany had to face defeat once again. After the fall of Germany, USA and UK concentrated their focus against Japan. On 6th August, 1945 an atom bomb was dropped on the city of Hiroshima, Japan was asked to surrender and when she refused another atom bomb was dropped on 9th August, 1945 AD on the city of Nagasaki. On August 14, 1945 AD, Japan surrendered unconditionally and the Second World War came to an end.

### IMPORTANT BATTLES

- Hundred Years' War (1337–1453)–England and France
- Seven Years' War (1756–1763)–French were defeated by the English
- Battle of Trafalgar (1805)–British force led by Duke of Wellington defeated French force led by Napoleon Bonaparte.
- Opium War (1839–1842)–China and Britain
- Crimean War (1853–56)–War between Russia and the alliance of England, France, Turkey and Sardinia
- Boer War (1899–1902)–Fought in South Africa between the British and the Boers.
- World War-I (1914–1918)–Germany (with Austria, Hungary) against Britain (with Russia, France, Japan Canada and Belgium)

- World War-II (1935–1945)–Axis Power (Germany, Italy and Japan) against the Allies (Great Britain, USA, USSR, China). Axis Powers were defeated.

### Persons and their Titles

Persons	Titles
Adolf Hitler	Fuehrer
Mussolini	II Duke
Florence Nightingale	Lady with the Lamp
John of Arc	Maid of Orleans
Elizabeth I	Maid in Queen
Bismark	Man of Blood & Iron
Napoleon	Man of Destiny Little Corporal

### Revolution and their year

Revolution	Year
American War of Independence	1776
Russian Revolution	1917
French Revolution	1789
Chinese Revolution	1911
Communist Revolution in India	1949
Industrial Revolution	1750–1850





# GEOGRAPHY

# WORLD GEOGRAPHY

## UNIVERSE

- The universe comprises billions of galaxies. The galaxies are made up of millions of stars held together by the force of gravity and these stars account for most of the masses of the galaxy.
- Our own galaxy is called the **Milky Way** (or the Akashganga) and it contains about 300 billion stars and one of these is our sun. Planets and other objects go round the sun and make up the solar system with the sun at the centre.
- In the 14th Century, **Ptolemy** propounded the theory that the earth was the centre of the universe and the sun and the other heavenly bodies revolved around it.
- In 1543 AD, **Copernicus** said that the sun is the centre of universe and not the earth.
- Kepler** supported Copernicus but said that the sun is the centre of solar system and not the universe.

## MEASUREMENT UNITS OF SPACE

- Light Year:** It is the distance covered by light in one year in vacuum at a speed of  $300000 \text{ km/s}$ .  $1 \text{ light year} = 9.46 \times 10^{12} \text{ km}$ .
- Astronomical Unit (A.U.):** It is the mean distance between the earth and the sun. One Light Year is equal to 60,000 A.U.  
 $1 \text{ A.U.} = 150 \text{ million km}$ .
- Parsec:** One parsec is the distance to a star that subtends an angle of 1 arc second act an arc length of 1 A.U.  
 $1 \text{ Parsec} = 3.26 \text{ light years}$ .

## EVOLUTION OF UNIVERSE

### (I) BIG BANG THEORY

- (Proposed by Georges Le Maitre).
- Big Bang was an explosion that occurred 13.8 billion years ago, leading to the formation of galaxies of stars and other heavenly bodies.

### (II) STEADY STATE THEORY

- Bondi, Gold and Fred Hoyle developed this theory and states that although the universe is expanding, it nevertheless does not change its appearance over time, it has no beginning and no end.

### (III) THE PULSATING THEORY

- According to this theory, the universe is supposed to be expanding and contracting alternately, i.e., pulsating. At present, the universe is expanding.
- Milky Way Galaxy** formed 5 billion years after the **Big Bang**.
- Latest known galaxy is the **Dwarf Galaxy**.
- Origin of the universe is explained by the **Big Bang Theory**, formulated and proposed by the Belgian astronomer and cosmologist **Georges Lemaitre**.
- Andromeda** is our nearest galaxy.

## 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**.

## EVOLUTIONARY STAGES OF A STAR

- Proto Star:** It is the stage, where the helium core become increasingly heavy accompanied with expanding out the layers. A Proto star is a highly condensed cloud of gases mainly hydrogen and helium.
- Red Giant:** This stage results into the swelling and reddening of the outer regions of the star. Such stars of gigantic dimension are called Red Star.
- White Dwarf:** If the mass of the star is relatively small like that of our sun, the gases that reach the outer layer are expelled. As these expelled gases cool and contract, the star becomes a white dwarf.

## THE SOLAR SYSTEM

- The Sun, Eight planets (excluding Pluto) and their respective satellites.
- Interstellar debris such as asteroids, meteoroids, comets.
- The electrically charged gases, called **Plasma**.
- Interplanetary dust particles.
- The components of solar system other than planets dwarf planets and satellites are called the **Small Solar System Bodies (SSSB)**.
- The gravitational pull of the sun keeps all the planets and other objects revolving around it.
- Planets revolve around the sun in an elliptical orbit.
- In the solar system, the planet nearest to the sun is **Mercury** and the planet farthest from the sun is **Neptune (and not Pluto)**.
- The solar system is dominated by the sun, which accounts for almost 99.9% of the matter in the whole solar system.
- Pluto** is a dwarf planet.
- Mercury, Venus, Earth and Mars** are called **terrestrial planets** and **Jupiter, Saturn, Uranus** and **Neptune** are called **gaseous planets**.

## ORIGIN OF SOLAR SYSTEM

Various theories have been given by different persons to explain the origin of Solar System.

Hypothesis	Propounder
Cepheid Hypothesis	A.C. Banerji
Nova Hypothesis	Hoyle and Lyttleton
Electromagnetic Hypothesis	H. Alfven
Interstellar Dust Hypothesis	Schmidt
Nebular Cloud Hypothesis	Dr. von Weizsacker
Protoplanet Hypothesis	G. Kuiper
Gaseous	Hypothesis Kant
Nebular Hypothesis	Laplace
Planetesimal Hypothesis	Chamberlin and Moulton
Tidal Hypothesis	James Jeans & Harold Jeffrey
Binary Star Hypothesis	H.N. Russel
Fission Hypothesis	Ross Gun

## MEMBERS OF THE SOLAR SYSTEM

### SUN

- It is the nearest star to the earth.
- Its diameter is 14 lakh kms.
- It is composed of 71% Hydrogen, 26.5% helium and 2.5% other elements.
- Within the sun, hydrogen is converted to helium due to nuclear fusion releasing a tremendous amount of heat and light.
- The shining surface of the sun is called Photosphere.
- The outer layer of sun's atmosphere made up of thin hot gases is called **Corona**.
- The middle surface is chromosphere. The temperature of Photosphere is 6000°C, that of chromosphere about 32400°C and that of Corona about 2700000°C.
- The planet travels with the sun through millions of stars in our galaxy at a speed of about 70,000 kms per hour.
- The sun is about 150 million kms away from the earth.
- Light takes about 8 minutes 20 seconds to reach the earth from the sun.

- Solar Winds.** The sun is continuously emitting streams of proton in all directions either as spiral streams called Solar Wind or bouts of incandescent material called **Solar Flares**. Solar flares, being hot ionised gases, pose danger to satellite communication.
- Aurora:** The constituent particles of the solar wind are trapped by the Earth's magnetic field and enter the Earth's upper atmosphere as Aurora. It is described as Aurora Borealis in the Northern hemisphere and Aurora Australia in Southern hemisphere.
- Bright spots are called Plages and dark spots are called Sunspots.

### Specifics of the Sun

Average distance from the Earth	149598900 km
Diameter	1391980 km
Temperature of the core	15000000°C
Rotation speed	25.38 days (with respect to Equator) 33 days (with respect to Poles)
Mass	330000 times of earth

### THE PLANETS

- These are opaque bodies.
- A ninth planet has been recently discovered by NASA named **Carla**.
- The sequence of planets according to their distance from the sun is Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and 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 and Mercury.

### CLASSIFICATION OF PLANETS

- Planets are classified into the following two groups inner and outer planets. These are separated by asteroid belt.

Inner Planet	Outer Planet
They have a core of molten metals.	They have ring system around the Sun.
They include: Mercury, Venus, Earth and Mars	They include: Jupiter, Saturn, Uranus and Neptune.

### MERCURY

- The planet has no water on it.
- Mercury planet has no gases like CO<sub>2</sub>, N<sub>2</sub>, H<sub>2</sub> and O<sub>2</sub> which can act as building blocks of life.
- Mercury planet has no protective blanket like Ozone.

### VENUS

- The planet is nearest to the Earth and is also the brightest planet.
- Venus is known as the “**Evening Star**” as well as “**Morning Star**”.
- Known as the “**Veiled Planet**”.
- Also known as the “**Earth’s twin**”. It also rotates clockwise like Uranus.
- Venus is the hottest planet (even hotter than Mercury).
- Venus has no water on it. There is no sufficient oxygen on the Venus.

### THE EARTH

- 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.
- Earth is known as the “**watery planet**” or the “**blue planet**”.
- Earth is the only known planet which provides sustenance or life on it.
- The earth has all the essential elements like carbon (in the form of CO<sub>2</sub>), hydrogen (H<sub>2</sub>), nitrogen (N<sub>2</sub>) and oxygen (O<sub>2</sub>) which act as building blocks for the origin of life.
- It has ‘**Goldilock Zone**’.
- 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.

Inner Planet	Outer Planet
They are called as terrestrial or rock planets. They are nearer to the Sun.	They are called as Jovian or Gaseous planets. They are far away from the Sun.

- The earth has a protective blanket of ozone layer high up in its atmosphere to save life from the harmful ultra violet radiations coming from the sun.

## THE MOON

- The Moon is the only satellite of the earth.
- It has diameter of 3475 km and its circumference is 10864 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 highest mountain on the moon is Liebuity Mountain, which is 10,660 metre 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.
- Gravitational pull of Moon is one-sixth (1/6th) that of the earth.
- Moon is also known as the fossil planet.

## MARS

- Iron-rich red soil and pink sky of **Mars** give it the name, "**Red Planet**".
- Phobes and Demos are two satellites of Mars.

## JUPITER

- Jupiter is also known as **winter planet** as its average temperature is very low (-148°C).
- Ganymede, satellite of Jupiter is the **largest satellite** in the Solar System.

## SATURN

- 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 is the first planet to have been discovered by the use of a telescope.
- Uranus is extremely cold, having surface temperature -190°C and is surrounded by 13 rings.
- 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 **very similar to Uranus** and can be considered as its twin.
- Neptune is surrounded by methane rings of sub-zero temperature.

## PLUTO IS NOT 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.
- 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**.

### Specifics of the Planets

Biggest planet	Jupiter
Biggest Satellite	Ganymede
Blue planet	Earth
Green planet	Uranus
Brightest planet	Venus

Specifics of the Planets	
Brightest star (outside solar system)	Sirius (Dog Star)
Closest star of solar system	Proxima Centauri
Coldest planet	Neptune
Evening star	Venus
Farthest planet from Sun	Neptune
Planet with maximum number of satellites	Jupiter
Hottest planet	Venus
Densest planet	Earth
Morning star	Venus
Nearest planet to Earth	Venus
Nearest planet to Sun	Mercury
Red planet	Mars
Smallest planet	Mercury
Earth twin	Venus

- Jupiter, Saturn, Uranus and Neptune are the outer planets.
- Mercury, Venus, Earth and Mars are the inner planets.
- Venus rotates from East to West.
- Uranus rotates from North to South.
- Mercury is the fastest revolving planet.
- Pluto is the slowest revolving dwarf planet.
- Planet revolves around the Sun in Anti-clockwise direction.
- Mercury is the nearest planet to Sun.
- Venus is the nearest planet to Earth.
- Neptune was farthest from Sun during 1979-99.
- Now Pluto (dwarf planet) is the farthest from the Sun after 1999 for the next 228 years.
- Venus is the hottest planet, its atmosphere contains 97% CO<sub>2</sub>.
- Pluto is the coldest and smallest dwarf planet.
- Jupiter is the biggest planet.
- Earth is the densest planet.
- Venus is the brightest planet.
- Earth is the blue planet.
- Mars is the Red planet.
- Venus is the Morning and Evening Star.
- Pluto is the dwarf planet.
- Venus is also called the Earth's twin.
- Saturn and Uranus is known as the planets with rings.
- Pluto is the Biplanet i.e. dwarf planet.
- Mercury has the shortest year.
- Mercury has the maximum diurnal range of temperature.

## ■ ASTEROIDS (OR PLANETOIDS)

- Asteroids are also known as minor planets.
- 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'.
- 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 its and the other moving behind it.

## ■ FACTS TO REMEMBER

- Saturn has maximum number of satellites.
- Pluto has the most electric orbit.
- Jupiter is the fastest rotating planet.
- Venus is the slowest rotating planet.
- Venus has the same period of rotation as revolution.
- The length of the day is nearly same on the planet Mars as that of the Earth.
- Jupiter, Saturn, Uranus and Neptune are the Jovian planets.
- The angle of inclination of Mars is nearly same as that of Earth.

Planets and their Satellites	
Planet	Natural Satellites
Earth	Earth's moon
Mars	Phobos, Deimos
Jupiter	Adrastea, Metis, Amalthea, Thebe, Io, Europa, Ganymede, Callisto, Leda, Himalia, Lysithea, Elara, Ananke, Carme, Pasiphae, Sinope
Saturn	Atlas, Prometheus, Pandora, Janus, Epimetheus, Mimas, Enceladus, Tethys, Calypso, Dione, Helene, Rhea, Titan, Hyperion, Iapetus, Phoebe.

Uranus	Cordelia, Ophelia, Bianca, Cressida, Desdemona, Juliet, Portia, Rosalind, Belinda, Puck, Miranda, Ariel, Umbriel, Titania, Oberon
Neptune	Naiad, Thalassa, Despina, Galatea, Larissa, Porteus, Triton, Nereid
Pluto (dwarf planet)	Charon and 2003 UB 313

## METEORS AND METEORITES

- Meteors and Meteorites are also called shooting stars.
- 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 are made up to frozen gages which hold together rocky and metallic materials.
- A comet becomes visible only when it travels close to the sun.
- Its ice melts and the age 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.

## STARS

- Stars are heavenly bodies made up to **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 they are at such great distance that relative changes in position become noticeable only over the centuries.
- A star's colour indicates the temperature of its surface. Blue colour denotes maximum temperature.

## SOME INFORMATION ABOUT THE STARS

- Brightest Star outside solar system is Sirius, also called Dog Star.

- Closest star to our solar system is Proxima Centauri (4.2 light years away).

## CONCEPT OF BLACK HOLE AND CHANDRASHEKHAR LIMIT

- The black holes are formed due to collapse and compaction under gravity, at the end of the life cycle.
- A renowned Indian Physicist Chandrashekhar had predicted an upper limit to the mass of stars, which is called as Chandrashekhar limit. It is 1.44 times the mass of sun.

### Facts about Stars

- There are  $10^{22}$  stars in the Universe.
- About 8000 stars are visible from the Earth with naked eye.
- 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 has been divided into units. These units are known as **Constellations**.
- At present **88 constellations** are recognized.

## EARTH'S GALAXY: THE MILKY WAY

- The Milky Way** is a large spiral-shaped galaxy.
- 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.
- It takes about 250 million years to complete one revolution.

## LIGHT YEAR

- Large distances in outer space are measured in light years.
- A light year is the distance light travels in one year at the speed of 299,792,458 metres per second or roughly 300,000 km per second.
- No star, apart from the sun, is close enough to Earth to appear as anything but a point of light.

## ANDROMEDA: EARTH'S CLOSEST GALACTIC NEIGHBOUR

- **Andromeda** is a spiral galaxy and also our closest neighbour.
- 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.
- About 30 galaxies, along with the Milky Way and the Andromeda so grouped in one cluster called the Local Group.

## NEBULAE

- Nebulae are hanged interstellar clouds of gas and dust that appear as faint, misty patches of light scattered all over the sky.
- A nebula depends for its luminosity upon the presence of stars that have either arisen from it or are contained in it.
- 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 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.
- When a ship approaches land, its funnel of 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

- 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.
- 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 **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 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**.

## Geological History of the Earth

Period	Beginning (years ago)
<b>Cenozoic Era Quaternary Period</b>	
Holocene Epoch	10000
Pleistocene Epoch	2 million
<b>Tertiary Period</b>	
Pliocene Epoch	5 million
Miocene Epoch	24 million
Oligocene Epoch	38 million
Eocene Epoch	55 million
Palaeocene Epoch	63 million
<b>Mesozoic Era</b>	
Cretaceous period	138 million
Jurassic period	205 million
Triassic period	240 million
<b>Palaeozoic Era</b>	
Permian period	290 million
Lower carboniferous period	330 million
Upper Carboniferous period	360 million
Devonian period	410 million
Silurian period	435 million
Ordovician period	500 million
Cambrian period	570 million
Pri-Cambrian period	4.5 billion

## BIOSPHERE

- The part of the earth where life exists is called the **Biosphere** ('bios' means 'life').

## 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% of the total surface area of the earth.

## HYDROSPHERE

- Hydrosphere (or sea) covers 70.70% of the total surface area of the earth.
- Water is freely available in the gaseous, liquid and solid state.

## LATITUDE

- Latitude is the angular distance of a point on the earth surface from the centre of earth, measured in degree. These lines are called parallels of latitude and on the globe they are circles.
- The distance between any two parallels of latitude is always equal. One degree latitude = Approx 111 km.
- The most important lines of latitudes are Equator ( $0^{\circ}$ ), the Tropic of Cancer ( $23\frac{1}{2}^{\circ}\text{N}$ ), The Tropic of Capricorn ( $23\frac{1}{2}^{\circ}\text{S}$ ) the Arctic Circle ( $66\frac{1}{2}^{\circ}\text{N}$ ) and the Antarctic Circle ( $66\frac{1}{2}^{\circ}\text{S}$ ).

## LONGITUDE

- Longitude is the angular distance of a point on the earth surface along the equator, east or west from the **Prime Meridian**.
- Prime Meridian is the semi-circle from pole to pole, from which all the other meridians radiate Eastwards and Westwards up to  $180^{\circ}$ .
- $180^{\circ}$  meridian (**International Date Line**) is exactly opposite to the Prime Meridian. Such points are called anti-podal points.

## LOCAL TIME (L) AND TIME ZONES

- The Indian Government has accepted the meridian of  $82.5^{\circ}$  degree east for standard time, which is 5 hrs. 30 mins. ahead of the Greenwich Mean Time.
- The earth is divided into 24 longitudinal zones, each being 15 degree or 1 hour apart in time ( $360$  degree =  $24$  hours,  $360/24=15$  degree in 1 hour) or 1 degree in 4 minute are called Standard Time Zones.
- Russia has as many as 11 time zones.
- Both USA and Canada have five time zones.

Longitudes are measured from zero to  $180^{\circ}$  east and  $180^{\circ}$  west (or  $180^{\circ}$ ) and both  $180^{\circ}$  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.

## INTERNATIONAL DATE LINE (IDL)

- The International Date Line (IDL) is an imaginary line on the surface of the Earth, that runs from the north to the south pole and demarcates one calendar day from the next.
- It passes through the middle of the Pacific Ocean, roughly following the  $180^{\circ}$  longitude but it deviates at Aleutian Islands, Fiji, Samoa and Gilbert Islands.
- The International Date line is on the opposite side of the Earth Prime Meridian.
- The Prime Meridian helps to define Universal Time and is the meridian from which all other time zones are calculated.
- A traveller crossing the International Date Line eastbound (i.e., from Japan to USA) subtracts one day, or 24 hours, so that the calendar date to the west of the line is repeated after the following midnight.
- Crossing the IDL westbound results in 24 hours being added, advancing the calendar date by one day.

Longest day in the Northern hemisphere	21 June
Shortest day in the Northern hemisphere	22 December
Equal day and night in the Northern hemisphere	21 March and 23 September
Longest day in the Southern hemisphere	22 December
Shortest day in Southern hemisphere	21 June
Equal day and night in the Southern hemisphere	21 March and 23 September

## THE EARTH'S MOVEMENT

- It rotates on its own axis from west to east once in every 24 hours. It causes day and night.
- It revolves around the sun in an orbit once in every 365 days. It causes the season and the year.

## ROTATION OF EARTH

- Spins on its imaginary axis from west to east in 23 hours, 56 minutes and 40.91 seconds.
- The rotational speed at equator is maximum (1967 km/hr) and then decreases towards the poles, where it is zero.

The rotation of the earth has the following implications such as

- Causation of day and night.
- Change in the direction of winds and Ocean currents.
- Rise and fall of **tides** everyday.
- A difference of one hour between the two meridians which are  $15^{\circ}$  apart.

## REVOLUTION OF EARTH

- It is the earth's motion in elliptical orbit around the sun.
- It takes 365 days, 5 hours, 48 minutes and 45.51 seconds. The revolution of earth results in:
  - Changes of season.
  - Variation of the length of the days and nights at different times of the year.
  - Shifting of the wind belts.

## PERIHELION

- The position of the earth of 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 kilometres.

## APHELION

- The position of the earth of 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 distances of 152 million kilometres.

## SUMMER SOLSTICE

- On June 21, the earth is so located in its orbit that the sun is overhead on the Tropic of Cancer ( $23\frac{1}{2}^{\circ}\text{N}$ ).
- 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 sun is overhead on the Tropic of Capricorn ( $23\frac{1}{2}^{\circ}\text{S}$ ), 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.
- 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 mid-summer, 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.

## ECLIPSES

- A 'solar eclipse' occurs between sun rays and 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.

### Specifics of the Earth

Age	4.6 billion years
Mass	$5.9 \times 10^{-24} \text{ kg}$
Volume	$1083 \times 10^{12} \text{ km}^3$

Mean Density	5.513g /cm <sup>3</sup>
Shape	Oblate spheroid or a gleoid
Radius of Earth	6400 km
Total surface area	509700000 sq km
Land area (29%)	148400000 sq km
Water area (71%)	361300000 sq km
Rotation time	23 hours, 56 minutes and 4.09 seconds
Revolution time	365 days, 5 hours, 48 minutes and 45.51 seconds
Orbit speed about the Sun	29.8 km/second
Mean surface temperature	14°C
Mean distance from the Sun	149598500 km
Inclination of polar axis from orbit plane	23°26 min and 59 sec
Deepest Ocean point	11034 m, Marina Trench

## 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.
- The crust is the outermost and the thinnest layer of the earth. This layer has the least density and its thickness varies about 8 to 40 km. **Mohorovicic Discontinuity** or Moho marks the lower limit of the crust.
- This layer is also called **Sial** (silica and aluminium). The average density of this layer is 2.7 gm/cm<sup>3</sup>.
- It is thicker in the region of the continents and thinner in the region of the Ocean floors.
- 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.

### THE MANTLE

- This layer is the intermediate layer of the earth in terms of both its location and density.
- It is about 2900 km in thickness.
- It is divided into further two layers upper mantle and lower mantle. The upper part of the mantle is called the **Asthenosphere**, which is about 250 km thick.
- The mantle layer is also known as **Sima** (silica and magnesium).
- The average density of this layer is about 5.68 gm/cm<sup>3</sup>.
- The transitional zone separating the mantle from the core is called the **Gutenberg Discontinuity**.

### DISCONTINUITIES

The various layers are separated by discontinuities, which are evident in seismic data.

- Concord discontinuity lies between upper crust and lower crust.
- Mohorovicic discontinuity lies between crust and montle.
- Gutenberg discontinuity lies between core and mantle. Here the earth's density as well as velocity of 'P' waves increases.
- Lehman discontinuity divides upper core and lower core.
- Repetti discontinuity lies between upper mantle and lower mantle.

### CORE

- The core is the innermost layer of the earth and occupies its center. It is about 3500 km in radius.
- The outer part of the core is believed to have the properties of a liquid and the innermost part of the core (about 1255 km in radius) may be called solid or crystalline.
- This layer is also known as **Nife** (nickel and iron).
- Temperature of the core is between 2200°C and 2750°C.
- Density of this part of the earth is 17.2 gm/cm<sup>3</sup>.

### COMPOSITION OF EARTH

- Made up of over 100 elements.

## Eight Important Elements

Oxygen	46.5%
Aluminium	8.13%
Calcium	3.63%
Potassium	2.62%
Magnesium	2.09%
Silicon	27.72%
Iron	5.01%
Sodium	2.85%

### CONTINENTAL DRIFT THEORY

- This theory was given by **Alfred Wegener**, in 1915, to explain the origin and evolution of the continents and the oceans.
  - According to this theory, about 250 million years ago, there was only one continent named pangea surrounded by one mass of waterbody named Panthalassa.
  - The present shape of the continents and Oceans is due to the breakup of Pangea.
  - The breaking process started about 200 million years ago.
  - The northern rifts cut pangea from east to west creating laurasia in the north and Gondwana land in south.
  - A shallow sea called tethys was situated between the laurasia and Gondwana land.

### SEA FLOOR SPREADING THEORY

- The concept of sea floor spreading was first formulated by **Harry Hess** in the year of 1960.
- According to this theory, the mid oceanic ridges were situated on the rising thermal convective current coming from mantle.
- The oceanic crust moves in opposite directions from mid oceanic ridges and thus there is continuous upwelling of new molten materials along the mid oceanic ridges. These molten masses cool down and solidify to form new crust.

### PLATE TECTONICS

- Plate tectonic is a scientific theory that describes the large-scale motions of earth's lithosphere.
- The theory of Plate tectonics states that the lithosphere is divided into several rigid segments, which include both oceanic and

continental crusts. These segments are called plates and they are moving on the asthenosphere, which is not a liquid, but a solid which flows under stress.

- About 20 such plates have been identified. There are seven major plates such as Eurasia, Antarctica, North America, Pacific, African and Indian Plate.

### PLATE MARGINS

Depending upon the type of movement, plate margins are three types:

- Divergent plate margin (constructive margins)
  - Convergent plate margin (Destructive margins)
  - Parallel plate margin (Conservative-margin or transform boundary)
- Collision can occur between two oceanic plates, one oceanic and one continental plate or two continental plates.

### EXOGENETIC OR EXTERNAL FORCES

- The forces affecting the surface of the earth from outside are called the external or exogenetic forces.
- Weathering** and **Erosion** are the examples of external forces.

### ENDOGENETIC OR INTERNAL FORCES

- The forces originating in the interior of the earth are called the internal or the endogenetic forces.
- Volcanoes**, **Earthquakes** and **Landslides** are the examples of internal forces. These forces are of two types:

#### Sudden Endogenetic Forces

- Sudden endogenetic forces are the result of long period preparation deep within the earth.
- But their cumulative effects on the earth's surface are quick and sudden.

#### Diastrophic Forces

- Diastrophic forces include both vertical and horizontal movements which are caused due to forces deep within the earth. These diastrophic forces operate very slowly and their effects become discernible after thousands and millions of years.

- These forces, termed as constructive forces effect larger areas of the globe and produce meso level reliefs for example, mountains, plateaus, plains, lakes, big faults etc.
- These diastrophic forces are further subdivided in two groups namely epirogenetic forces and orogenetic forces.

### Epirogenetic forces

- It causes upliftment and subsidence of continental masses through upward movements and are infact vertical movements. These forces and resultant movements affect larger parts of the continents.

### Orogenetic forces

- Orogenetic movements is caused due to endogenetic forces working in horizontal movement. Horizontal forces and movement are also called as tangential forces.
- Orogenetic or horizontal forces work in two ways, namely
  - in opposite direction and
  - towards each other
- When it operates in opposite direction, called tensional force. Tensional force create faulting, cracking and fracture. Tensional forces are also called as divergent forces.
- The forces when operates face to face, is called compression forces or convergent forces. Compression creates folding and wrapping.

## ROCKS

- The **solid parts of the earth's crust are called rocks.**
- Minerals are obtained from rocks.
- Rocks are classified in three main types depending on the process of their formation:
  - Igneous
  - Sedimentary
  - Metamorphic

### IGNEOUS ROCKS

- Hot lava pours out at the time of volcanic eruptions and cools down later on, 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**.
- Igneous rocks are generally **harder and granular**.
- There are no **layers** in igneous rocks.
- Fossils** are **not found** in igneous rocks.
- 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.
- 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%.
- Other examples of igneous rocks are- Granite, Diorite, Dolerite, Punic stone, Basalt and Gabbro.

### SEDIMENTARY ROCKS

- They are formed by the deposition, sedimentation and lethification of sediments over a long period of time.
- Sometimes the remains of plants, dead animals etc. are found in the deposited material.
  - Limestones, chalk, dolomite change to marble.
  - Sandstone changes to quartzite.
  - Granite changes to gneiss.
  - Shale changes to slate.
- They are fossiliferous. About 75% of the surface area of globe is covered by the sedimentary rocks, but 95% of the crust is composed of igneous and metamorphic rocks.
- Sandstone, limestone, chalk, corals and shale are some examples of sedimentary rocks.

### METAMORPHIC ROCKS

- The nature of igneous and sedimentary rocks changes due to the effect of tremendous heat or pressure, and new, transformed rocks, called **metamorphic rocks**, are formed. Uranium is found in metamorphic rocks.
- The layers of sedimentary rocks hold all reserve of coal, oil and natural gas.

## EARTHQUAKES

- The sudden tremors or shaking of the earth's crust is called an **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'** deals with the study of earthquake.
- 'Richter scale'** and **'Mercalli scale'** are the instruments to measure and 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.
- The waves generated by earthquake are called seismic waves and they are classified into 3 types such as:
- Primary Waves (P Waves)**: These are the waves of short wavelength and high frequency. They are longitudinal waves and can travel through solid, liquid and gases.
- Secondary Waves (S Waves)**: These are the waves of short wave length and high frequency. They are transverse waves, which travel through all solid particles only.
- Surface Waves or Long Waves (L Waves)**: They are the waves of long wavelength, confined to the skin of the earth's crust. It causes most of the earthquake's structural damage.

### SHADOW ZONES

- There are some specific areas where earthquake waves do not occur or occur rarely, such areas are termed as shadow zones.
- They are located between  $105^{\circ}$  and  $140^{\circ}$  from epicentre.

### THE EARTHQUAKE ZONES IN INDIA

- The Indian plate is moving from south to north. That is why there are earthquakes in the Himalayan regions.

## VOLCANOES REALSCAPE

- There are three types of Volcanoes:
  - Active Volcanoes
  - Dormant Volcanoes
  - Extinct Volcanoes

## DISTRIBUTION OF EARTHQUAKES

- Most of the world earthquakes occur in:
- The zones of young fold mountain.
  - The zones of lodging and faulting.
  - The zone of junction of continental and oceanic margin.
  - The zone of active volcanoes.
  - Along different plate boundaries.

## THE TRADITIONAL ZONES OF EARTHQUAKES

- Circum-Pacific belt
- Mid-Continental belt
- Mid-Atlantic belt

## VOLCANIC ERUPTIONS

- Volcanic eruptions are closely associated with several integrated processes such as:
- Gradual increase in temperature with increasing depth, due to the heat generated by degeneration of radioactive elements inside the earth.
- Origin of magma due to the lowering of the melting point caused by reduction in pressure of overlying rocks due to fractures caused by splitting of plates.
- Ascent of magma due to pressure from gases and vapour.
- The pouring out of the magma or molten rock through ground surface is called a **volcanic eruption**.
- At the time of eruption, the magma, steam, fragments of rock, dust and gaseous substances are ejected with great force from under the ground surface through a pipe like passage.
- The opening of this pipe on the earth's surface is known as the vent which forms a **crater**.

## TYPES OF VOLCANIC ERUPTIONS

- Volcanic eruptions are classified into two types depending on the manner of ejection of the magma:
  - Central eruption
  - Fissure eruption

## CENTRAL ERUPTION

- This type of eruption is sometimes very explosive, because lava, steam, gas, dust, smoke, stone fragments are ejected 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, the **Fujiyama** in Japan and the **Vesuvius and Mount Etna** in Italy.

## 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.
- Basalt plateaus are formed due to these eruptions.
- In Maharashtra, the fertile black regur soil has been formed from basalt rocks. It is also called **black cotton soil**.

Volcanoes On the Basis of Periodicity of Eruptions	
Active volcano	Volcanoes which erupt periodically e.g., Etna (Sicily), Stromboli (Lepari Island), Mayon
Dormant volcano	Volcanoes which become quiet after their eruption for some time e.g., Fujiyama (Japan), Krakatoa (Indonesia), Vesuvius (Italy).
Extinct volcano	They have no indication of future eruption

## VARIOUS VOLCANIC BELTS

- Circum-Pacific Belt (Fire girdle of the Pacific or the fire ring of the Pacific)**: It extends across the Kamchatka Peninsula, Kurile Islands, the Islands of Japan, Philippines, New Guinea, New Zealand and the Solomon Islands. Highest volcanic peaks—Cotopaxi (South America), Fujiyama (Japan), Valley of ten thousand smokes (Alaska).

- Mid-continental Belt**: Volcanic zones of convergent continental plate margins. It includes volcanoes of alpine mountain chain, the mediterranean sea and fault zone of eastern Africa of stramboli, Vesuvius, Etna, Kilimanjaro etc.

- Mid-Atlantic Belt**, in which the volcanoes are fissure eruption type. e.g., Iceland, Canary Island, Cape Verde, Azores etc.

## WEATHERING

- It is the process of disintegration or decomposition of rocks in situ by natural agents. It is a static process.
- Physical weathering**: It involves rocks disintegration without any change in the chemical constituents of the rocks.
- The factors responsible for physical weathering are temperature change, crystallisation of water into ice, the pressure release mechanism.
- Chemical weathering**: It involves the decomposition due to chemical changes. There are various chemical processes which cause chemical weathering such as solution, oxidation, carbonation, hydration and hydrolysis.

Process	Mechanism of chemical weathering
Solution	It involves the dissolution of soluble particles and minerals from the rocks with the help of water.
Oxidation	It represents addition of oxygen to form oxides.
Hydration	It is the process of addition of water to the minerals.
Carbonation	It is the reaction of carbonate or bicarbonate ions with minerals.
Hydrolysis	It is the process wherein both minerals of rocks and water molecules decompose and react in such a way that new mineral compounds are formed.

- Biological weathering**: Plants and animals, including man, largely control it.

## EROSION

- It involves removal of rock material and then transportation of it.

# LANDFORMS

## MOUNTAINS

- Mainly there are three types of landforms—Mountains, Plateaus, and Plains.
- The height of mountains is over 600 metres and these have conical peaks. On the basis of origin there are four types of mountains; Block Mountains, Residual Mountains, Accumulated Mountains and Fold Mountains.

### BLOCK MOUNTAINS

- They are formed when great block of earth's crust may be raised or lowered due to tectonic activities.
- When the earth's crust cracks due to tension or compression, faulting takes place.
- Examples of Block Mountain: Narmada, Tapti and Damodar valley in India, the Vosges in France, Salt Range in Pakistan and Block forest (Rhine valley) in Germany.

### VOLCANIC MOUNTAINS

- They are formed due to the accumulation of volcanic material.
- It is also called as Mountains of Accumulation.
- Examples: Mt. Fuji (Japan), Cotopaxi in Andes, Vesuvius and Etna in Italy, Mt. Mayon (Philippines), Kilimanjaro in Africa, Mt. Merapi in Sumatra etc.

### RESIDUAL OR DISSECTED MOUNTAINS

- They are formed as a result of erosion of plateaus and high plains by various agents of erosion.
- Examples: Catskill mountains of New York, Nilgiri, Parasnath, Girnar and Rajmahal, Vindhya ranges, Aravallis, Satpura, Eastern and Western Ghats of India.

### ACCUMULATED MOUNTAINS

- These are formed due to accumulation of sand, soil, rocks, lava, etc. on the Earth's crust, e.g., sand dunes.

### FOLD MOUNTAINS

- It is formed due to the compressive forces generated by endogenetic forces (earthquake, landslide, etc.).
- Examples of fold mountains are Himalayas, Alps, Andes, Rockies, Atlas, etc.
  - Young/New Fold Mountains:** It came into existence after the continental drift. Himalayas are regarded as the youngest mountains in the world.
  - Old Mountains:** They belong to pre-drift era, then subject to denudation and uplift, e.g., Aravallis (India), etc.

### Major Mountain Ranges

Range	Location	Length (km)
Andes	South America	7200
Himalayan	South Central Asia	5000
Karakoram and Hindukush		
Rockies	North America	4800
Great dividing range	East Australia	3600
Atlas	North West Africa	1930
Caucasus	Europe	1200
Alaska	USA	1130
Alps	Europe	1050

## PLATEAUS

- Generally the height of plateau ranges from 300 to 500 feet.
- Tibetan Plateau (5000 m) is the highest plateau in the world.
- Tectonic Plateau:** These are formed by earth movements, which cause uplift and are normally of a considerable size and fairly uniform altitude.

- When plateaus are enclosed by fold mountains, they are known as Intermont Plateau.
- Examples of Tectonic Plateau are: Tibetan Plateau between the Himalayas and the Kunlun and the Bolivian Plateau between two ranges of the world.

### VOLCANIC PLATEAU

These are formed by accumulation of lava, e.g., Deccan Plateau (India).

### DISSECTED PLATEAU

Through the continual process of weathering and erosion by running water, ice and winds, high extensive plateau are gradually worn down, and their surface made irregular as example is the Scottish Highlands.

### INTERMOUNTAINOUS PLATEAU

Plateau formed between mountain, Example: Tibetan Plateau.

### MOUNTAINSTEP PLATEAUS

The flat region between a plain and the base of a mountain.

### CONTINENTAL PLATEAUS

These are formed when the Lacolith inside the earth comes to the surface due to weathering, e.g., the Southern Plateau.

Plateau	Location
Tibetan Plateau	Between Himalayas And Kunlun Mountains
Deccan Plateau	Southern India
Arabian Plateau	South West Asia
Plateau of Mexico	Mexico
Plateau of Colombia	U.S.A.
Plateau of Madagascar	Madagascar
Plateau of Alaska	North West North America
Plateau of Bolivia	Andes Mountains
Great Basin Plateau	South of Colombia Plateau U.S.A.
Colorado Plateau	South of Great Basin Plateau U.S.A.

### DOMELIKE PLATEAU

These are formed due to the movement of man and animals on the surface, e.g., Ramgarh Plateau.

## PLAINS

Plains can be defined as flat area with low height (below 500 ft.).

### CLASSIFICATION OF PLAINS

- Structural plains:** Formed due to the uplift of a part of the sea floor e.g., the great plains of U.S.A.
- Erosional plains:** Formed when the elevated tract of land is worn down to a plain by the process of erosion e.g., plain of north Canada.
- Depositional plains:** Formed by filling up of sediments into depressions along the foothills, lakes and seas e.g Indo-Gangatic plain.

### WEATHERED PLAINS

The plain formed due to weathering by rivers, glaciers, winds, etc.

### LOESS PLAINS SETYS

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 rivers.

## 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.

### COMPOSITION OF THE ATMOSPHERE

- (i) Nitrogen–78%, (ii) Oxygen–21%, (iii) Argon–0.93%, (iv) Carbon dioxide–0.03%, (v) Neon–0.0018%, (vi) Helium–0.0005%, (vii) Ozone–0.006%, (viii) Hydrogen–0.0005%.
- 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.
- Dust** intercepts and reflects incoming insolation.
- Dust in the atmosphere contributes to the red and orange colour of sunrise and sunset.

## STRUCTURE 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. It contains more than 90% of gases in the atmosphere.
- At every **165 m**, there is a drop of  $1^{\circ}\text{C}$  (or  $6.4^{\circ}\text{C}$  per km). This is called **Normal Lapse Rate of Temperature**.
- Tropopause** separates Troposphere from Stratosphere.
- All weather phenomena** such as condensation, precipitation and storms, etc. occur in the troposphere only.
- The height at which the temperature stops decreasing is called **Tropopause**. Here the temperature may be as low as  **$-58^{\circ}\text{C}$** .

### STRATOSPHERE

- The Stratosphere extends up to about 50 km, where **Stratopause** separates it from the mesosphere.
- In this layer, the temperature increases with increase in height. This phenomenon is known as **temperature inversion**.
- The temperature rises in this layer from about  $60^{\circ}\text{C}$  at Stratopause.
- The part of the stratosphere, in which there is a concentration of ozone, is often called **Ozonosphere**.
- This is the **second layer** of the atmosphere. It extends from the Tropopause to about **50 km**.
- Temperature increases due to the absorption of the **ultraviolet radiation** of the Sun by **ozone** present in this layer.
- It provides idle flying conditions for large jet planes.
- The end of the Stratosphere is called the **Stratopause**.

### 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  **$-90^{\circ}\text{C}$** .
- The end of this layer is known as the **Mesopause**.
- It is considered the coldest layer of the atmosphere.

### IONOSPHERE

- Ionosphere is located above the mesosphere and extends up to about 600 km.
- This layer is also called as ionosphere because it contains electrically charged ions that reflect the radio waves back to the earth thus making radio communication possible.

### Thermosphere

- The zone between the 85 km and 400 km above the surface is often called thermosphere. In this layer, the temperature increases with increasing altitude.
- The upper part of the thermosphere contains only the lighter gases like helium and hydrogen.

## EXOSPHERE AND MAGNETOSPHERE

- The outermost part of the atmosphere of the earth is called exosphere.
- This zone of the atmosphere extends up to a height of about 900 km.
- The outer part of the exosphere is called magnetosphere.

## CHEMICAL COMPOSITION OF THE ATMOSPHERE

- Homosphere up to 90 km:** In this region, the proportion of various constituents is same throughout.
- Heterosphere:** The recent data from the satellite studies suggested that beyond about 100 km the lightest gases separates out, forming several concentric layers around the earth.

### Greenhouse Effect and Global Warming

- The primary greenhouse gases in the earth's atmosphere are water vapour, carbon dioxide, methane, nitrous oxide and ozone.

- Global Warming** is the increase of earth's average surface temperature due to effect of greenhouse gases, such as carbon dioxide emissions from burning fossil fuels or from deforestation. This is a type of greenhouse effect.

### Montreal Protocol on Substances that Deplete the Ozone Layer

- It is an international treaty designed to protect the ozone layer from Chlorofluorocarbons (CFCs).

### Kyoto Protocol

- The Kyoto protocol is a protocol to the United Nations Framework Convention on Climate Change (UNFCCC), aimed at fighting global warming.
- The protocol was initially adopted on December 11, 1997 in Kyoto, Japan and entered to force on February 16, 2005.

## INSOLATIONS

- Solar radiation that is intercepted by the earth is known as Insolation.

- Insolation is measured with the help of **Pyrometers**.
- The earth's surface does not absorb all the energy that it receives. The proportion of the solar radiation reflected from the surface is called **Albedo**.

## HEAT BUDGET OF THE EARTH

- The Earth receives energy continuously from the sun, its temperature is almost constant except the long term climate changes. This is because the atmosphere loses an amount of heat equal to the gain through insolation. This mechanism of maintaining the same temperature by the atmosphere is called the Heat Budget or **Heat Balance**.
- If 100 units of energy reach the top of the atmosphere of the Earth, 14 units are absorbed directly by the atmosphere and 35 units are lost to space through reflection.
- The remaining 51 units reach the Earth's surface and absorbed by the Earth due to which the surface gets heated.

## 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.

## 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.
- Air is an extremely compressible gas having its own weight. The pressure exerted by air due to its weight is called atmospheric pressure on the Earth's surface.

## INFLUENCE ON THE ATMOSPHERIC PRESSURE

- Altitude:** Air pressure increases, when air descends due to the decrease in volume.

**Temperature:** The pressure of air rises, when its temperature falls.

## THE GLOBAL PRESSURE BELTS

### Equatorial Low Pressure Belt

- It is located on either side of the geographical equator in a zone extending between 5°N and 5° S.
- It is thermally induced because of the intense heating of the ground surface by the almost vertical sun rays.
- It represents the zone of convergence of north east and south east trade winds.
- This convergence zone is characterised by light and feeble winds and because of the frequent calm condition this belt is called as a belt of calm or doldrums.

### Subtropical High Pressure Belt

- It extends between 30° to 35° in both the hemispheres.
- This zone of high pressure is also called as horse latitude.
- It is dynamically induced as it owes its origin to the rotation of the Earth and sinking and setting down of winds.

### Subpolar Low Pressure Belt

- It extends between 60° to 65° in both the hemispheres.
- The low pressure belt does not appear to be thermally induced because there is low temperature throughout the year and as such there should have been high pressure belt instead of low pressure belt. Thus it is dynamically induced.

### Polar High Pressure Belt

- High pressure persists at the poles throughout the year because of the prevalence of very low temperature all the year round.

## MEASUREMENT AND UNITS OF ATMOSPHERIC PRESSURE

- The **mercury barometer** is the standard instrument for measuring atmospheric pressure.
- Standard sea level pressure is 76 km of 29.92 inches on this scale.**
- Orica atmospheric pressure (76 cm of mercury) = 760 mm of Hg = 1013.25 millibars (mb).

## ISOPLETH

Line drawn on map along which the value of a particular phenomenon is uniform.

### Some Important Isopleths

Isopleth	Reaction
Isobar	Equal Pressure
Isohaline	Salinity
Isohypse	Elevation above Sea
Isoneph	Cloudiness
Isobaths	Equal depth in Sea
Isohels	Sunshine
Isonif	Snow
Isocline	Slope
Isobronts	Thunderstorm at the same time
Isohyets	Rainfall
Isotherms	Temperature
Isodapan cost	Equal transportation distance

## WINDS

- Wind is the movement of air caused by the uneven heating of the earth by the sun.

## WINDS SYSTEM

- The air moves from high pressure to low pressure.
- The imaginary line joining the points having same pressure is called **isobars**.
- The winds blowing parallel to the isobars generally at the height of 600 m is called geotropic winds.

The factors that control the air motion are as follows:

- Pressure gradient
- Rotation of earth and coriolis force
- Centrifugal force.

## WINDS DIRECTION AND RELATED LAWS

- The Coriolis force generated due to the rotation of earth acts as a deflective force to the wind direction.
- Because of the Coriolis force, all the winds are deflected to the **right in the Northern**

**Hemisphere** while they are deflected to the **left in the Southern Hemisphere** with respect to the rotating earth. This is referred to as **Farrell's Law**.

- The Coriolis force is absent along the equator, but increases progressively towards the poles.

### PRIMARY MOVEMENT (PERMANENT WINDS)

- Trade winds
- Polar winds
- Westerlies

### SECONDARY MOVEMENT

- Cyclone:** Tropical and temperate, thunderstorms and tornado
- Anticyclone
- Seasonal wind i.e. monsoon
- Tertiary movement.

## PRIMARY WIND MOVEMENTS (PERMANENT WINDS)

### 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.

### 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 Hemispheres 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**.

### 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.

## SECONDARY WIND MOVEMENTS

### CYCLOCNES

- Cyclones are the centres of low pressure having increasing pressure outward and closed air circulation from outside towards the central low pressure in such a way that air blows inward in anti-clockwise direction in the northern hemisphere.
- Air blows inward in clockwise direction in the Southern hemisphere.

Cyclones are mainly of two types: 1. Tropical cyclones, 2. Temperate cyclones.

#### Tropical cyclones

- They are found in the trade wind belt between 8°–20° north and south.
- They travel from east to west in the easterly wind belt.
- Tropical cyclones are much smaller with a diameter of about 200 to 500 km.
- They are formed only in the summer.

#### Temperate cyclones

- Normally found between 30°–65° north and south in the sub polar frontal zone, where cold polar air mass meets the warm tropical mass.
- They move from west to east embedded in the westerly wind belt.
- They form over much large area with the diameter 300 to 1500 km.
- Temperate cyclones are frontal in nature.
- They are formed either over oceans or over the continents.

#### Anticyclone

- They are the wind system, which has the highest air pressure at the centre and lowest at the outer margins surrounded by circular isobars where wind blows:
  - from centre to outward in clockwise direction in northern hemisphere.
  - from centre to outward in anti-clockwise direction in southern hemisphere.

- They are generally associated with rainless fair weather and that is why they are called 'weatherless phenomena'.

### THUNDERSTORMS

- Thunderstorms are local storms characterised by swift upward movements of air and heavy rainfall with cloud thunder and lightening.
- Structurally, thunderstorms consist of several convective cells, which are characterised by strong updrift of air.

### TORNADO

- Tornadoes are very strong tropical cyclones of smaller size. In the Mississippi Valley (US), they are called **Twisters**.

## TERTIARY WIND MOVEMENT (LOCAL WINDS)

### LOCAL WINDS

- Chinook**-Hot, dry wind in Rockies, also called 'Snow eater'
- Foehn**-Hot, dry wind in Alps
- Khamsin**-Hot, dry wind in Egypt
- Sirocco**-Hot, moist wind from Sahara to Mediterranean Sea
- Solano**-Hot, moist wind from Sahara towards Iberian Peninsula
- Harmattan**-Hot, dry wind blowing outwards from the Interior of west-Africa, also called 'Guinea Doctor'
- Boro**-Cold dry Wind blowing outwards from Hungary to the North of Italy
- Mistral**-Very cold wind, which blows down from the Alps over France
- Punas**-Very cold dry wind blowing down towards the western side of Andes.
- Brickfielder**-hot wind in Australia
- Purga**-Cold wind in Russian Tundra
- Levanter**-Cold wind in Spain
- Norwester**-Hot wind in New Zealand
- Santa Ara**-Hot wind in Southern California in U.S.A.

### CLIMATIC WINDS OR PERIODIC WINDS

- Land and sea breeze and the Monsoon winds are typical examples of periodic winds.

### JET STREAM

- The strong and rapidly moving circumpolar westerly air circulation in a narrow belt of a few hundred kilometres width in the upper limit of troposphere is called Jet Stream.
- The extent of jet streams narrows down during the summer season because of their northward shifting while these extends up to 20° north latitude.

### HUMIDITY

- Humidity of air refers to the contents of the water vapour present in the air at a particular time and place.
- Humidity is measured by an instrument called hygrometer.
- Absolute humidity:** The total weight of moisture content per volume of air at definite temperature is called absolute humidity.
- Specific humidity:** The mass of the water vapour in grams contained in a kilogram of air and it represents the actual moisture present in a definite air.
- Relative humidity:** It is the ratio of the amount of water vapour actually present in the air having definite volume and temperature to the maximum amount the air can hold.
- Condensation** is the change of physical state of matter from gaseous phase into liquefied phase and is the reverse of **vapourisation**.
- When the relative humidity reaches 100% the air is completely saturated. The air temperature is said to be as **dew-point**.
- Smog** (Smoke + Fog) is a form of fog that occurs in areas, where the air contains a large amount of smoke.
- Fog** is made from the droplets of water suspended in the lower layer of the atmosphere.

### CLOUDS

- Clouds are a mass of small water droplets or tiny ice crystals.

#### There are four groups of clouds:

- High clouds 6000 m to 12000 m
- Middle clouds 2100 m to 6000 m
- Low clouds below 2100 m
- Clouds of great vertical extent 1500 to 9000 m

## ■ TYPES OF CLOUDS

### **High Clouds**

- **Cirrus:** Cirrus composed of small ice crystals, white wispy and fibrous in appearance.
- **Cirro Cumulus:** Composed of ice crystals, but globular or rippled in appearance.

### **Middle Clouds**

- **Alto Cumulus:** Composed of water droplets in layers and patches.
- **Alto Stratus:** Composed of water droplets forming sheets of grey or watery looking clouds.

### **Low Clouds**

- **Strato Cumulus:** Large globular masses, bumpy looking, soft and grey in appearance forming a pronounced regular and sometimes wavy pattern
- **Nimbo Stratus:** Dark grey and rainy looking, dense and shapeless, often gives continuous rains.

### **Great Vertical Extent**

- **Cumulus:** Round topped and flat based forming a whitish grey globular mass, consists of individual clouds units.

- **Cumulo Nimbus:** They have great vertical extent, white or black globular masses, whose rounded tops often spread out in the form of anvil. It is characterised by convectional rain, lightning and thunder.

## ■ PRECIPITATION

- **Convectional Rainfall:** It occurs due to thermal convection currents caused due to insolation heating of ground surface.
- **Frontal Rainfall:** It occurs due to upward movement of air caused by convergence of cold air masses against warm air masses.
- **Cyclonic Rainfall:** When the air is caused to rise upward due to cyclonic circulation, the resulting precipitation is called cyclonic rainfall.

## CLIMATE

Weather refers to the sum total of the atmospheric conditions in terms of temperature, pressure, wind moisture, cloudiness, precipitation and visibility.

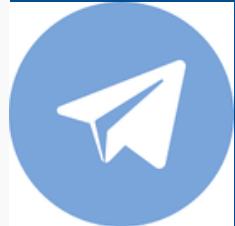
### World Climate Types

Climatic Zone	Climate type	Rainfall	Natural Vegetation
Equatorial zone 0°–10° N and S	1. Hot, wet equatorial	Rainfall all the year (80 inches)	Equatorial rain forest
Hot zone 10°–30° N and S	2 (a) Tropical Monsoon  (b) Tropical marine	Heavy summer rain (60 inches)	Monsoon forest
	3. Sudan type	Rain mainly in summer (70 inches)	Savana (tropical grassland)
	4. Desert type  (a) Saharan type  (b) Mid latitude type	Little rain (5 inches)	Desert vegetation scrub
Warm temperate zone (30°N–45°S)	5. Western margin (mediterranean type)	Winter rain (35 inches)	Mediterranean forests
	6. Central continental type (steppe type)	Light summer rain (20 inches)	Steppe temperate grassland

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	7. Eastern margin (a) China type (b) Gulf type (c) Natal type	Heavier summer rain (45 inches)	Warm wetforest and bamboo
Cool temperate zones (45°N–65°S)	8. Western margin	Rain in autumn and winter (30 inches)	Deciduous forests
	9. Central continental (siberian type)	Light summer rain (25 inches)	Coniferous forests
	10. Eastern margin (lauritton type)	Moderate summer rain (40 inches)	Mixed forests coniferous and deciduous.
Cold zone	11. Arctic or polar	Very light summer rain (10 inches)	Tundra mosses
	12. Mountain climate	Heavy rainfall variable	Alpine fern coniferous

## FORESTS

They are of the following types:

- (a) **Tropical Evergreen Rain Forests:** Such forests are found in the equatorial and the tropical regions with more than 200 cms annual rainfall. The leaves of trees in such forests are very wide. Examples: 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) **Temperate Mixed Forests:** Such forests are a mixture of trees and shrubs. Corks, oak, etc. are the major trees of these forests.
- (d) **Coniferous Forests or Triga:** These are evergreen forests. The trees in these forests have straight trunk, 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 sledge and Lichens grow here in the summer.
- (f) **Mountainous Forests:** Vegetation varies according to altitude.

## FAMOUS GRASSLAND OF THE WORLD

Grassland	Countries
Steppe	Eurasia
Prairie	U.S.A.
Pampas	Argentina
Veld	South Africa
Downs	Australia

## HYDROSPHERE

### OCEANS

- There are four oceans. In order of their size, they are: Pacific Ocean, Atlantic Ocean, Indian Ocean and Arctic Ocean.

### PACIFIC OCEAN

- It is the **deepest Ocean** with an average depth of 4,200 m.
- The **Mariana Trench** is the world's deepest trench with a depth of 11,033 metres (36,201 feet).
- Most of the islands of this Ocean are of **volcanic or coral origin**.

### ATLANTIC OCEAN

- The Atlantic Ocean has the **longest coastline**.
- The Atlantic Ocean is the **busiest Ocean for trade and commerce**.

- 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**.

### ■ INDIAN OCEAN

- 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.

### ■ ARCTIC OCEAN

- 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 less salinity than all the oceans have.

### Trench and their Location

Trench	Location	Depth
Mariana Trench	Western Pacific Ocean (Near Philippines and Japan)	10,911m
Tonga Trench	Southern Pacific Ocean (Near New Zealand)	10,882m
Kuril-Kamchatka Trench	Northern Pacific Ocean	10,542m
Philippine Trench	Philippines	10,540m
Kermadec Trench	New Zealand	10,047m

## RELIEF OF THE OCEAN BASIN

### ■ CONTINENTAL SHELF

- The shallow submerged extension of the continent is called the continental shelf.
- Extends to a depth of 100 fathoms (1 fathom = 1.8m).
- Average width 70 km; average slope 17 feet/mile or about 1°.
- Continental shelf covers 7.5% area of the oceans. It extends over 13.3% of the Atlantic Ocean, 5.7% of Pacific Ocean and 4.2% of Indian Ocean.

### ■ CONTINENTAL SLOPE

- Extends seawards from the continental shelf.
- Depth is 200–2000 fathoms (3660m)
- Average slope is 210.5 degrees.

### ■ CONTINENTAL RISE

- Continental rise is an area at the foot of the slope, slightly rising due to the accumulation of debris transported over the slope.

- Oil deposits occur here.
- Average slope –0.5° to 1°.

### ■ ABYSSAL OR THE DEEP SEA PLAINS

- It is the deepest and most extensive part of the oceanic floor.
- It covers about 75.9% of total oceanic area.
- Average depth 3000 m to 6000 m.

### ■ DEEPS/TRENCHES

- Trenches are narrow and steep sides of depressions.
- Marina Trench (challenger deep) is the deepest trench in the world situated in the NW Pacific Oceans, near Philippines. It is more than 11 km deep.

### ■ OCEANIC RIDGES

- Oceanic Ridges are formed by the volcanic activity along the spreading boundary of plates.
- It is thousand of km long and hundreds of km wide mountain range on the oceanic floor for example: mid oceanic ridges.

## SEAMOUNTS AND GUYOUTS

- A ridge rising more than 100 m above the Ocean floor is called seamount.
- The flat topped seamounts are called Guyouts.

## SUBMARINE CANYONS

- Submarine canyons are the deep gorges on the Ocean floor and are restricted to the continental shelves, slopes and rises.

## CORAL REEFS

- Coral reefs are formed due to accumulation and the compaction of skeletons of lime secreting organisms known as Coral Polyps.
- Corals are found mainly in the tropical oceans and sea because they require high mean annual temperature ranging between 20°C to 25°C.
- Corals do not live in deeper waters due to lack of sufficient sunlight and oxygen.

### Coral reef and their location

Coral Reef	Location
Great Barrier Reef	Queensland, Australia
Belize Barrier Reef	Belize
New Caledonia Barrier Reef	New Caledonia
Andros Barrier Reef	Bahamas
Red Sea Coral Reef	Red Sea
Pulley Ridge	Florida (USA)
Maldives	Indian Ocean
Raja Ampat Islands	Indonesia

## FRINGING REEFS

- It develops along the continental margins or along the islands.
- These types of reefs are found near Rameshwaram in the Gulf of Mannar.

## BARRIER REEFS

- Largest coral reefs off the coastal platform, but parallel to them.
- The reef lies at a distance away from the coast.

## ATOLL

- A reef of narrow growing corals of horse-shoe shape and crowned with palm trees is called an atoll.

- It is formed around an island or in an elliptical form on a submarine platform.
- Funafuti atoll of Ellice Islands is a famous atoll also found in Lakshadweep and Nicobar.

## CORAL BLEACHING

- When corals are stressed by changes in conditions such as temperature, light or nutrients, they expel the symbiotic algae living in their tissues, causing them to turn known as coral bleaching.

## Most Saline Waterbodies

Waterbodies	Percentage composition
Lake Assal (Djibouti)	34.8
Lake Van	33
Dead Sea (West Asia)	33.7
Great Salt Lake U. S. A.	32.0

## SALINITY

- Average salinity in Southern Hemisphere is more than that of Northern Hemisphere.
- Isohalines represent the salinity distribution at the surface of the sea. These are the lines joining places having an equal degree of salinity.
- Poles have minimum salinity because of addition of fresh water in the form of icebergs and excessive snowfall.
- Salinity also increases the density of water.
- Salinity on an average decreases from Equator to Poles.

## Composition of Sea Water

Salt	Percentage composition
Sodium Chloride	77.8%
Magnesium Chloride	10.9%
Magnesium Sulphate	4.7%
Calcium Sulphate	3.6%
Potassium Sulphate	2.5%
Others	0.5%

## CONTROLLING FACTORS OF THE OCEANIC SALINITY

- The salinity of oceans and different seas depends on a number of factors such as evaporation, precipitation, influx of the river water, prevailing wind, Ocean currents and sea waves, etc.

## MOVEMENTS OF OCEANIC WATER

- Waves are the oscillatory movements in water mainly produced by winds manifested by an alternate rise and fall of the sea surface.
- Seismic waves or Tsunamis are waves caused by earthquakes volcanic eruptions in the sea bottom.

## OCEAN CURRENT

- An Ocean current is continuous directed movement of Ocean water generated by the forces acting upon it, such as breaking waves, wind, coriolis effect, temperature and salinity difference and tides caused by the gravitation pull of the Moon and the Sun.
- Ocean currents circulate in clockwise direction in Northern Hemisphere and in anti-clockwise direction in Southern Hemisphere.
  - Warm Currents:** The Ocean currents flowing from lower latitude to higher latitude are called as warm currents.
  - Cold Currents:** The Ocean currents flowing from higher latitude to lower latitude are called as cold currents.

## CURRENTS OF NORTH PACIFIC OCEAN

### Warm Currents

- North Equatorial Current:** It flows westwards from the western coast of Mexico to Philippines.
- Kuroshio Current:** It is an extension of North Equatorial Current near Japan Coast. It flows towards north.
- Alaska Current:** It flows along the coast of British Columbia and the Alaska Peninsula.

### Cold Currents

- Oyashio Current:** It flows down from Bering Sea towards Japan from North Pole and it joins Kuroshio currents.
- Okhotsk Current and Kuril:** Okhotsk joins Kuroshio Current to the North of Japan.

- West Wind Drift:** It flows towards Alaska.
- Californian Current:** It is an extension of Alaskan currents. It joins finally the North Equatorial current and completes clockwise circulation of water.

## CURRENTS OF SOUTH PACIFIC OCEAN

### Warm Currents

- East Australian Current or Great Barrier Current:** It flows towards East coast of Australia from equator towards pole.
- South Equatorial Current:** It originates due to south-east trade winds and flows westwards and bifurcates near New Guinea.
- Counter Equatorial Current:** It extends up to Panama Bay. It flows exactly on equator from West to East.

### Cold Currents

- Peruvian Current** (Humboldt Current): It flows from South towards equator on the coast of Chile and Peru.
- West Wind Drift:** It flows from Tasmania to Chile coast of South America.

## CURRENTS OF NORTH ATLANTIC OCEAN

### Warm Currents

- North Equatorial Current:** It is present between equator and 10° N.
- Cayenne Current:** It flows adjacent to French Guinea and enters into Caribbean Sea and Gulf of Mexico.
- Florida Current:** Cayenne current near Florida (US Coast) is called Florida current.
- Antilles Current:** It flows to the East of West Indies and other islands.
- Gulf Stream:** It flows from US coast towards North West Europe under the influence of westerly winds.
- North Atlantic Drift:** Gulf Stream bifurcates into-
  - North Atlantic Drift (warm),
  - West Wind Drift (cold) and Canaries current (cold).

### Cold Currents

- Labrador Current:** It originates in Baffin Bay and Davis Strait and merges with Gulf Stream near Newfoundland. Newfoundland

is a famous zone of fishing, commonly known as Grand Bank.

- **Armiger Current or Greenland Current:** It flows between Greenland and Iceland and merges with North Atlantic drift.
- **Canaries Current:** It flows along the Western coast of North Africa between Madeira Caps Verde and it joins North equatorial current.
- **West Wind Drift:** It flows towards UK.

## CURRENTS OF SOUTH ATLANTIC OCEAN

### Warm Currents

- **South Equatorial Current:** It flows between the equator and 10°S.
- **Brazilian Current:** It flows to the east coast of Brazil from equator towards pole.

### Cold Currents

- **Falkland Current:** It flows along the South-East coast of South America from south to north.
- **Benguela Current:** It flows from south to north near the 'Cape of Good Hope'.
- **West Wind Drift:** It is continue of Brazilian and Falkland current.
- **Guinea Current:** It flows near coast of Guinea (Africa).

### Currents of the Indian Ocean

- The Asiatic Monsoon influences the currents of the North Indian ocean, while the currents of South Indian Ocean are influenced by the atmosphere's anti cyclonic circulation.
- **North Equatorial Current:** The current flows from east to west and upon reaching the east coast of Africa, a good portion turns southward, crosses the equator and becomes the Mozambique current.
- **Mozambique current:** The Mozambique current flows south along the east coast of Africa from the vicinity of the equator to about 35°S where it becomes agulhas stream.
- **Agulhas stream:** The Agulhas stream flows westward along the southern west of madagascar and joins the Mozambique current along the East African Coast.
- West wind drift current
- North-east monsoon drift
- South-west monsoon drift
- South equatorial current
- Somalia current

## TIDES

- The rise and fall of the sea level as a result of the forces between the earth, the moon and the sun is called a tide.
- The interval between two tides is 12 hours and 26 minutes.

## SPRING-TIDES

- When the earth, the moon and the sun are in a straight line the Sun enhances the gravitational pull of the Moon, creating a condition of higher high tides and lower low tides known as spring tides.

## NEAP TIDES

- When the sun and moon are at right angles to the earth, the sun partially contracts the pull of the moon, producing lower high tides typical of a Neap tide.

## CONTINENTS OF THE WORLD

- Asia, Africa, North America, South America, Europe, Australia and Antarctica are the seven continents.

## ASIA

### GENERAL INTRODUCTION TO ASIA

- It covers about one-third of the land surface of the world.
- It contains about 60% of the world population.
- This vast continent comprises the greatest **diversity** in terms of physical features, climate, vegetation, wildlife and people.
- It has 49 and 5 disputed countries
- Latitude: 10°S and 80°N.
- Longitude: 25°E and 170°W.
- Area 44579000 km<sup>2</sup>.

### Important Information about Asia

- Caspian Sea is the world's largest lake and five times larger than the Lake Superior. It separates Europe from Asia.
- Dast-e-Kavir is the largest salt desert of the world situated in the Northern Iran.
- Lop Nor Lake in China is a site for numerous nuclear tests.
- Hwang Ho is called as China's Sorrow.
- Amur River forms the boundary between Russia and China.

- **Yangtze Kiang** is the longest river of Asia.
- Mekong river flows through China, Thailand-Laos border, Cambodia and Vietnam to South China Sea.
- Laos is the only landlocked country in South-East Asian peninsula.
- Group of islands is called an Archipelago. Indonesia is the largest archipelago in the world.
- Irrawaddy River is known as the lifeline of Myanmar. It falls into Gulf of Martaban.
- Lake Van of Turkey is the most saline waterbody in Asia.
- Japan is the most industrialised nation of Asia.
- Myanmar is called land of mountains and rivers.
- Pakistan is called country of canals.
- Japan is called land of Rising Sun.
- Dead Sea, the third saltiest waterbody in the world, is a landlocked sea. It lies between Israel and Jordan.
- Osaka is called the Manchester of Japan.
- It has the **coldest place, Votok**. Antarctica has winter temperature of -89°C. Jacobabad in Sindh is the hottest place on the Earth.
- **Mausynram**, Cherrapunji (India) has the **world's highest average rainfall** of 2600 cm.
- Asia has the world's **deepest fresh water lake**, i.e. **Baikal Lake** (Russia).
- **Higest point:** mt. Everest (8848m).
- **Lowest point:** Dead Sea (396m).
- It has the **largest delta** 'Sunderbans' the most fertile river valleys.
- 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 and 80°N latitudes, i.e. it spans over 90° of latitudes.
- Longitude:** It lies almost entirely in the Eastern Hemisphere.

- Large longitudinal extent brings about a difference of 11 hours between the local times of the easternmost part and the westernmost part of Asia.

## AFRICA

- Highest Point:** Kilimanjaro (5895 metres).
- Lowest Point:** Lake Assol (-156.1 metres).
- **Plateaus:** The entire continent is a plateau.
- It is the second largest continent after Asia and about nine times the size of India.
- Africa belongs to all four hemispheres. It is joined to Asia by the narrow Isthmus of Suez and separated from Eurasia at three different points (Strait of Gibraltar, Suez Canal and the strait of Bab-el-Mandeb).
- It is the only continent, which is crossed by Tropic of Cancer, Equator and Tropic of Capricorn.
- It is also called as Dark Continent.

## Important Information about Africa

- Lake Victoria is the largest lake of Africa, which is located between Uganda, Kenya and Tanzania. The equator passes through it.
- Nile River is the longest river in the world and lifeline of Egypt.
- Congo River crosses the equator twice.
- The Zambezi River includes the Victoria Fall, one of the largest falls in the world. It makes the natural political boundary between Zambia and Zimbabwe.
- The Orange River forms the natural boundary between South Africa and Namibia.
- The Limpopo River crosses the Tropic of Capricorn twice and it separates South Africa from Botswana and Zimbabwe.

## NORTH AMERICA

- Highest Point:** Meckinley (6,194 metres).
- Lowest Point:** Death Valley (-85.9 metres).

## EXTENSION

- It is the 3rd largest continent after Asia and Africa.
- It is separated from the easternmost tip of Siberia by the **Bering Strait**.
- 49° Latitude parallel forms the boundary between Canada and USA and 100° W

longitude divides the North America into more or less two equal parts.

### **Important Information about North America**

- Canada has the longest coastline in the world.
- The Prairie region of North America is ideally suited for the cultivation of wheat.
- **Lake Superior** is the largest sweet water lake in the world.
- Canada is the largest producer of newsprint in the world.
- The **Panama Canal** connects Atlantic Ocean and Pacific Ocean. By Sung Panama Canal, the distance from New York to San Francisco can be shortened to nearly 23,200 km.

### **SOUTH AMERICA**

**Highest Point:** Aconcagua (6960 m).

**Lowest Point:** Valdes Peninsula (-39.9 m).

- Paraguay and Bolivia are the only landlocked countries.
- Pampas is the most fertile region of South America and Alfa-Alfa grasses are found here.
- It is the fourth largest continent.
- South America as well as Mexico, Central America and West Indies are collectively known as Latin America.

### **Important Information about South America**

- It contains the world's highest waterfall, i.e. Angel Falls in Venezuela in Orinoco River.
- It contains the world's second longest river after Nile and the largest river by volume, i.e. Amazon River.
- The longest mountain range of the world, i.e. the Andes lies in South America.
- Moreover, the driest place on Earth, i.e. Atacama desert, the largest rain forest, i.e. the Amazon rain forest, the highest capital city, i.e. Lapaz (Bolivia), the highest commercially navigable lake, i.e. Lake Titicaca are situated in South America.
- Llanos and Campos are the Savanna grassland in South America. Selvas are the equatorial rain forests of Amazon basin.
- Brazil has the world's largest reserves of iron in Serra Dos Carajas Hills.
- Brazil is also known as the 'coffee bowl of the world', because it is the largest producer of coffee.

- Brazil is the only country through which both equator and one of the tropics (Tropic of Capricorn) passes.

### **EUROPE**

- **Highest Point:** Mt. Elbrus (5,642 metres).
- **Lowest Point:** Caspian Sea (-28.0 metres).
- Greenland, the world's largest island belongs to Denmark.
- Wheat is the most important crop of Europe.
- The Ruhr in Germany is the biggest and richest coal field of Europe. Other coal fields in Germany are Saar and Saxony.
- It is the second smallest continent in the world, by area, after Australia.
- **Baltic States:** It is a group of three countries namely Estonia, Lithuania and Latvia.
- Iceland, Norway, Sweden and Denmark are collectively called as **Scandinavian** countries.
- The world's most northerly capital is **Reykjavik**.

### **Important Information about Europe**

- Copenhagen, capital of Denmark is known as the key to the Baltic.
- Finland is known as the land of forests and lakes.
- The continental shelf areas around Europe including Dogger Bank are rich in fish.
- United Kingdom is the name given to the combination of Great Britain and Northern Ireland. Great Britain consists of England, Scotland and Wales.
- Russia is the largest country of the world and the highest populated country of Europe.
- Vatican City is in Rome, Italy. It is the smallest country of the world both in terms of area and population.

### **AUSTRALIA**

- Australia is an inland continent.
- **Highest Point:** Puncak Jaya (4,884 metres) in an island of New Guinea.
- **Lowest Point:** Lake Eyre (-15.8 metres).
- It is the smallest continent of the world. It lies entirely in the Southern hemisphere. The Tropic of Capricorn runs almost through the middle of the continent and divides the continent in two equal parts.

- It is the only continent that is also a country.

### **Important Information about Australia**

- Australia is known as the 'Forgotten Land'.
- Australia is the largest producer of Bauxite.
- Largest city of Australia is Sydney.
- Great Barrier Reef is the world's longest Coral Reef and is located in the North-East of Australia. The largest lake of Australia is Eyre.
- The highest peak of New Zealand is Mt. Cook.

### **ANTARCTICA**

- Ronald Amundsen was the first man to reach geographical South Pole in Antarctica.
- It is called as the continent for science.
- Mt. Erebus is the only active volcano on Antarctica.
- Mt. Vinson (5140 m) is the highest peak of Antarctica.
- It is the only continent, which is completely frozen. It is, therefore, known as White Continent.

## **SOME IMPORTANT FACTS**

### **World Continents**

Continents	Biggest Country	Highest Peak	Longest River
Asia	China	Mt. Everest (8850 m)	Yangtze Kiang
Africa	Sudan	Mt. Kilimanjaro (5895 m)	Nile
Australia	Australia	Mt. Kosciuszko (2228 m)	Darling
Antarctica		Vinson Massif (5140 m)	
North America	Canada	Mt. McKinley (6194 m)	Mississippi Missouri
South America	Brazil	Mt. Aconcagua (6960 m)	Amazon
Europe	Russia	Mt. Elbrus (5642 m)	Ob

### **Principal Rivers of the World**

River	Origin	Length (m)	Falls in
Nile	Victoria Lake	6,650	Mediterranean Sea
Amazon	Andes (Peru)	6,428	Atlantic Ocean
Yangtze	Tibetan Kiang Plateau	6,300	China Sea
Mississippi Missouri	Itasca Lake (USA)	6,275	Gulf of Mexico (USA)
Yenisei	Tannu-Ola Mts.	5,539	Arctic Ocean
Huang Ho	Kunlun Mts.	5,464	Gulf of Chibli
Ob	Altai Mts.	5,410	Russia Gulf of Ob
Congo	Lualaba and Luapula rivers	4,700	Atlantic Ocean
Amur	North-east	4,444	China Sea of Okhotsk
Lena	Baikal Mts.	4,400	Laptev Sea
Mekong	Tibetan Highlands	4,350	South China Sea
Mackenzie	Great Slave Lake	4,241	Beaufort Sea
Niger	Guinea	4,200	Gulf of Guinea

### **Major Lakes of the World**

Highest Lake	Lake Titicaca in Bolivia
Largest Saline Water Lake	Lake Caspian Sea

Deepest Lake	Lake Baikal in Siberia
Largest Lake	Caspian Sea
Largest Fresh Water Lake	Lake Superior
India's Largest Lake	Chilka Lake in Orissa

### Principal Plateaus of the World

Plateau	Situation
Plateau of Colombia	USA
Plateau of Madagascar	Madagascar
Plateau of Alaska North	West North America
Plateau of Bolivia	Andes Mountain
Great Basin Plateau	South of Colombia Plateau, USA
Colorado Plateau	South of Great Basin Plateau, USA
Tibetan Plateau	Between Himalayas and Quinloo Mountains
Deccan Plateau	Southern India
Arabian Plateau South	West Asia
Plateau of Brazil Central	Eastern South America
Plateau of Mexico	Mexico

### Oceans of the World

Oceans	Area (sq.km)	Greatest Depth
Pacific	16,62,40,000	Mariana Trench
Atlantic	8,65,60,000	Puerto Rico Trench
Indian	7,34,30,000	Java Trench
Arctic	1,32,30,000	-

### Major Peninsulas of the World

Peninsula	Area (sq. km)
Arabia	32,50,000
Southern India	20,72,000
Alaska	15,00,000
Labrador	13,00,000
Scandinavia	8,00,000
Iberian	5,84,000

### Major Gulfs of the World

Name	Area (sq. km.)
Gulf of Hudson	12,33,000
Gulf of Mexico	15,44,000
Gulf of St. Lawrence	2,37,000
Gulf of California	1,62,000
Arabian Gulf	2,38,000
English Channel	89,900

### Important Straits of the World

Straits	Area	Waterbodies Joined
Bab-al-Mandeb	Arabia and Africa	Red Sea and Arabian Sea
Bering	Alaska and Asia	Arctic Ocean and Bering Sea
Bosphorus	Turkey	Black Sea and Marmara Sea
Dover	England and Europe	North Sea and Atlantic Ocean
Florida	Florida and Bahamas Islands	Gulf of Mexico and Atlantic Ocean
Gibraltar	Spain and Africa	Mediterranean Sea and Atlantic Ocean
Malacca	India and Indonesia	Java Sea and Bay of Bengal
Palk	India and Sri Lanka	Bay of Bengal and Indian Ocean
Magellan	Chile	South Pacific and South Atlantic Ocean
Sunda	Indonesia	Java Sea and Indian Ocean

**Smallest and Biggest Countries**

<b>Biggest Nations (Population-wise)</b>	<b>Biggest Nations (Area-wise)</b>
China	Russia
India	Canada
USA	China
Indonesia	USA
Brazil	Brazil
Pakistan	Australia
Bangladesh	India
Nigeria	Argentina
Russia	Kazakhstan
Japan	Sudan
<b>Smallest Nations (Population-wise)</b>	<b>Smallest Nations (Area-wise)</b>
Vatican City	Vatican City
Tuvalu	Monaco
Nauru	Nauru
Palau	Tuvalu
San Marino	San Marino
Monaco	Liechtenstein
Liechtenstein	Marshall Islands
Saint Kitts and Nevis	Saint Kitts and Nevis
Antigua and Barbados	Maldives
Dominica	Malta

**Important Cities on River Banks (World)**

<b>City</b>	<b>River</b>	<b>Country</b>
Adelaide	Torrens	Australia
Amsterdam	Amsel	Netherlands
Alexandria	Nile	Egypt
Ankara	Kazil	Turkey
Bangkok	Chao Praya	Thailand
Basra	Eupharates and Tigris	Iraq
Baghdad	Tigris	Iraq
Berlin	Spree	Germany

Bonn	Rhine	Germany
Budapest	Danube	Hungary
Bristol	Avon	UK
Buenos Aires	Laplata	Argentina
Chittagong	Majyani	Bangladesh
Canton	Si-Kiang	China
Cairo	Nile	Egypt
Chung King	Yang-tse-king	China
Cologne	Rhine	Germany
Dandzing	Vistula	Germany
Dresden	Elbe	Germany
Dublin	Liffy	Ireland
Hamburg	Elbe	Germany
Kabul	Kabul	Afghanistan
Karachi	Indus	Pakistan
Khartoum	Confluence of Blue and White Nile	Sudan
Lahore	Ravi	Pakistan
Leningrad	Neva	Russia
Lisbon	Tagus	Portugal
Liverpool	Messey	England
London	Thames	England
Moscow	Moskva	Russia
Montreal	St. Lawrence	Canada
Nanking	Yang-tse-kiang	France
New Orleans	Mississippi	USA
New York	Hudson	USA
Ottawa	Ottawa	Canada
Paris	Seine	France
Philadelphia	Delaware	USA
Perth	Swan	Australia
Prague	Vitava	Czech Republic
Quebec	St. Lawrence	Canada
Rome	Tiber	Italy
Rotterdam	New Mass	The Netherlands
Stalingrad	Volga	Russia

Shanghai	Yang-tse-kiang	China
Sidney	Darling	Australia
Saint Louis	Mississippi	USA
Tokyo	Arakava	Japan
Vienna	Danube	Austria
Warsaw	Vistula	Poland
Washington DC	Potomac	USA
Yangoon	Irrawaddy	Myanmar

### World's Geographical Surnames

Surname	Name
Bengal's Sorrow	Damodar River
Blue Mountains	Nilgiri Hills
China's Sorrow	Hwang Ho
Emerald Isle	Ireland
Eternal City	Rome
Empire City	New York
Forbidden City	Lhasa (Tibet)
Garden City	Chicago
Gate of Tears	Strait of Bab-el-Mandeb
Gateway of India	Mumbai
Gift of the Nile	Egypt
Granite City	Aberdeen (Scotland)
City of Sky-scrappers	New York
City of Seven Hills	Rome
City of Dreaming Spires	Oxford
City of Palaces	Kolkata
City of Golden Gate	San Francisco
City of Magnificent Buildings	Washington D.C.
City of Eternal Springs	Quito (S. America)
Hermit Kingdom	Korea
Herring Pond	Atlantic Ocean
Holy Land	Jerusalem
Island Continent	Australia
Island of Cloves	Zanzibar
Isle of Pearls	Bahrein (Persian Gulf)
Key to the Mediterranean	Gibraltar

Manchester of Japan	Osaka
Pillars of Hercules	Strait of Gibraltar
Pearl of the Antilles	Cuba
Playground of Europe	Switzerland
Quaker City	Philadelphia
Queen of the Adriatic	Venice
Roof of the World	The Pamirs, Central Asia
Rose Pink City	Jaipur
Sugar Bowl of the World	Cuba
Venice of the North	Stockholm
Windy City	Chicago
Whiteman's Grave	Guinea Coast of Africa
Yellow River	Huang Ho (China)
Land of Cakes	Scotland
Land of Golden Fleece	Australia
Land of Maple Leaf	Canada
Land of Morning Calm	Korea
Land of Midnight Sun	Norway
Land of the Thousand Lakes	Finland
Land of the Thunderbolt	Bhutan
Land of White Elephant	Thailand
Land of Five Rivers	Punjab
Land of Thousand Elephants	Laos
Land of Rising Sun	Japan
Loneliest Island	Tristan De Gunha (Mid-Atlantic)

### Famous Tribes of the World

Abhors	People of Mongolian blood living between Assam and Eastern tribes
Afridis	Tribes residing in the North-West Frontier (Pakistan)
Bantus	Negroes living in the Central and South Africa
Boers	The Dutch settlers of South Africa
Cossacks	People living in the southern and eastern frontiers of Russia

Eskimos	Inhabitants of Greenland and of Arctic regions
Flemings	A term used for the people of Belgium
Hamites	Inhabitants of North-West Africa
Khingiz	People living in Central Asia
Kurds	Tribes living in Kurdistan (Iraq)
Magyars	Inhabitants of Hungary
Maoris	Inhabitants of New Zealand
Negroes	Mostly found in Africa
Pygmies	Short-sized people found in Congo basin in Africa
Red Indians	Original inhabitants of North America
Semites	Caucasian people of ancient times

Zulus	People of South Africa living in certain part of Nata
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### Important Boundaries

Durand Line	Pakistan and Afghanistan
MacMohan Line	India and China
Radcliffe Line	India and Pakistan
Maginot Line	France and Germany
Oder Niesse Line	Germany and Poland
Hindenberg Line	Poland and Germany (at the time of First World War)
38th Parallel	North and South Korea
49th Parallel	USA and Canada

# INDIAN GEOGRAPHY

## THE INDIAN SUBCONTINENT

- Mainland of the Indian Subcontinent, comprising India, Pakistan, Bangladesh, Nepal, and Bhutan extends between 8°4'N and 37°9'N latitudes and between 68°7'E and 97°15'E longitudes.

## SIZE AND EXTENT OF SUBCONTINENT

- From North to South this subcontinent stretches over 3,200 km and from east to west it is 3,000 km. 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 (82½°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 to Eurasia.
- It is located on one of the peninsulas of Southern Asia. The country extends from Kashmir in the 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.

## BASIC INFORMATION

- Latitudinal extent: 8°4' North to 37°6' North.
- Longitudinal extent: 68°7' East to 97°25' East.
- North-south extent: 3214 km.
- East-west extent: 2933 km.

- Land frontiers: 15200 km.
- Coastline of mainland India-6100 km.
- Total coastline: 7516.6 km.
- Number of states: 29
- Number of union territories: 7.
- Number of islands in the Bay of Bengal-204
- Number of islands in the Arabian sea-43
- Land neighbours (7): Pakistan, Afghanistan, China, Nepal, Bhutan, Bangladesh and Myanmar.
- States with longest coastline: Gujarat.
- Active volcano: Barren Island in Andaman and Nicobar.
- Southernmost point; Indira Point in Great Nicobar.
- Southernmost tip main land: Kanyakumari.
- Northernmost point: Indira Col Jammu & Kashmir.
- Westernmost point: West of Ghaur mota in Gujarat
- Easternmost point: Kibithu in Arunachal Pradesh.
- The Tropic of Cancer (23½° N) passes through the middle of the country. The location of the country is in the northern and the eastern hemispheres.

### Indian states situated on the border

Country	Indian States
Pakistan (4)	Gujarat, Rajasthan, Punjab and Jammu and Kashmir
Afghanistan (1)	Jammu and Kashmir
China (5)	Jammu and Kashmir, Uttrakhand, Himachal Pradesh, Sikkim and Arunachal Pradesh
Nepal (5)	Uttar Pradesh, Uttrakhand, Bihar, West Bengal, Sikkim

Bhutan (4)	Sikkim, West Bengal, Assam and Arunachal Pradesh
Bangladesh (5)	West Bengal, Assam, Meghalaya, Tripura and Mizoram

### 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 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 of China only).
- India contains about one-sixth of the total population of the world.

## PHYSICAL FEATURES

### 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 Suleiman and the Kirthar in the east and the Himalayas in the west separate the Indian subcontinent from rest of Asia.
- Indian subcontinent can be divided into following physical divisions:
  - The Great Mountain wall of the North.
  - The Great Northern Plains.
  - The Great Peninsular Plateau.
  - The Coastal Plains.
  - The Great Indian Desert.
  - The Island Groups.

## HIMALAYAS

- Himalayas are young fold mountains of tertiary period, which were folded over Tethys Sea due to inter-continental collision.
- They stretch from the Indus River in the West to the Brahmaputra River in the East.
- The Himalayas, the highest mountain wall of the world, are situated on the northern boundary of India like an arc.
- Mount Everest, the highest peak in the word, lies in these mountains in Nepal.

- The total length is about 2500 km with varying width 240 to 320 km and a total area of 5000 km<sup>2</sup>.

### DIVISIONS OF THE HIMALAYAS

- The Himalayas consist of three parallel mountain ranges: (i) The Greater Himalayas (ii) The Lesser Himalayas and (iii) The Outer Himalayas.

### THE GREATER HIMALAYAS (OR HIMADRI)

- Northern most part of the Himalayan range; it is the world's highest part with an average altitude of 6,100 metres above the sea level.
- It includes world's highest peak, Mt. Everest (8,850 m) located in Nepal. It is known as Sagarmatha in Nepal and Chomolangma in China.
- Kangchenjunga that lies in Sikkim is the second highest peak of the greater Himalayas.
- Zaskar range is situated on the western part of Greater Himalayas. It includes Nanga Parbat (8,126 metres of the Kashmir-Himachal region) and Nepal Dhaulagiri (8,172 metres).
- This is the loftiest of the three ranges of Himalayas. Mount Everest lies in this range.

Location	Important Passes
Jammu and Kashmir	Burzi-La, Joji-La Karakorm Banihal Rohtang
Himachal Pradesh	Bara La, Cha-La, Shipki-La
Uttarakhand	Niti-La, Lipu-Lekh-La
Sikkim	Jelep-La, Nathu-La
Arunachal Pradesh	Bomdi-La

### THE LESSER HIMALAYAS (OR THE HIMACHAL HIMALAYAS)

- South of the Greater Himalayas, the range also lies parallel to it from west to east.

- Pirpanjal range (Jammu and Kashmir): It is longest range of the middle Himalaya.
- Dhauladhar range (Himachal Pradesh); Missouri range (Uttarakhand); Nagtibba range (Nepal); Mahabharat range (Nepal).
- Important hill resorts are Shimla, Ranikhet, Almora, Nainital and Darjeeling, Dharmashala, Dalhousie, Darjeeling, Mussorie.
- Average height of the middle Himalayas is 3700–4500 km.

### THE OUTER HIMALAYAS (OR SHIWALIKS)

- This is the southernmost, the newest and the third parallel range of the Himalaya.
- Its breadth is only 10 to 50 kms. Shiwalik range is broader in the west.
- Shiwaliks are characterised by fault scraps anticlinals, crest and synclinal hills.
- Average elevation is 900–1200m.

### TRANS HIMALAYAN ZONES

- This zone lies to the North of the Great Himalayas.
- Trans Himalayans, also known as Tethys Himalayans are the part of Eurasian Plate and are formed of sedimentary rocks.
- Some important ranges of this zone are Karakoram and Ladakh, etc. The highest peak in region is K2 or Godwin Austin or Qagir (8,611m in Pak occupied Kashmir). Mount K2 is also the 2nd highest peak of the world and the highest peak of India, located in Karakoram range.
- Mt. Rakaposhi** is the highest peak in Ladakh range and the steepest peak in the world.
- Siachin glacier** is the largest glacier of the world outside the polar region (more than 72 km) and is located in Nubra valley.
- Indus river, flowing between Ladakh and Zaskar ranges from south east to north west, originates from Chamayung dung glacier near Kailash.

### THE GREAT NORTHERN PLAINS

- The northern plains are divided into three sub-divisions. 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 Ghaghara, the Gandak, the Kosi and the Tista are other tributaries of the Ganga.
- The Sone and the Damodar are tributaries of the Ganga while the Chambal and the Betwa are tributaries of the Yamuna from the peninsular plateau.
- It extends from west to east for 2400 km having an average width in between 150–300 km.
- It is composed of Bhangar (old alluvium), Khadar (new alluvium) in river bed, Bhabar (porous grave) riddien plain at the foothills of Shiwalik.

#### Difference between bhangar and khadar

Bhangar	Khadar
These are low plains composed of older alluvium.	The deposits of fresh alluvium every year brought by Himalayan rivers makes this belt of northern plains.
It contains calcareous deposits locally known as kankar.	It does not contain calcareous deposits of calcium.

#### Difference between bhabar and terai

Bhabar	Terai
Bhabar is a long narrow plain along the foot hills.	Terai is a broad long zone at south of bhabar plain.
It is pebble studded zone of porous beds.	It is a marshy damp area covered with dense forest.
It is 9–16 km wide.	It is 20–30 km wide.

#### SUB DIVISIONS OF GREAT PLAIN

- Punjab Haryana plain:** It extends from Punjab in the west to Yamuna (Haryana) in the east. They are composed of dhaya (heavily gullied bluffs and bets (Khadar plains)
- Rajasthan plain:** Thar desert is the westernmost region of the great Indian plain. A semi arid plain lying to the east of the Thar desert is known as Rajasthan bager.

The Luni is the only south west flowing river of the region.

- Brahmaputra plain:** A low level plain formed by Brahmaputra river system is situated between eastern Himalayas in the north and lower Ganga plain and Indo-Bangladesh border in the west.
- The Eastern and Western Ghats demarcate the Eastern and Western edge of the Deccan Plateau.

### MEGHALAYA PLATEAU

- The Plateau is separated from main block of the peninsular Plateau by a gap called Garo-Raj Mahal gap.
- From east to west, the plateau comprises Garo Khasi, Jaintia and Mikir Hills.

### BUNDELKHAND UPLAND

- It is composed of granites and gneiss.
- It is located to the south of Yamuna river between Madhya Bharat Pathor and Vindhyan scrap land.

### CHOTTANAGPUR PLATEAU

- It is composed mainly of Gondwana rocks with patches of granites and gneisses and Deccan lavas.
- It covers mostly Jharkhand, Chhattisgarh and Purulia of West Bengal.

### DOAB

- Punjab-Haryana plain is drained by five rivers and the intervening area between the rivers is known as doab. From South to North doabs are as follows:

Doab	Region
Bist Doab	Between Beas and Sutlej
Bari Doab	Between Beas and Ravi
Rachna Doab	Between Ravi and Chenab
Chai Doab	Between Chenab and Jhelum
Sind Sagar Doab	Between Jhelum and Indus

### THE GREAT PENINSULAR PLATEAU

- It is composed of old crystalline igneous and metamorphic rocks.
- It covers a total area of 16000 km<sup>2</sup>.

- The Narmada which flows through a rift valley divides the region into two parts—the central highland in the north and the Deccan Plateau in the south.
- The Anamudi or Anaimudi (2,695 metres) is the highest peak of the peninsula.
- The western edge of the plateau rises steeply from the Arabian Sea to form the **Western Ghats** (which includes the **Sahyadri**).
- 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 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.
- These rivers do not have deltas.

### PLATEAUS UPLANDS OF PENINSULAR INDIA

#### CENTRAL HIGHLAND

- Central highland lie to the north of the Narmada river covering a major area of the Malwa Plateau.
- The Aravalis range is bounded by the central highland on the north-west and Vindhyan range on the south.

#### DECCAN PLATEAU

- Deccan Plateau is a triangular land lying to the south of the river Narmada.
- Is comprises Maharashtra plateau, Karnataka plateau and the Telangana and Rayalseema plateau.

### HILL RANGES OF THE PENINSULA

#### ARAVALI RANGE

- Aravalis are one of the world's oldest fold mountains running in north-east to south-east direction from Delhi to Palampur in Gujarat. It is an example of relict mountain. Gurushikhar is the highest peak of Aravali.

## VINDHYAN RANGE

- This range acts as a water-divide between Ganga system and the river system of south India.

## SATPURA RANGE

- It is a series of seven mountains running in East-West direction to the South of Vindhya and in between the Narmada and Tapi.
- It comprises Rajpipla hills, Mahadeo hills and Maikal Range.
- Satpuras are fold mountains and Dhupgarh is its highest peak.

## EASTERN GHATS

- It comprises the discontinuous and low hills that are highly eroded by the rivers such as the Mahanadi, the Godavari, the Krishna, the Cauvery, etc.

## WESTERN GHATS

- The Western Ghats are locally known by different names such as Sahyadri in Maharashtra, Nilgiri hills in Karnataka and Tamil Nadu and Anamalai hills, Cardamom hills in Kerala.
- It runs from the south of the valley of river Tapti to Kanyakumari.
- There are three important passes in the Sahyadris.
  - (a) Thalghat (between Mumbai and Pune).
  - (b) Palghat (between Palakkad and Coimbatore).
  - (c) Bhorghat (between Mumbai and Nasik).
- The Eastern and the Western Ghats meet each other at the Nilgiri hills.

## THE COASTAL PLAINS

- Narrow steeps of flat land on the eastern and western coasts are known as the East Coastal Plain and the West Coastal Plain respectively.

## THE WEST COASTAL PLAIN

- It is about 1500 km long from Surat to Cape Camorin.
- This plain which lies between the Arabian Sea and the Western Ghats spreads from Gujarat in the north to Kanyakumari in the south.

- Its northern part from Gujarat to Goa is called **Konkan**, while southern part from Goa to Kanyakumari is known as **Malabar**.
- Important ports** developed on its coast from north to south are: Kandla, Mumbai, New Jawahar Port, Mumbai, Marmagao, Mangalore and Cochin.

This plain is sub-divided into

- Kuchchh Plains:** An Island surrounded by sea and lagoons.
- Kathiawar Plains:** It extends from Rann of Kuchchh to Daman in the south.
- Gujarat Plains:** East to Kuchchh and Kathiawar formed by the river Narmada, Tapi, Mahi and Sabarmati.
- Konkan Coast:** It extends from Daman to Goa for a distance of about 500 km.
- Karnataka or Conora Coast:** It extends from Goa to Mangalore in narrow belt.
- Malabar Coast/Kerala Coast:** It extends between Mangalore and Kanyakumari. The back-waters, locally Kayals, are the shallow lagoons.

## THE EAST COASTAL PLAIN

- This broader coastal plain spreads along the Bay of Bengal from Orissa in the north to Kanyakumari in the south.
- Its northern part is known as Northern Circar plains and the southern part is called **Coromandel Coast**.
- Chilka and Pulicat Lakes** are fine examples of **lagoons** on our east coast.

## THE GREAT INDIAN DESERT

- It lies to the west of the Aravali range.
- 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.

## THE ISLAND GROUPS

### (I) ANDAMAN AND NICOBAR GROUP

- Ten degree channel separates Andaman group from Nicobar. Duncan passage lies between South Andaman and Little Andaman group.

## ■ (II) LAKSHADWEEP GROUP

- Minicoy is the largest and southernmost island of this group.
- Minicoy is separated from rest of the Lakshadweep by Nine degree Channel.
- Eight degree channel separates Lakshadweep group from Maldives.

## DRAINAGE SYSTEM OF INDIA

- 90% of land water drains into the Bay of Bengal and the rest drains into the Arabian Sea.
- Those Himalayan rivers, which originated before the formation of Himalaya, are known as Antecedent rivers, such as—Indus, Brahmaputra and Sutlej.

**In India the rivers have been divided into two main groups:**

- (i) Himalayan rivers, (ii) Peninsular rivers.

### Indus River System

River	Source	Length (km)	Falls into
Indus	Near Mansarovar Lake	2,880	Arabian Sea
Jhelum	Verinag	724	Chenab
Chenab	Bara Lacha Pass	1,180	Indus
Ravi	Near Rohtang Pass	725	Chenab
Beas	Near Rohtang Pass	460	Sutlej
Sutlej	Mansarovar Rakas Lake	1,450	Chenab

## ■ THE GANGA SYSTEM

- The Ganga system is the second major drainage system of India.
- It rises in the Gangotri glacier near Gaumukh (3,900 m) in the Uttarakhand. Here, it is known as the Bhagirathi. At Devprayag, the Bhagirathi, meets the Alaknanda, hereafter, it is known as the Ganga.
- The Alaknanda has its source in the Satopnath glacier above Badrinath.

- The left bank tributaries of the Ganga are Ramganga, Gomti, Kali or Sharda, Gandak, Kosi, Mahanadi.
- The right bank tributaries of the Ganga are Yamuna and Son. The Yamuna joins the Ganga at Allahabad.
- Kosi is called as ‘Sorrow of Bihar’ while Damodar is called as ‘Sorrow of Bengal’.
- Hooghly is distributary of the Ganga flowing through Kolkata.

### Ganga River System

River	Source	Length (km)	Falls into
Ganga	Gangotri Glacier	2,525	Bay of Bengal
Yamuna	Yamunotri Glacier	1,376	Yamuna

River	Source	Length (km)	Falls into
Chambal	Near Mahow	960	Yamuna
Ramganga	Garhwal District	596	
Ghagra	South of Mansarovar Park	1,080	
Sone	Amarkantak Plateau	780	
Gandak	Tibet-Nepal Border	425*	
Koshi	Sikkim-Nepal-Tibet Himalaya	730*	

\*Length in India

### THE BRAHMAPUTRA SYSTEM

- It is known as Tsangpo in Tibet, Dihang of Siang in Arunachal Pradesh, Brahmaputra in Assam and Jamuna in Bangladesh.
- Majuli is the largest riverine island in the world.
- The combined stream of Ganga and Brahmaputra forms the biggest delta in the world, the Sunderbans.

- Brahmaputra is volumewise largest river of India, whereas lengthwise Ganga is the longest in India.

### THE PENINSULAR RIVER SYSTEM

- East Flowing Rivers** (or Delta forming rivers)
  - East flowing rivers do not form estuaries.
  - East flowing rivers fall in Bay of Bengal.

#### East Flowing Rivers

River	Source	Length (km)	Tributaries
Mahanadi	Foothills of Dandakanaya	857	Seonath, Hasdeo, Db, Mand Tel, Ong And Jonk
Godavari	Triambak Sahyadri Near Nashik	1,465	Penganga, Wardha, Indravati Sabri Manjira.
Krishna	Mahabaleswar in Western Ghats	1,400	Bhima, Tungabhadra, Malprabha and Koyana
Cauveri	Brahmgiri Range in Western Ghats	800	Herongi, Hemavati; Shishma, Arkvati

#### 2. West Flowing Rivers (or Estuaries forming rivers)

- West flowing rivers do not form delta.
- West flowing rivers fall in Arabian Sea.

#### West Flowing Rivers

River	Source	Length (km)	Tributaries
Sabarmati	Aravali Range	371	Hathmati, Siri, Wakal
Mahi	Vindhyan Range	583	—
Narmada	Amarkantak	1,312	Hiran, Tawa Shakkar
Tapi	Multai Satpura Range	724	Purna, Betul, Arunvati, Ganjal
Luni	Aravalis	495	—

### Important River Valley Projects of India

Bakra Nangal Project	On Satluj in Punjab. Highest in India. Height 226m. Reservoir is called Gobind Sagar Lake.	Chambal Valley Project	On Chambal in M.P. and Rajasthan. 3 dams are there: Gandhi Sagar dam, Rana Pratap Sagar dam and Jawahar Sagar dam
Mandi Project	On Beas in H.P.		

Damodar Valley Project	On Damodar in Jharkhand. Based on Tennessee Valley Project, USA
Hirakud Project	On Mahanadi in Orissa. World's longest dam: 4,801 m
Rihand Project	On Son in Mirzapur. Reservoir is called Govind Vallabh Pant Reservoir
Kosi Project	On Kosi in N. Bihar
Mayurakshi Project	On Mayurakshi in W.B.
Kakrapara Project	On Tapi in Gujarat
Nizamsagar Project	On Manjra in A.P.
Nagarjuna Sagar Project	On Krishna in A.P.
Tungabhadra Project	On Tungabhadra in A.P. and Karnataka
Shivasamudram Project	On Cauvery in Karnataka
Tata Hydel Scheme	On Bhima in Maharashtra
Sharavathi Hydel Project	On Jog Falls in Karnataka
Farakka Project	On Ganga in W.B. Apart from power and irrigation, it helps to remove silt for easy navigation
Ukai Project	On Tapti in Gujarat
Mahi Project	On Mahi in Gujarat
Salal Project	On Chenab in J and K
Mata Tila Multipurpose Project	On Betwa in U.P. & M.P.
Thein Project	On Ravi, Punjab
Pong Dam	On Beas, Punjab

## CLIMATE OF INDIA

### CLIMATIC DIVERSITY IN THE INDIAN SUBCONTINENT

- The interior of the country, especially in the north, has a continental type of climate.
- The coastal areas have a more equitable climate. In mountainous areas, altitude determines the climate.

- In June, the highest temperature in Rajasthan may go up to 55°C.
  - But, in Drass and Kargil the night temperature in January may go down to -45°C to -50°C.
  - Mausynram or Cherrapunji in Meghalaya has an annual rainfall of 2,500 cms.
  - But, in the Thar Desert the annual rainfall is less than 13 cm.
  - India has tropical monsoon type of climate. It is greatly influenced by the presence of Himalayas in the North as they block the cold masses from Central Asia.
  - The Tropic of Cancer ( $23.5^{\circ}\text{N}$ ) divides India into two almost equal climatic zones, namely, the Northern Zone and the Southern Zone.
  - The Southern Zone has the midday sun almost vertically overhead at least twice every year and the Northern Zone does not have the midday sun vertically overhead during any part of the year.
- The factors influencing the climate of India are:

- Location and Latitudinal extent
- Distance from sea
- The Northern mountain range
- Physiography
- Monsoon wind
- Upper air circulation
- Tropical cyclones and Western disturbances
- El Nino and La Nina:** El Nino is a narrow warm current, which occasionally appears off the coast of Peru in December by temporarily replacing the cold Peru Current. La Nina is the reverse of El-Nino. It is a harbinger of heavy monsoon showers in India.
- Southern Oscillation:** Whenever the surface level pressure is high over the Indian Ocean, there is low pressure over the Pacific Ocean and *vice versa*. This inter-relation of high and low pressures over the Pacific and the Indian Ocean is called Southern Oscillation.

### Local Storms in India

Name	Significance
Norwester	It is spring storm shower and cause rain fall in Assam and West Bengal.

Name	Significance
Mangoshower	Thunderstorm causing rainfall in southern plateau helps in mango ripening.
Cherry blossoms	Thunderstorm causing rainfall in Karnataka helps in flowering coffee.
Kalbaisakhis	Storm in West Bengal during summer due to the strong convective movement.

## SEASONS IN INDIA

- India Meteorological Department (IMD) has recognised the following four distinct seasons:

### Climatic Regions of India

Climate type	Areas	Characteristics
Tropical rain forests climate (Am)	Western Ghats, west coastal plains, parts of Assam and Tripura	High temperature throughout the year, heavy seasonal rainfall, annual rainfall 200 cm
Tropical Savana climate (Aw)	Most peninsular regions (except leeward side of Western Ghats)	Dry winters, annual rainfall varies from 76 cm to 150 cm
Tropical semi arid steppe climate (Bs)	Rainshadow belt running southward from central Maharashtra to Tamil Nadu	Low rainfall varies from 38 cm to 80 cm and temperature from 20° to 30°C
Tropical and subtropical steppes climate (Bsh.)	Punjab, Haryana and Kachchh region	Temperature varies from 12°–35°C
Tropical desert climate	Western part of Barmer Jaisalmer and Bikaner districts of Rajasthan, parts of Kachchh	Scanty rainfall
Humid subtropical climate with dry winters (CGW)	South of Himalayas	Mild winters and extremely hot summers
Mountain climate (H)	Mountainous region above 6000m or more	Rainfall varies from 63.5 to 254 cm.

### Forests of India

Forest type	Distribution	Climatic condition	Characteristics	Species
Tropical evergreen forests	<ul style="list-style-type: none"> <li>Rainy slopes of western Ghats</li> <li>N. E. India (Except A. P.)</li> <li>Eastern part of West Bengal and Odisha</li> <li>Andaman and Nicobar Islands</li> </ul>	<ul style="list-style-type: none"> <li>Rainfall &gt; 200 cm</li> <li>Relative humidity &gt; 70%</li> <li>Average temperature is about 24°C</li> <li>Hot and humid climate</li> </ul>	<ul style="list-style-type: none"> <li>Height of trees 40 to 60 m</li> <li>Leaves are dark green and broad</li> </ul>	<ul style="list-style-type: none"> <li>Mahagony, Mahua, Bamboo, Irowood Kadam, Irul, Jamun, Hopea Rubber tree</li> </ul>

- The cold weather or winter season.
- The hot weather or summer season.
- The South-West monsoon season of rainy season.
- The season of the retreating monsoon of cool season.

## CLIMATIC REGIONS OF INDIA

### TREWARTHA'S CLASSIFICATION

- Dr.Trewartha's scheme has been most satisfactory of all classifications of Indian climatic regions. He presented a modified form of Koppen's classification.

Forest type	Distribution	Climatic condition	Characteristics	Species
Tropical moist deciduous forests	<ul style="list-style-type: none"> <li>Eastern parts of sahyadris</li> <li>North eastern part of peninsula.</li> <li>Middle and lower Ganga Valley</li> <li>Foothills of Himalayas in bhabar</li> </ul>	<ul style="list-style-type: none"> <li>100 to 200 cm rainfall per annum</li> <li>Moderate temperature</li> </ul>	<ul style="list-style-type: none"> <li>30 to 40 m high trees</li> <li>They shed their leaves in dry season</li> </ul>	Sal, Teak, Arjun, Mulberry, Kusum, Sandalwood, Mango
Tropical dry deciduous forests	<ul style="list-style-type: none"> <li>Large part of Maharashtra, Telengana and Andhra Pradesh</li> <li>Parts of Punjab, Haryana, and eastern parts of Rajasthan</li> <li>Western part of M. P.</li> <li>Tamil Nadu</li> </ul>	<ul style="list-style-type: none"> <li>50 to 100 cm rainfall</li> <li>Moderate humidity</li> </ul>	<ul style="list-style-type: none"> <li>6 to 15m high</li> <li>Roots are thick and long.</li> </ul>	Teak, Sal, Bamboo, Mango, Acacia, Neem, Shisham
Dry forests	<ul style="list-style-type: none"> <li>Rajasthan and adjoining areas of Haryana, Gujarat and Punjab</li> </ul>	<ul style="list-style-type: none"> <li>Low rainfall (less than 50 cm. per annum). Relative humidity is less</li> </ul>	<ul style="list-style-type: none"> <li>Thorny vegetation</li> <li>leaves are small</li> </ul>	Cactus, Thorny Babool, Palm khair
Mountainous forests	<ul style="list-style-type: none"> <li>In Himalayan Region</li> </ul>	<ul style="list-style-type: none"> <li>Due to increase of altitude the temperature decreases hence Himalayan forests contain all the varieties of world except equatorial forests</li> </ul>	<ul style="list-style-type: none"> <li>Each vegetation belt occurs at relatively 300m more height in Eastern Himalayas</li> </ul>	Sal, Teak, Chir, Deodar, Oak, Olive, Chestnut Conifers, Spruce etc.

## 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.

### 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 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— (i) Running water, (ii) Wind.

### TYPES OF SOIL FOUND IN INDIA

- Indian Council of Agricultural Research (ICAR) divides Indian soils into eight groups:

### ALLUVIAL SOIL

- 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 and Rabi crops like cereals, cottons, oilseeds and sugarcane. The lower Ganga-Brahmaputra Valley is useful for jute cultivation.

### REGUR OR BLACK SOIL

- 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.
- They cover the plateaus of Maharashtra, Saurashtra, Malwa and southern Madhya Pradesh and extend eastward in the south along the Godavari and Krishna Valleys.
- Crops Grown:** Cotton, Jowar, Wheat, Sugarcane, Linseed, Gram, Fruit and Vegetables.

### RED SOIL

- Formed by weathering of crystalline and metamorphic mixture of clay and sand.
- 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.
- Crops Grown:** Wheat, Rice, Millets, Pulses.

### LATERITE SOIL

- The Laterite soils are formed due to weathering of lateritic rock 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, Orissa 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.

### SALINE AND ALKINE SOIL

- Region:** Drier parts of Bihar, Jharkhand, Uttar Pradesh, Haryana, Punjab, Rajasthan and Maharashtra.
- Many salts such as sodium, magnesium and calcium.

### ARID AND DESERT SOIL

- Region:** Northwest India covers entire area of the west Aravallis in Rajasthan and parts of Haryana, Punjab and Gujarat.
- Rich in Phosphates and Calcium not deficient in Nitrogen and humus.
- Fertile if irrigated, e.g., Ganga Nagar area of Rajasthan (wheat basket of Rajasthan).

### MOUNTAIN SOIL

- Region:** Hills of Jammu and Kashmir, Uttarakhand and Assam hills.
- Rich in Iron and humus but deficient in lime.

### PEATY AND MARSHY SOIL

- Region:** Kerala, coastal regions of Odisha, Tamil Nadu and Sundarbans of west Bengal.
- Contain large amount of soluble salts and organic matter.

## AGRICULTURE IN INDIA

- About 65–70% of the total population of the country is dependent on agriculture.
- Agriculture with its allied activities accounts for 45% of our national income.

There are three crop seasons in India:

- Kharif:** Sown in June/July, harvested in September/October, e.g., rice, jowar, bajra, ragi, maize, cotton and jute.
- Rabi:** Sown in October/December, harvested in April/May, e.g., wheat, barley, peas, rapeseed, mustard grains.
- Zyad:** They are raised between April/June, e.g., melons, watermelons, cucumbers, *toris*, leafy and other vegetables.

## TYPES OF FARMING

### ■ SHIFTING AGRICULTURE

- It is practised by the tribals in the forest areas of Assam, Meghalaya, Nagaland, Manipur, Tripura, Mizoram, Arunachal Pradesh,

Odisha, Madhya Pradesh, Jharkhand and Andhra Pradesh.

- In this type of agriculture, a piece of forest land is cleared mainly by tribal people by felling and burning of trees and crops are grown.

### Major crops and producing states

Crop Type	Crop Name	Major Producers
Cereals	Wheat	Uttar Pradesh, Punjab and Madhya Pradesh
	Rice	West Bengal and Uttar Pradesh
	Gram	Madhya Pradesh and Tamil Nadu
	Barley	Maharashtra, Uttar Pradesh and Rajasthan
	Bajra	Maharashtra, Gujarat and Rajasthan
Cash crops	Sugarcane	Uttar Pradesh and Maharashtra,
	Poppy	Uttar Pradesh and Himachal Pradesh
Oil seeds	Coconut	Kerala and Tamil Nadu
	Linseed	Rajasthan, Madhya Pradesh and Haryana
	Groundnut	Gujarat, Andhra Pradesh and Tamil Nadu
	Rape seed and Mustard	Rajasthan, Madhya Pradesh and Haryana
	Sesame	Uttar Pradesh and Rajasthan
	Sunflower	Andhra Pradesh and Maharashtra
Fibre	Cotton	Maharashtra and Gujarat
	Jute	West Bengal and Bihar
	Silk	Karnataka and Kerala
	Hemp	Madhya Pradesh and Uttar Pradesh
Plantation	Coffee	Karnataka and Kerala
	Rubber	Karnataka and Kerala
	Tea	Assam and Kerala
	Tobacco	Gujarat, Maharashtra and M. P.
Spices	Pepper	Kerala, Karnataka and Tamil Nadu
	Ginger	Kerala and Uttar Pradesh
	Turmeric	Andhra Pradesh and Odisha

### ■ EXTENSIVE FARMING

- This is a system of farming in which the cultivator uses a limited amount of labour and capital on relatively large area.
- Here, per acre yield is low but overall production is in surplus due to less population.
- Agriculture is done with the help of machines.

- Annually two or three crops are grown due to the demand of food for 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.

### ■ INTENSIVE FARMING

- This is a system of farming in which the cultivator uses large amount of labour and capital on relatively small area.

- Indian agriculture is chiefly of subsistence type where a large manual labour is

- 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.

- Deforestation, overgrazing and heavy rainfall have led to soil erosion.
- Divisions of land have led to fragmentation.
- The size of land holding is very small and uneconomic.
- The farmers are poor, illiterate and ignorant.
- They use primitive tools and out-dated methods.
- They lack financial credit and investment facilities.
- Good seeds, fertilizers and improved technology are not available to them.
- They lack irrigation facilities and are still on the mercy of nature.

## 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, use of fertilizers, machines and irrigation, etc. is known as **green revolution**.
- Green revolution had made us self-sufficient in food production.
- It is the phrase generally used to describe the spectacular increase that took place during 1968 and is continuing in the production of food-grains in India.

## IMPACT OF GREEN REVOLUTION

### ■ POSITIVE IMPACT

- Increase in agricultural production
- Reduction of the import of food grains
- Capitalistic farming
- Industrial growth
- Rural employment

### ■ NEGATIVE IMPACT

- Inter-crop imbalance
- Increase in regional imbalance
- Unemployment due to mechanisation
- Increase in inter-regional migration
- Environment Impacts
- Soil Solinisation
- Negligence of other crops

## MINERAL RESOURCES OF INDIA

Three types of minerals resources are as follows:

Mineral	Area
<b>Non-Metallic mineral Mines</b>	
Limestone	Found in Rajasthan, Madhya Pradesh, Andhra Pradesh, Gujarat, Chhattisgarh
Dolomite	About 90% of the dolomite is found in Madhya Pradesh, Chhattisgarh, Odisha, West Bengal, Gujarat
Asbestos	Rajasthan, Andhra Pradesh and Karnataka
Gypsum	Found in Rajasthan and Jammu and Kashmir
Graphite	Occurs in Bolangir, Kalahandi (Odisha) and Bhagalpur (Bihar)
<b>Metallic Mineral Mines</b>	
Iron	Kemmangundi, Hospet and Sondur (Karnataka) Barbil-Koria (Odisha), Boiladila and Dalli-Rajhara (Chhattisgarh) North Goa
Manganese	Found in Karnataka, Madhya Pradesh, Odisha and Maharashtra
Chromite	Found in Odisha, Bihar, Karnataka, Andhra Pradesh and Maharashtra.
Copper	Malanj Khand Belt (M.P.) Ketri-Singhara Belt (Rajasthan) Singhbhum (Jharkhand)
Bauxite	Found in Odisha, Gujarat, Jharkhand, Maharashtra, Chhattisgarh
Gold	Kolar and Hutt (Karnataka) Ramgiri in (Anantpur) A. P.
<b>Atomic Mineral Mines</b>	
Uranium	Gaya (Bihar) Saharanpur (U.P.) Jadugoda (Jharkhand) Monazite sands of Kerala Coast.
Thorium	Derived from Monazite sand, Found in Kerala, Jharkhand Bihar, Tamil Nadu and Rajasthan
Lithium	Found in lepidolite and spodumene, lepidolite is found in Jharkhand, M. P. and Rajasthan, Bastar region

4. NH-5	Pathankot — Amritsar — Bhatinda — Bikaner — Jaisalmer — Samakhiali
5. NH-2	Faridabad — Mathura — Agra — Allahabad — Varanasi — Aurangabad — Dhanbad — Durgapur — Kolkata
6. NH-8	Delhi — Gurgaon — Jaipur — Udaipur — Gandhinagar — Ahmedabad — Vadodara — Surat — Silvassa — Mumbai
7. NH-17	Panvel — Panaji — Ankola — Mangalore — Kozhikode — Kochi
8. NH-4	Mumbai — Pune — Kolhapur — Bangalore — Vellore — Chennai
9. NH-3	Agra — Gwalior — Indore — Mumbai
10. NH-31	Barhi — Begusarai — Dalkhola — Siliguri — Kokrajhar — Guwahati

## NATIONAL HIGHWAY DEVELOPMENT PROGRAMME (NHDP)

- 1. The Golden Quadrilateral Project involves connectivity of:
  - i. Delhi to Kolkata: 1,453 km (NH2).
  - ii. Delhi to Mumbai: 1,419 km (NH8, NH76 and NH46).
  - iii. Mumbai to Chennai: 1,290 km (NH4, NH6 and NH60).

Total length: **5,846 kms.**

- 2. North-South and East-West Corridors:
  - i. NS corridor connects Srinagar to Kanyakumari.
  - ii. EW corridor connects Porbandar (Gujarat) to Silchar (Assam).
- NS and EW corridors cross each other at Jhansi (Uttar Pradesh).

## STATE HIGHWAYS

- They are constructed and maintained by the State Government.
- Maharashtra has the maximum length of roads.
- West Bengal has the maximum road density.
- Roads on the borders are constructed and maintained by the Border Roads Organisation (BRO).
- BRO was established in May 1960.

- The BRO is doing highly commendable jobs of construction and maintenance in Myanmar and Afghanistan too.

## RAIL TRANSPORT

- The total route covered is approximately 63000 km.
- Indian Railway Board was established in March 1905.
- Indian Railway was nationalised in 1950.
- The management and governance of the Indian Railways is in the hands of the Railway Board.
- Railways have been divided into 17 zones.
- **A new zone** Kolkata Metro Zone (17th zone) was established on 29 December, 2010.
- India has the second largest railway network in Asia and the fourth largest in the World after the USA, Russia and China.
- It is the largest public sector undertaking of the country and it is the world's second largest railway network under single management.
- The first Indian railway line in India was operated for public traffic in 1853 between Mumbai and Thane over a distance of 34 km.
- The first electric train in India was 'Deccan Queen'. It was introduced in 1929 between Bombay and Poona.
- The fastest train in India is the Bhopal-New Delhi Shatabdi Express, whose maximum speed is 140 km/hr.
- The first metro rail was introduced in Kolkata on October 24, 1984.
- The oldest steam engine 'Fairy Queen' still runs on rail.
- Uttar Pradesh has largest railway network in India.
- Mumbai CST is the busiest railway junction of India.
- About 26% of the rail lines have been electrified.

## Railway Zones

Zone	Headquarter
Central Railway	Mumbai
Eastern Railway	Kolkata
Northern Railway	New Delhi
North-Eastern Railway	Gorakhpur

Zone	Headquarter
North Eastern Frontier Railway	Malegoan
Southern Railway	Chennai
South Central Railway	Secundrabad
South Eastern Railway	Kolkata
Western Railway	Mumbai (Church Gate)
East Central Railway	Hajipur
East Coast Railway	Bhubaneshwar
North Central Railway	Allahabad
North Western Railway	Jaipur
South-East Central Railway	Bilaspur
South-West Railway	Hubli
West Central Railway	Jabalpur
Kolkata Metro	Kolkata

### Vivek Express

- It has the longest train route in India connecting Dibrugarh and Kanyakumari.
- It is 8th longest route in the world.

### Konkan Railways

- It runs from Mangalore to Roha (40 km south of Mumbai).

### AIR TRANSPORT

- JRD Tata was the first person to take a solo flight from Mumbai to Karachi in 1931.
- In 1935, the 'Tata Airlines' started its operation between Mumbai and Thiruvananthapuram and in 1937 between Mumbai and Delhi.
- Airways in India started in 1911.
- All the airway companies were nationalised in 1953 as Air India.
- Vayudoot was established in 1981 for domestic services, but was later merged in Indian Airlines.

### MERGER OF AIR INDIA AND INDIAN AIRLINES

On 1 March, 2007, the Union Cabinet approved the proposal to merge Indian Airlines and Air India.

Accordingly, a new company, viz. National Aviation Company of India Limited (NACL)

has been incorporated on 30 March, 2007 with its Headquarters at Mumbai.

The brand name of the new airlines will be Air India (or Indian) and its logo will be Maharaja.

### WATER TRANSPORT

- The Central Water Tribunal was established in 1887.
- Its headquarter is in Kolkata.

### INTERNAL WATERWAYS

- India has got about 14,544 km of navigable waterways which comprise rivers, canals, backwaters, creeks, etc.
- The waterway from Haldia to Allahabad was made a National Waterway in 1986.
- The Inland Waterways Authority of India (IWAI) came into existence on 27 October, 1986.

### PORTS IN INDIA

- India has about 190 ports, with 13 major and the rest intermediate and minor.
- Largest port of India is Jawaharlal 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.
- Mumbai port is the busiest port of India.
- Large ports are maintained by the Central Government whereas small ports are included in the concurrent list and are managed by the State Government.

### Nicknames of Important Indian Places

Nickname	Place
Garden City of India	Bengaluru
Silicon Valley of India	Bengaluru
Electronic City of India	Bengaluru
Pink City	Jaipur
Gateway of India	Mumbai
Twin City	Hyderabad-Secunderabad
City of Festivals	Madurai
Deccan Queen	Pune
Golden City	Amritsar
Manchester of India	Ahmedabad

Nickname	Place
City of Seven Islands	Mumbai
Queen of Arabian Sea	Cochin
Space City	Bangaluru
City of Buildings	Kolkata
Dakshin Ganga	Godavari
Old Ganga	Godavari
Egg Bowls of Asia	Andhra Pradesh
Soya Region	Madhya Pradesh
Manchester of the South	Coimbatore
City of Nawabs	Lucknow
Venice of the East	Cochin
Sorrow of Bengal	Damodar river
Sorrow of Bihar	Kosi river
City of Rallies	New Delhi
Manchester of the North	Kanpur
City of Temples	Varanasi
Steel City of India	Jamshedpur (also called Tatanagar)
City of Lakes	Srinagar
City of Weavers	Panipat
Heaven of India	Jammu & Kashmir
Blue Mountains	Nilgiri
Queen of the Mountains	Mussoorie (Uttarakhand)
Sacred River	Ganga
Hollywood of India	Mumbai
City of Castles	Kolkata
State of Five Rivers	Punjab
Boston of India	Ahmedabad
Garden of Spices of India	Kerala
Abode of the God Prayag	Allahabad
Pittsburg of India	Jamshedpur
Switzerland of India	Kashmir

### Important Indian Towns on Rivers

Town	River
Ludhiana	Satluj
Ferozepur	Satluj
Mathura	Yamuna

Town	River
Delhi	Yamuna
Agra	Yamuna
Badrinath	Alaknanda
Hardwar	Ganga
Kanpur	Ganga
Allahabad	At the confluence of the Ganga and Yamuna
Kota	Chambal
Ahmedabad	Sabarmati
Bareilly	Ram Ganga
Ayodhya	Saryu
Jaunpur	Gomti
Lucknow	Gomti
Srinagar	Jhelum
Varanasi	Ganga
Patna	Ganga
Ujjain	Kshipra
Jamshedpur	Swarnarekha
Jabalpur	Narmada
Surat	Tapti
Curnool	Tungabhadra
Vijayvada	Krishna
Panji	Mandavi
Nasik	Godavari
Hyderabad	Musi
Tiruchirapalli	Cauvery
Seriranganatnam	Cauvery
Cuttack	Mahanadi
Sambalpur	Mahanadi
Kolkata	Hooghly
Guwahati	Brahmaputra
Dibrugarh	Brahmaputra

### Famous Hill Stations in India

Hill Station	Height from sea level (m)	State
Gulbarga	2550	J and K
Dalhousie	2035	H.P.
Ooty (Ootacamund)	2290	Tamil Nadu

Hill Station	Height from sea level (m)	State
Shimla	2210	H.P.
Pahalgam	2200	J & K
Darjeeling	2135	West Bengal
Kodaikanal	2120	Tamil Nadu
Lansdowne	2120	Uttarakhand
Mussoorie	2006	Uttarakhand
Panchgani	1200	Maharashtra
Kullu Valley	1200	H.P.
Mt. Abu	1220	Rajasthan
Kalimpong	1250	West Bengal
Mahabaleshwar	1370	Maharashtra
Mandi	709	H.P.
Periyar	915	Kerala
Panchmarhi	1065	M.P.
Mannar	1160	Kerala
Mukteshwar	1975	Uttarakhand
Nainital	1940	Uttarakhand
Kasauli	1985	H.P.
Coonoor	1860	Tamil Nadu
Gangtok	1850	Sikkim
Manali	1830	H.P.
Ranikhet	1830	Uttarakhand
Ranchi	1800	Jharkhand
Srinagar	1770	J and K
Almora	1650	Uttarakhand
Shillong	1500	Meghalaya
Lonawala	620	Maharashtra
Khandala	620	Maharashtra

### Tribal Groups of India

Tribal Group	Found in
Apatamis	Arunachal Pradesh
Angami	Manipur
Adivasis	MP (Bastar distt.)
Abhors	North-East
Birhors	M.P. and Bihar
Bhuria	M.P.
Bhotias	Uttarakhand

Tribal Group	Found in
Bhilis	M.P. and Rajasthan
Bakkarwals	J and K
Baigas	M.P.
Badagas	Tamil Nadu
Chutia	Assam
Chenchus	A.P. and Odisha
Chang North-East	North-East
Oarons	Bihar and Odisha
Onges	Andaman and Nicobar
Pho North-East	North-East
Santhals	WB, Odisha and Bihar
Sangtam	North-East
Murias	M.P.
Nishi North	East
Nagas	Nagaland
Warlis	Maharashtra
Mundas	Bihar
Moplahs	Kerala
Minas	Rajasthan
Murias	M.P.
Lushai	Tripura
Lepchas	Sikkim
Lahaulas	Himachal Pradesh
Kuki	Manipur
Kotas	Tamil Nadu
Kolam	A.P.
Kol	M.P.
Khonds	Odisha
Khasis	Assam and Meghalaya
Khas	U.P.
Khond	M.P.
Kharia	M.P.
Katkari	M.P.
Kanikar	Tamil Nadu
Jarawas	Little Andamans
Jaintias	Meghalaya
Irula	Tamil Nadu

Tribal Group	Found in
Gujlars	J and K and H.P.
Gonds	M.P. and Bihar
Garos	Assam and Meghalaya
Gallong	North-East
Gaddis	Himachal Pradesh
Sema	Nagaland
Sentinelese	Andaman and Nicobar
Shompens	Andaman and Nicobar
Todas	Tamil Nadu
Uralis	Kerala
Wancho	North-East

### Indian Towns Associated with Industries

Town	Industries	State
Ahmedabad	Cotton Textiles	Gujarat
Agra	Leather, Marble, Carpet	U.P.
Aligarh	Locks, Cutlery	U.P.
Ankleshwar	Oil Fields	Gujarat
Ambernath	Machine Tools	Maharashtra
Amritsar	Woollen Clothes	Punjab
Anand	Milk and its Products	Gujarat
Alwaye	Fertilizer, Monazite Factory	Kerala
Ambala	Scientific Instruments	Haryana
Bokaro	Steel Plant	Jharkhand
Bengaluru	Telephones, Aircrafts, Motors, Cotton Textiles, Toys	Karnataka
Batanagar	Shoes	West Bengal
Bareilly	Resin Industries, Match Factory	U.P.
Bhilai	Steel Plant	Chhattisgarh
Barauni	Chemical Fertilizer	Bihar

Town	Industries	State
Burnpur	Steel Plant	West Bengal
Bhurkunda	Glass Industries	Jharkhand
Bhagalpur	Silk Industries	Bihar
Bhandara	Explosives	Maharashtra
Bhadrapur	Iron and Steel	Karnataka
Bongaigaon	Petroleum	Assam
Bhadoi	Carpets	U. P.
Churk	Cement	M. P.
Cyberabad	Electronics, Computers, Information Technology	Andhra Pradesh
Chittaranjan	Locomotive	West Bengal
Kolkata	Jute, Leather, Electric goods	West Bengal
Cochin	Ship-building, Coconut oil, Rubber	Kerala
Calicut	Coffee, Coconut	Kerala
Coimbatore	Cotton Industries	Tamil Nadu
Dhariwal	Woollen Clothes	Punjab
Durgapur	Steel	West Bengal
Digboi	Petroleum	Assam
Delhi	Textiles, Electronics, D.D.T.	Delhi
Dalmianagar	Cement	Bihar
Darjeeling	Tea	W. Bengal
Dindigul	Cigar, Tobacco	Tamil Nadu
Ferozabad	Bangle works	M. P.
Guntur	Cotton industries	Andhra Pradesh
Gwalior	Pottery, Tobacco	Madhya Pradesh
Gomia	Explosives	Jharkhand
Haridwar	Heavy electricals	Uttarakhand
Hatia	Heavy Engineering Corporation	Jharkhand

Town	Industries	State
Haldia	Chemical fertilizer	West Bengal
Hazira	Artificial Rayon	Gujarat
Jamshedpur	Iron and Steel, Locomotives, Railway coaches	Jharkhand
Jallundhur	Surgical goods and sports articles	Punjab
Jaipur	Cloth Printing, Brass	Rajasthan
Jharia	Coal mines	Jharkhand
Jabalpur	Bidi industry	Madhya Pradesh
Jainakot	H.M.T. watches	Jammu and Kashmir
Japla	Cement	Jharkhand
Kanpur	Cotton and woollen mills, Leather, Sugar	U.P.
Katni	Cement	M.P.
Korba	Aluminium factory, Thermal plant	Chhattisgarh
Koyna	Aluminium factory	Maharashtra
Koyali	Petrochemical industries	Gujarat
Kolar	Gold-mining centre	Karnataka
Kota	Atomic power plant	Rajasthan
Kanchipuram	Silk clothes	Tamil Nadu
Karnal	Dairy product	Haryana
Kandla	Chemical fertiliser, famous port	Gujarat
Khetri	Copper industries	Rajasthan
Ludhiana	Hosiery	Punjab
Lucknow	Embroidery work, Chicken work	U.P.

Town	Industries	State
Chennai	Leather, Cigarette, Integral coach factory	Tamil Nadu
Madurai	Cotton-and Silk-weaving	Tamil Nadu
Mirzapur	Carpet, Pottery, Brass industries	U.P.
Muradabad	Brassware, Cutlery	U. P.
Mathura	Oil refinery	U.P.
Mysore	Sandalwood oil, Silk goods	Karnataka
Meerut	Publication work, Sports goods, Scissors-making	U.P.
Mumbai	Cinema industries, Cotton textiles	Maharashtra
Modinagar	Nylon thread	U.P.
Moorie	Aluminium	Jharkhand
Majhagaon	Ship-building	Maharashtra
Nagpur	Cotton mills, Oranges	Maharashtra
Nepanagar	Newsprint	Madhya Pradesh
Nasik	Security printing press	Maharashtra
Neyveli	Lignite industries	Tamil Nadu
Nunamati	Oil refineries	Assam
Narora	Atomic Power Plant	U.P.
Nangal	Fertilisers	Punjab
Panna	Diamond mining	M.P.
Pinjore	Hindustan Machine Tools	Haryana
Perambur	Integral coach factory	Tamil Nadu
Pimpri	Penicillin factory	Maharashtra

Town	Industries	State
Raniganj	Coal-mining	West Bengal
Rourkela	Steel plant, Chemical fertilisers	Odisha
Rana Pratap Sagar	Hydropower plant	Rajasthan
Renukoot	Aluminium plant	U.P.
Roopnarayanpur	Cables	West Bengal
Rishikesh	Antibiotic Plant	Uttarakhand
Saharanpur	Cigarette factory, Newsprint	U.P.
Sindri	Chemical fertilisers	Jharkhand
Srinagar	Woollen shawls, Silk, Woodwork	Jammu and Kashmir
Surat	Cotton textiles, Diamond- cutting	Gujarat
Surajpur	Cement factory	Haryana
Suratgarh	Agricultural implements	Rajasthan
Singhbhum	Copper, iron	Jharkhand
Singreni	Coal-mining	Andhra Pradesh
Salem	Iron and steel	Tamil Nadu
Samastipur	Jute, Paper, Tobacco, Sugar	Bihar
Tarapur	Atomic power plant	Maharashtra
Titagarh	Paper and jute	West Bengal
Thiruvanantha- puram	Coir-matting	Kerala
Trombay	Oil refinery	Maharashtra
Tiruchirapalli	Cigar	Tamil Nadu
Tirupati	Scooter	Andhra Pradesh
Tanjore	Silk clothes	Tamil Nadu
Thumba	Rocket- launching station	Kerala
Vijaypur	Fertilisers	M.P.

Town	Industries	State
Vijaynagar	Steel plant	Karnataka
Vishakhapatnam	Ship-building, Iron and steel, Oil refinery	A.P.
Varanasi	Rail engines and saari industries	U.P.
Worli	Baby food	Maharashtra
Zainkot	HMT watches	Jammu and Kashmir

**Largest, Longest,  
Highest and Smallest in India**

Largest Dome	Gol Gumbaz, Bijapur (Karnataka)
Largest Zoo	Zoological Gardens, Alipur, Kolkata
Largest Man-made Lake	Govind Vallabh Pant Sagar (Rihand Dam)
Largest Desert	Thar (Rajasthan)
Highest Tower	Pitampura Tower, Delhi
Smallest State (Area)	Goa
Highest Waterfall	Gersoppa Waterfall (Karnataka)
Longest Electric Railway Line	From Delhi to Kolkata via Patna
Largest Cave Temple	Kailash Temple, Ellora (Maharashtra)
Longest River	Ganges
Longest Tributary River of India	Yamuna
Longest River of the South	Godavari
Highest Mountain Peak	Godwin Austen (K2)
Largest Lake (Fresh Water)	Wular Lake (Kashmir)
Highest Dam	Bhakra Dam (Punjab)
Largest Mosque	Jama Masjid, Delhi
Longest Road	Grand Trunk Road
State with Longest Coastline	Gujarat
Longest Railway Route	From Jammu to Kanyakumari

Longest Tunnel	Jawahar Tunnel (Jammu and Kashmir)
Longest National Highway	NH-7
Longest Dam	Hirakud Dam (Odisha)
Longest River Bridge	Mahatma Gandhi Setu, Patna
Largest Museum	National Museum, Kolkata
Largest Delta	Sunderbans Delta, West Bengal
Largest Animal Fair	Sonepur (Bihar)
Highest Gateway	Buland Darwaza, Fatehpur Sikri (Agra)
Biggest Hotel	Oberoi-Sheraton (Mumbai)
Largest State (Area)	Rajasthan
Place of Heaviest Rainfall	Mausinram (Meghalaya)
Largest Corridor	Rameshwaram Temple Corridor (Tamil Nadu)
Largest Cantilever Span Bridge	Howrah Bridge (Kolkata)
Largest Forest State	Madhya Pradesh
Highest Straight Gravity Dam	Bakra Dam
Longest Railway Platform	Gorakhpur (U.P.)
Largest Stadium	Salt Lake (Yuva Bharti), Kolkata
Largest Port	Mumbai
Highest Battlefield	Siachin Glacier
Highest Airport	Leh (Laddakh)
Largest River Island	Majuli (Brahmaputra River, Assam)
Largest Planetarium	Birla Planetarium (Kolkata)
Highest Lake	Devatal (Garhwal)
Largest Lake (Saline Water)	Chilka Lake, Odisha
Largest Gurudwara	Golden Temple, Amritsar
Deepest River Valley	Bhagirathi and Alaknanda
State with Longest Coastline of South India	Andhra Pradesh

Longest River which forms estuary	Narmada
Largest Church	Saint Cathedral (Goa)
Longest Beach	Marina Beach, Chennai

### Important Indian Towns on the Bank of Rivers

Town	River
Allahabad	At the confluence of the Ganga and Yamuna
Ujjain	Shipra
Surat	Tapti
Jamshedpur	Swarnarekha
Dibrugarh	Brahmaputra
Guwahati	Brahmaputra
Kolkata	Hooghly
Sambalpur	Mahanadi
Cuttack	Mahanadi
Serirangapatnam	Cauvery
Hyderabad	Musi
Nasik	Godavari
Vijaywada	Krishna
Curnool	Tungabhadra
Tiruchirapalli	Cauvery
Delhi	Yamuna
Mathura	Yamuna
Ferozepur	Satluj
Ludhiana	Satluj
Srinagar	Jhelum
Lucknow	Gomti
Jaunpur	Gomti
Ayodhya	Saryu
Bareilly	Ram Ganga
Ahmedabad	Sabarmati
Kota	Chambal
Jabalpur	Narmada
Panji	Mandavi
Patna	Ganga
Varanasi	Ganga
Kanpur	Ganga
Haridwar	Ganga

Town	River
Badrinath	Alaknanda
Agra	Yamuna

### Heights of Some Important Indian Peaks

Peak	Height (in metres) above mean sea level
K2	8,611
Kanchenjunga	8,598
Nanga Parbat	8,126
Gasher Brum	8,068
Broad Peak	8,047
Disteghil Sar	7,885
Masher Brum E	7,821
Nanda Devi	7,817
Masher Brum W	7,806
Rakaposhi	7,788
Kamet	7,756
Saser Kangri	7,672
Skyang Kangri	7,544

Peak	Height (in metres) above mean sea level
Sia Kangri	7,422
Chaukhamba (Badrinath Peak)	7,138
Trisul West	7,138
Nunkun	7,135
Pauhunri	7,128
Kangto	7,090
Dunagiri	7,066

### Lengths of Some Important Indian Rivers

River	Length (km)
Indus	3,000
Brahmaputra	2,900
Ganga	2,510
Godavari	1,450
Narmada	1,290
Krishna	1,290
Mahanadi	890
Cauvery	760

### Multipurpose Projects of India

Project	River	States involved	Objectives
1. Bhakra-Nangal Project (Highest straight way gravity dam in the world.)	Satluj River	Joint Venture of Punjab, Haryana and Rajasthan.	<ul style="list-style-type: none"> <li>Two dams at Bhakra and Nangal</li> <li>Turn the turbines of power houses at Ganguwal, Kotla;</li> <li>Provides water for irrigation canals</li> </ul>
2. Beas Project	Beas River	Punjab, Haryana and Rajasthan	<ul style="list-style-type: none"> <li>Bhakra Pong Dam—provide water supplies to Rajasthan canal</li> <li>Project mainly provides irrigation to Punjab, Haryana and Rajasthan</li> <li>A small power house for power generation</li> </ul>
3. Beas-Sutlej Link Project	Beas and Sutlej Rivers	Himachal Pradesh and Rajasthan	<ul style="list-style-type: none"> <li>To tap the hydroelectric and irrigation potential of the River Beas.</li> <li>Remaining water of Beas is stored in Pong Reservoir for irrigating arid wastelands in Rajasthan through the Rajasthan canal.</li> </ul>
4. Chambal Project	Chambal River (origin on the northern slopes of the Vindhya near Mhow in Madhya Pradesh.)	Joint venture of Rajasthan and Madhya Pradesh	<ul style="list-style-type: none"> <li>Completion in three stages</li> <li>Stage I—Gandhisagar Dam, near Chaurasigarh fort for power production; Kota Barrage, near Kota, Right main canal; Left main canal.</li> <li>Stage II—Rana Pratap Sagar at Rawatbhata in Chittorgarh District—Irrigation and power generation.</li> <li>Stage III—Jawahar Sagar Dam—Power generation.</li> </ul>

5. Damodar Valley Project	Damodar River (rises in the Kamarpet hill in the Chhotanagpur Plateau of Jharkhand).	Jharkhand and West Bengal.	<ul style="list-style-type: none"> <li>Flood Control, irrigation, navigation, afforestation and control of soil-erosion.</li> <li>Promotion of agriculture and industry, electricity generation.</li> <li>Four dams at Tilaiya, Konar, Maithan, Panchet</li> </ul>
6. Gandak Project	Gandak River	Joint venture of Uttar Pradesh, Bihar. Nepal also receives irrigation and power facilities	<ul style="list-style-type: none"> <li>Barrage at Balmikinagar in Bihar—irrigation</li> <li>Main Western Canal—irrigation to Bihar and U.P.</li> <li>Main Eastern Canal — irrigation to Bihar and Nepal Power House—Gift to Nepal</li> </ul>
7. Hasdeo Project	Hasdeo River, a tributary of Mahanadi	Chhattisgarh	<p>Completion in 3 phases :—</p> <ul style="list-style-type: none"> <li>Phase I—Hasdeo Barrage; Left Bank Canal—supplies cooling water to Korba Thermal Power Station and creates irrigation potential.</li> <li>Phase II—Right Bank Canal and Janjgir branch Canal</li> <li>Phase III—Hasdeo Bargo Dam—storage and irrigation; Extension of the Left Bank Canal—irrigation and hydel power generation.</li> </ul>
8. Hirakud Project	Mahanadi River (rises from Bastar Hills near Sihawa and flows through Chhattisgarh and Orissa).	Odisha	<ul style="list-style-type: none"> <li>Stage I—(a) Hirakud dam in Sambalpur district of Odisha—Power supplies to Indian Aluminium Co. and other industries in the region. (b) Canals—Sambalpur Canal, Baragarh Canal, Saran Canal—Irrigation to Orissa. (c) Mahanadi Delta Irrigation Scheme. (d) Navigation—from Dholpur to Cuttack.</li> <li>Stage II—Power house at Chiplima, Hirakud Dam at Tikarpore and at Naraj west of Cuttack.</li> </ul>
9. Kosi Project	Kosi River (rises from 6000 m. high Tibet Plateau).	Bihar & Nepal	<ul style="list-style-type: none"> <li>Unit I—Barrage near Hanumannagar in Nepal—Appurtenant Works.</li> <li>Unit II—Flood embankment and other protective works</li> <li>Unit III—Eastern Kosi Canal System—Irrigation of North Bihar. The project provides transport facilities, soil conservation and development of agro-based industries.</li> </ul>
10. Nagarjunasagar Project	Krishna River	Andhra Pradesh	<ul style="list-style-type: none"> <li>Irrigation of Krishna river delta and surrounding regions.</li> <li>Power generation.</li> </ul>
11. Rihand Dam	Rihand River (It rises in the Mainpat Hills in the Surguja district of M.P.)	Uttar Pradesh	<ul style="list-style-type: none"> <li>Flood control by preserving water in Govind Ballabh Pant Sagar Reservoir</li> <li>Provides irrigation to eastern parts of U.P. and Bihar.</li> <li>Development of fisheries, water sports, tourism and navigation in U.P. and M.P.</li> </ul>

12. Tungabhadra Project	Tungabhadra River	Joint venture of Andhra Pradesh and Karnataka	<ul style="list-style-type: none"> <li>Irrigation to Andhra Pradesh and Karnataka.</li> <li>Two Power Stations at Hampi supply cheap power.</li> </ul>
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### Nuclear Power Stations in India

Tarapur	Maharashtra
Kalpakkam	Tamil Nadu, called Indira Gandhi Centre for Atomic Research
Narora	U. P.
Rawatbhata	Kota, Rajasthan
Kaiga	Karnataka
Kakrapar	Gujarat
Kudankulam	Tamil Nadu

### Major Thermal Power Plants in India

Neyveli	Tamil Nadu
Korba	Chhattisgarh
Obra	U. P.
Harduaganj	U. P.
Rihand	U. P.
Singrauli	U. P.
Parichha	U. P.
Talcher	Odisha
Farakka	W. Bengal
Satpura	M. P.
Ramagundam	A. P.
Vindhyanachal	M. P.

- State with lowest female literacy — Bihar (51.5%)
- State having highest decadal growth — Meghalaya (27.9%)
- State having highest Population — Uttar Pradesh (19,98,12,341)
- State having lowest Population — Sikkim (6,10,577)
- State with highest Population Density— Bihar (1106)
- State with lowest Population Density — Arunachal Pradesh (17)
- State having highest Sex Ratio — Kerala (1,084)
- State having lowest Sex Ratio — Haryana (879)
- India accounts for a meagre 2.4 percent of the world surface area of 135.79 million sq km.
- India supports 17.5 percent of the World Population.
- Life Expectancy at Birth — 63.5 years, Male — 62.6 years, Female — 64.2 years
- First census was undertaken in 1872 but a systematic programme of Population Census started in 1881.
- Highest Death Rate among states is in Odisha — 98 per thousand.
- Lowest Death Rate among states is in Kerala — 16 per thousand.
- Decadal growth rate in Population — 17.7%
- State having lowest population decadal growth rate — Nagaland (-0.6%)
- Four cities having highest population in India are Mumbai, Kolkata, Delhi and Chennai respectively.
- Andhra Pradesh was the first state to prepare a population policy.
- Highest Scheduled Caste population is in Uttar Pradesh.
- Highest Scheduled Tribe Population is in Madhya Pradesh.
- Lowest Scheduled Caste Population is in Nagaland.
- Lowest Scheduled Tribe Population is in Punjab.

### CENSUS OF INDIA

- Total Population of India — 1,21,08,54,977
- Sex Ratio (females per thousand males) — 943
- Density — 382 persons per sq. km.
- Crude Birth Rate (2009) — 22.5
- Crude Death Rate (2009) — 7.3
- Infant Mortality Rate (2006) — 57 per thousand live births
- Maternal Mortality Rate — 407 per lakh live births
- Literacy rate of the country — 73 per cent. (Male — 80.9 per cent, Female — 64.6 per cent)
- State with highest literacy — Kerala (94.0%)
- State with lowest literacy — Bihar (61.8%)
- State with highest female literacy — Kerala (92.1%)

**STATES OF INDIA**

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**Largest Union Territories (Population- Wise) : 2011**

Rank	States	Persons	Rank	States	Persons
1.	Delhi	1,67,87,941	5	Dadra & Nagar Haveli	3,43,709
2.	Puducherry	12,47,953	6	Daman & Diu	2,43,247
3.	Chandigarh	10,55,450	7	Lakshadweep	64,473
4.	Andaman & Nicobar Islands	3,80,581			

**Largest Indian States (Population-Wise) : 2011**

Rank	States	Persons	Rank	States	Persons
1.	Uttar Pradesh	19,98,12,341	16	Punjab	2,77,43,338
2.	Maharashtra	11,23,74,333	17	Chhattisgarh	2,55,45,198
3.	Bihar	10,40,99,452	18	Haryana	2,53,51,462
4.	West Bengal	9,12,76,115	19	Jammu & Kashmir	1,25,41,302
5.	Madhya Pradesh	7,26,26,809	20	Uttarakhand	1,00,86,292
6.	Tamil Nadu	7,21,47,030	21	Himachal Pradesh	68,64,602
7.	Rajasthan	6,85,48,437	22	Tripura	36,73,917
8.	Karnataka	6,10,95,297	23	Manipur	28,55,794
9.	Gujarat	6,04,39,692	24	Meghalaya	29,66,889
10.	Andhra Pradesh	4,93,86,799	25	Nagaland	19,78,502
11.	Odisha	4,19,74,218	26	Goa	14,58,545
12.	Telangana	3,51,93,978	27	Arunachal Pradesh	13,83,727
13.	Kerala	3,34,06,061	28	Mizoram	10,97,206
14.	Jharkhand	3,29,88,134	29	Sikkim	6,10, 577
15.	Assam	3,12,05,576			

**Largest Indian States : Area-Wise**

Rank	States	Area (Sq. km)	Rank	States	Area (Sq. km)
1.	Rajasthan	3,42,239.00	16	Jharkhand	79,714.00
2.	Madhya Pradesh	3,08,252.00	17	Assam	78,438.00
3.	Maharashtra	3,07,713.00	18	Himachal Pradesh	55,673.00
4.	Uttar Pradesh	2,40,928.00	19	Uttarakhand	53,483.00
5.	Jammu & Kashmir	2,22,236.00	20	Punjab	50,362.00
6.	Gujarat	1,96, 244.00	21	Haryana	44,212.00
7.	Karnataka	1,91,791.00	22	Kerala	38,863.00
8.	Andhra Pradesh	1,60,205.00	23	Meghalaya	22,429.00
9.	Odisha	1,55,707.00	24	Manipur	22,327.00
10.	Chhattisgarh	1,35,192.00	25	Mizoram	21,081.00

11.	Tamil Nadu	1,30,060.00	26	Nagaland	16,579.00
12.	Telangana	1,14,840.00	27	Tripura	10,486.00
13.	Bihar	94,163.00	28	Sikkim	7,096.00
14.	West Bengal	88,752.00	29	Goa	3,702.00
15.	Arunachal Pradesh	83,743.00			

### Largest Union Territories : Area-Wise

Rank	States	Area (Sq. km)	Rank	States	Area (Sq. km)
1.	Andaman & Nicobar Islands	8249.00	5	Chandigarh	114.00
2.	Delhi	1483.00	6	Daman & Diu	111.00
3.	Dadra & Nagar Haveli	491.00	7	Lakshadweep	30.00
4.	Puducherry	490.00			

## 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.
- **Advection:** Transfer of heat through horizontal movement of air.
- **Acolian:** Relating to or caused by wind.
- **Altimeter:** A type of aneroid barometer for measuring height used mainly in aeroplanes.
- **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.
- **Atoll:** A ring or horseshoe-shaped coral reef.
- **Aurora Australis and Aurora Borealis:** The light phenomena seen in the sky at night in the higher latitudes of the southern and northern hemisphere respectively.
- **Avalanche:** A large mass of snow and ice at high altitude, sliding downslope on a mountain.
- **Azonal soil:** Soil which has not been subjected sufficiently to soil forming processes and thus has changed little from the parent material.
- **Barometer:** Instrument used for measuring pressure.
- **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.
- **Beach:** A gently sloping strip of land along the coast.
- **Beaufort scale:** A scale identifying wind strength.
- **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.
- **Chaparral:** The low, dense scrub, characteristic of Mediterranean type of climatic regions.
- **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 vapour in the atmosphere.
- **Condensation:** The process by which a substance changes from vapour to liquid.
- **Condensation nuclei:** Microscopic particles having an affinity for water.
- **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.
- **Coral:** A kind of rock formed of polyps forming reefs in the oceans.
- **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.
- **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.
- **Estuary:** Mouth of a river where tidal effects are evident and where fresh water and sea water mix.
- **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 thereof now under the sea.
- **Flora:** The plant life of a region or geological period.
- **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.
- **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.
- **Gulf:** A large, deep bay.
- **Habitat:** Natural environment of a plant or animal.
- **Halophyte:** A plant which grows naturally in saline environment.
- **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.
- **Hyetograph:** A self-recording rain-gauge.
- **Hygrophyte:** Plant growing in wetlands.
- **Illuviation:** Deposition, in the lower soil horizon, of material removed by alluviation from the upper horizons of the soil.
- **Insolation:** Energy radiated from the sun received by the earth.
- **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.
  - **Isanomal:** Isopleth of anomaly.
  - **Isarithm:** Any line representing continuous value on maps.
  - **Isobars:** Lines of equal depth in sea.
  - **Isonaths:** Lines of 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.
  - **Isohalines:** Isopleths of salinity.
  - **Isohels:** Isopleths of equal amount of sunshine.
  - **Isohyets:** Isopleths of rainfall.
  - **Isohypse or contour lines:** Isopleths of elevation above sea level.
  - **Isonif:** Isopleth of amount of snow.
  - **Isorymes:** Line of equal frost.
  - **Isoseismals:** Lines of equal seismic activity.
  - **Isotherms:** Isopleths 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 reefs.
  - **Lapse rate:** The rate of change of temperature in atmosphere with height.
  - **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.
  - **Loess:** A deposit of fine silt or dust generally held to have been transported to its present situation by wind.
  - **Lunar month:** The interval of time in which the moon makes one complete revolution around the earth—about 29.5 days.
  - **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.
  - **Monsoon:** A type of wind system in which there is complete reversal or almost so, of prevailing wind direction from season to season.
  - **Moraine:** The debris or fragments of rock material brought down with the movement of glacier.
  - **Mulatto:** 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.
  - **Oasis:** Area in the desert where water is available.
  - **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.
  - **Pastoralism:** Practice of breeding and rearing cattle.
  - **Pedology:** The science of the study of soils.
  - **Peninsula:** A stretch of land almost surrounded by water.
  - **Permafrost:** Ground that is permanently frozen.
  - **Petrology:** 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.
  - **Piedmont:** Belonging to or related to the foot of a mountain.

- **Plateau:** Extensive level or near level area of elevated land.
- **Precipitation:** Falling of 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.
- **Radiation:** Process by which a body emits radiant energy, viz.-in the form of heat.
- **Rain shadow:** Area having relatively lower average rainfall.
- **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 a reg.
- **Saprophyte:** A plant which lives on decaying organic matter.
- **Satellite:** A relatively small body revolving around a planet.
- **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.
- **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.
- **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 forest land of Siberia.
- **Tidal range:** Average difference in water level between high and low tide at one place.
- **Trans-humane:** Practice among pastoral communities to move with their animal seasonally between two regions of different climate.
- **Tributary:** A smaller river which joins a larger river.
- **Tropophyte:** A plant which acts as a hygrophyte in one season and xerophyte in the other.
- **Tsunami:** A large sea wave caused by an earthquake originating on the seabed.
- **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 km 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.
- **Watershed:** Elevated boundary line separating headstreams which are tributaries to different river systems or basins.
- **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-wily:** Tropical cyclone in the Pacific near the east coast of Australia.
- **Wind vane:** Instrument used to indicate the direction of the wind.
- **Yazoo river:** Tributary which is prevented from joining the main river because the latter has built up high natural levees; it thus runs parallel to the main stream for a considerable distance before joining it downstream.
- **Zenith:** Point in the celestial sphere vertically above one's head.
- **Zonal soil:** A soil which owes its well developed characteristics largely to the influence of climate and vegetation.
- **Zoophyte:** An animal which resembles a plant, viz. a coral polyp or a sponge.



## ENVIRONMENT AND ECOLOGY

## ENVIRONMENT

'Environment' is a term derived from the French word 'Environner' that means 'to surround'. There was a time when the environment just meant surroundings. It was used to describe the physical world surrounding us, including soil, rocks, water and air. Gradually, it was realised that the enormous variety of plants, animals and micro-organisms on this earth, including human beings are an integral part of the environment. Hence, to make a sensible definition of environment, it was necessary to include the interactions and inter-relationships of all living organisms with the physical surroundings.

As per the Environment (Protection) Act, 1986, environment includes all the physical and biological surroundings of an organism along with their interactions. Environment is, thus, defined as 'the sum total of water, air and land and the inter-relationships that exist among them and with the human beings, other living organisms and materials'.

### Environment Calendar

World Wetland Day	February 2
World Forest Day	March 21
World Day for Water	March 22
World Meteorological Day	March 23
Earth Day	April 22
International Biodiversity Day	May 22
Anti-tobacco Day	May 31
World Environment Day	June 5
World Ocean Day	June 8
World Population Day	July 11
Ozone Week	Sept. 16–23
World Car-free Day	Sept. 22

Green Consumer Day	Sept. 28
World Farm Animal's Day	Oct. 2
World Habitat Day	Oct. 3
World Animal Welfare Day	Oct. 4
Wildlife Week	Oct. 1–7
International Day for Natural Disaster Reduction	Oct. 13
World Conservation Day	Oct. 24
International Day for Biological Diversity	Dec. 29

### TYPES OF ENVIRONMENT

Environment can be classified into three broad types:

(a) **Biotic (living):** The word 'biotic' refers to having to do with living organisms. Biotic elements refer to the biological component of the ecosystem, consisting of population of plants, animals and micro-organisms in complex communities. The biotic factors influencing an organism, viruses and other parasitic organisms cause diseases. These are all parts of an organism's biotic environment. The biotic component of the ecosystem consists of three distinct groups of organisms, **the producers, consumers and decomposers**. The producers are those organisms capable of photosynthesis, production of organic material solely from solar light and carbon dioxide. The consumers are organisms whose very survival depends on the organic material manufactured by the producers. The last group of living organisms are the decomposers. These include micro-organisms, such as fungi, bacteria, yeast, etc. as well as

a diversity of worms, insects and many other small animals.

**(b) Abiotic:** Abiotic factors include the flow of energy necessary to maintain any organism, the physical factors that affect it and the supply of molecules required for its life functions. Other physical factors include climate, temperature, precipitation, including its types (rain, snow, hill) around and seasonable distribution, types of soil present (sandy or clay, dry or wet, fertile or infertile). In the ecosystem, the abiotic (non-living) components perform important function of providing water and oxygen for organisms. Second, they act as a reservoir of the six most important elements for life, carbon (C), hydrogen (H), oxygen (O), nitrogen (N), sulphur (S) and phosphorus (P).

**(c) Cultural:** The stage of development that human beings have attained in the path towards progress will determine their culture as the way of life. Human interaction with environment also influences the ecosystem. People of different cultures view their place in society from different angles. Among the factors that can shape their views are religious understandings, economic pressures and fundamental knowledge of nature. Due to this diversity of background different cultures put different values on the natural world. But the general attitude has been one of development rather than preservation. Technology has been the key to human progress. Technology has also increased the quantity of environmental degradation. Human interaction with the environment has increased very fast of.

### Components of Environment

Abiotic	Biotic
Energy	Green Plants
Radiation	Non-Green Plants

Temperature & heat flow Water	Decomposers Parasites
Atmospheric gases and wind	Symbionts
Gravity & Fire	Man
Topography & Soil	Animals
Geologic Substratum	

## ECOLOGY

The word 'ecology' is derived from the Greek word 'oikos' meaning habitation, and 'logos' meaning discourse or study, implies a study of the habitations of organisms. Ecology was first described as a separate field of knowledge in 1866 by the German Zoologist Ernst Haeckel, who invented the word 'ecology' for the relation of the animal to its organic as well as its inorganic environment, particularly its friendly or hostile relations to those animals or plants with which it comes in contact. Ecology has been variously defined by other investigators as 'scientific natural history', 'the study of biotic communities' or 'the science of community population', probably the most comprehensive definition is 'the study of animal and plants in their relations to each other and to their environment'.

### ECOSYSTEM

An assemblage of species of plants and animals inhabiting a common area and having effects on one another is known as a 'biotic community'. A combination of a biotic community with the natural or physical environment is known as an ecosystem. The term 'ecosystem' implies a local community of organisms interacting with their local non-living environment. In other words, the interdependence of living and non-living aspects, i.e., plants, animals, man, forest, soil, etc. make an ecosystem. It is defined as a unit which includes all the organisms (biological component) in a given area interacting with the environment (physical component) so that the flow of energy leads to a clearly defined trophic

(nutrient supply) structure biotic diversity and material cycles.

### FUNCTIONS OF AN ECOSYSTEM

1. Ecosystem performs the most important function of satisfying the requirements of the different aspects of the biotic component.
2. It is through an ecosystem that the interaction as well as interdependence between the biological component and the physical component in the environment takes place, this interdependence is between abiotic and biotic components. For example, plants depend on solar energy and soil. The interdependence is also between different aspects within the biotic components. For example, the carnivores depend on herbivores.
3. Ecosystem leads to transfer of food energy and nutrients from one source to another source.
4. The different forms of ecosystem are beneficial because they lead to positive effects on the environment, which, in turn, helps the living organisms.
5. Ecosystems have helped human beings by providing materials as well as services necessary for survival as well as development.

## BIODIVERSITY

- ‘Biological diversity’ or ‘biodiversity’ refers to numbers, variety, and variability of living organisms and ecosystems.
- The term ‘biodiversity’ includes all terrestrial, marine, and other aquatic organisms.
- It also covers diversity within species, between species, as well as the variation among ecosystems.
- It is concerned also with their complex ecological interrelationships.

### TYPES OF BIODIVERSITY

- I. **Genetic diversity:** It refers to variation of genes within species. Each member of any animal or plant species differs widely from other individuals in its genetic make-up because of the large

number of combinations possible in the genes that give every individual specific characteristics.

- II. **Species diversity:** The number of species of plants and animals that are present in a region constitutes its species diversity. This diversity is seen both in natural ecosystems and in agricultural ecosystems. Some areas are richer in species than others. Natural undisturbed tropical forests have much greater species richness than plantations developed by the Forest Department for timber production.

- III. **Ecosystem diversity:** There are a large variety of different ecosystems on earth, which have their own complement of distinctive interlinked species based on the differences in the habitat. Ecosystem diversity can be described for a specific geographical region or a political entity, such as a country, a state or a taluka. Distinctive ecosystems include landscapes, such as forests, grasslands, deserts, mountains, etc., as well as aquatic ecosystems, such as rivers, lakes, and the sea. Each region also has man-modified areas, such as farmland or grazing pastures.

### Biogeographic classification of India

1. Trans-Himalayan zone
2. Himalayan zone
3. Desert zone
4. Semiarid zone
5. Western ghat zone
6. Deccan plateau zone
7. Gangetic plain zone
8. North east zone
9. Coastal zone
10. Islands present near the shore line

### PROTECTED AREA

An area declared under the Wildlife (Protection) Act, 1972 for the protection of wildlife in India. As today, there are four types of protected areas in India, namely:

- (a) **National Park:** A large area which receive highest level of protection under

Section 35 of the Wildlife (Protection) Act, 1972 for the conservation of wildlife is called National Park. There are, about more than 100 national parks in India. In Chhattisgarh, there are 4 national parks.

- (b) **Wildlife Sanctuary:** A large area which received medium level of protection under Section 18A of the Wildlife (Protection) Act, 1972 for the conservation of wildlife is called Wildlife Sanctuary. There are about more than 500 wildlife sanctuaries in India. In Chhattisgarh, there are 11 wildlife sanctuaries.
- (c) **Conservation Reserve:** A small area owned by the government located very adjacent to a national park or wildlife sanctuary, which received medium level of protection under Section 36A of the Wildlife (Protection) Act, 1972 for the conservation of wildlife is called 'Conservation Reserve'.
- (d) **Community Reserve:** A small area owned by the local people located very adjacent to a village area which received medium level of protection under Section 36C of the Wildlife (Protection) Act, 1972 for the conservation of wildlife is called Community Reserve. There are more than 100 National Parks and more than 500 Wildlife Sanctuaries in India.

## NTCA

The National Tiger Conservation Authority (NTCA) is a body constituted by the Central Government of India under the Wildlife (Protection) Act, 1972 for the maintenance of a viable population of tigers in India through declaration and management of Tiger Reserve.

## TIGER RESERVE

There were about 40,000 tigers during 1905–10. This number came down drastically due to large-scale hunting during the British Period as well as after Independence in India. The first ever All-India Tiger Census

was conducted in 1972, which revealed the existence of only 1,872 tigers in India. In 1969, a serious concern was voiced about the low population of tiger at the IUCN meeting held in Delhi. Subsequently, a nationwide ban on tiger killing was imposed in 1970. In 1972, the Wildlife (Protection) Act, 1972 came into force and the Tiger Project was initiated in 1973.

## OBJECTIVES OF THE RESERVE

- Elimination of all forms of human exploitation and biotic disturbance from the core area and rationalisation of activities in the buffer zone.
- Restricting the habitat management only to repair the damages done to the ecosystem by human and other interferences.
- Monitoring the faunal and floral changes over time and carrying out research about wildlife.

## PROJECT ELEPHANT

Project Elephant was launched in 1992 to assist the state having free-ranging population of wild Asian Elephants to ensure long-term survival of identified viable population of elephants in their natural habitats.

## OBJECTIVES OF THE ELEPHANT PROJECT

The elephant reserve has the following objectives:

- To restore the lost and degraded habitat of elephants.
- To create/manage corridors for elephant movement.
- To mitigate human-elephant conflict.
- To establish the database on the population dynamics of elephants.
- To improve the quality of life of people living around elephant habitats.

**Biosphere Reserve:** A biosphere reserve is a kind of conservation reserve created to protect the biological and cultural diversity of a region while promoting sustainable economic development. A biosphere reserve

is a unique kind of protected area that differs from a PA (NP, WLS).

There are three very different, but equal, aims:

- Conservation of genetic resources, species, and ecosystems;
- Scientific research and monitoring; and
- Promoting sustainable development in communities of the surrounding region.

National parks and other kinds of protected natural areas usually are primarily concerned with conservation, and only secondarily with research and sustainable development.

Biosphere reserves serve in some ways as 'living laboratories' for testing out and demonstrating integrated management of land, water and biodiversity.

## ZONES

A biosphere reserve must contain three elements:

### CORE AREAS

These areas are securely protected sites for conserving biological diversity, monitoring minimally disturbed ecosystems, and undertaking non-destructive research and other low-impact uses (such as education).

### BUFFER ZONES

These usually surround or adjoin the Core Areas. Buffer Zones may be used for sound ecological practices including environmental education, recreation, ecotourism and applied and basic research.

### TRANSITION, OR COOPERATION, ZONES

These areas may contain towns, farms, fisheries, and other human activities and are the areas where local communities, management agencies, scientists, non-governmental organisations, cultural groups, economic interests, and other stakeholders work together to manage and sustainably develop the area's resources.

## POLLUTION

Pollution occurs when pollutants contaminate the natural surroundings; which brings about changes that affect our normal

lifestyles adversely. Pollutants are the key elements or components of pollution, which are generally waste materials of different forms. Pollution disturbs our ecosystem and the balance in the environment. With modernisation and development in our lives, pollution has reached its peak; giving rise to global warming and human illness.

## TYPES OF POLLUTION

### Air Pollution

Air pollution is the most prominent and dangerous form of pollution. It occurs due to many reasons. Excessive burning of fuel, which is a necessity of our daily lives for cooking, driving and other industrial activities, releases a huge amount of chemical substances in the air everyday. These pollute the air.

### Water Pollution

Water pollution has taken toll of all the surviving species of the earth. Almost 60% of the species live in water bodies. It occurs due to several factors. The industrial wastes dumped into the rivers and other water bodies cause an imbalance in the water, leading to its severe contamination and death of aquatic species. If you suspect that nearby water sources have been contaminated by a corporation, then it might be a good idea to hire an expert to see to it.

### Soil pollution

Soil pollution occurs due to incorporation of unwanted chemicals in the soil due to human activities. Use of insecticides and pesticides absorbs the nitrogen compounds from the soil, making it unfit for plants to derive nutrition from. Release of industrial waste, mining and deforestation also exploits the soil. Since plants can't grow properly, they can't hold the soil and this leads to soil erosion.

### Noise pollution

Noise pollution is caused when noise, which is an unpleasant sound, affects our ears and leads to psychological problems, like

stress, hypertension, hearing impairment, etc. It is caused by machines in industries, loud music, etc.

### **Radioactive pollution**

Radioactive pollution is highly dangerous when it occurs. It can occur due to nuclear plant malfunctions, improper nuclear waste disposal, accidents, etc. It causes cancer, infertility, blindness, defects at the time of birth. It can sterilise soil and affect air and water.

### **Thermal/heat pollution**

Thermal/heat pollution is due to the excess heat in the environment creating unwanted changes over long time periods; due to huge number of industrial plants, deforestation and air pollution. It increases the earth's temperature, causing drastic climatic changes and extinction of wildlife.

### **Light pollution**

Light pollution occurs due to prominent excess illumination of an area. It is largely visible in big cities, on advertising boards and billboards, in sports or entertainment events at the night. In residential areas, the lives of the inhabitants are greatly affected by this. It also affects the astronomical observations and activities by making the stars almost invisible.

## **EFFECTS OF POLLUTION**

- Environment Degradation:** Environment is the first casualty for increase in pollution, whether in air or in water. The increase in the amount of CO<sub>2</sub> in the atmosphere leads to smog, which can restrict sunlight from reaching the earth, thus, preventing plants in the process of photosynthesis. Gases like sulphur dioxide and nitrogen oxide can cause acid rain. Water pollution in terms

of oil spill may lead to death of several wildlife species.

- Human Health:** The decrease in quality of air leads to several respiratory problems including asthma or lung cancer. Chest pain, congestion, throat inflammation, cardiovascular disease, respiratory disease are some of the diseases that can be caused by air pollution. Water pollution occurs due to contamination of water and may pose skin-related problems, including skin irritations and rashes. Similarly, noise pollution leads to hearing loss, stress and sleep disturbance.

- Global Warming:** The emission of greenhouse gases, particularly CO<sub>2</sub> is leading to global warming. Every other day, new industries are being set up, new vehicles come on roads and trees are cut to make way for new homes. All of them, in direct or indirect way, lead to increase in CO<sub>2</sub> in the environment. The increase in CO<sub>2</sub> leads to melting of polar ice caps, which increases the sea level and poses danger for the people living near the coastal areas.

- Ozone Layer Depletion:** Ozone layer is the thin shield high up in the sky that stops ultra-violet rays from reaching the earth. As a result of human activities, chemicals, such as chlorofluorocarbons (CFCs) were released into the atmosphere, which contributed to the depletion of ozone layer.

- Infertile Land:** Due to constant use of insecticides and pesticides, the soil may become infertile. Plants may not be able to grow properly. Various forms of chemicals produced from industrial waste are released into the flowing water, which also affects the quality of soil.

### **List of Biosphere Reserves of India**

S. No.	Year	Name	State	Type	Key Fauna
1.	2008	Great Rann of Kutch	Gujarat	Desert	Indian Wild Ass
2.	1989	Gulf of Mannar	Tamil Nadu	Coast	Dugong or Sea Cow

3.	1989	Sundarbans	West Bengal	Gangetic Delta	Royal Bengal Tiger
4.	2009	Cold Desert	Himachal Pradesh	Western Himalayas	Snow leopard
5.	1988	Nanda Devi	Uttarakhand	Western Himalayas	NA
6.	1986	Nilgiri Biosphere Reserve	Tamil Nadu, Kerala and Karnataka	Western Ghats	Nilgiri Tahr, Lion-tailed macaque
7.	1998	Dihang-Dibang	Arunachal Pradesh	Eastern Himalaya	NA
8.	1999	Pachmarhi Biosphere Reserve	Madhya Pradesh	Semi-arid	Giant squirrel, Flying squirrel
9.	2010	Seshachalam Hills	Andhra Pradesh	Eastern Ghats	NA
10.	1994	Simlipal	Odisha	Deccan Peninsula	Gaur, Royal Bengal Tiger, Wild elephant
11.	2005	Achanakamar-Amarkantak	Madhya Pradesh, Chhattisgarh	Maikala Hills	NA
12.	1989	Manas	Assam	East Himalayas	Golden langur, Red panda
13.	2000	Khangchendzonga	Sikkim	East Himalayas	Snow leopard, Red panda
14.	2001	Agasthyamalai Biosphere Reserve	Kerala, Tamil Nadu	Western Ghats	Nilgiri Tahr, Elephants
15.	1989	Great Nicobar Biosphere Reserve	Andaman and Nicobar Islands	Islands	Saltwater crocodile
16.	1988	Nokrek	Meghalaya	East Himalayas	Red panda
17.	1997	Dibru-Saikhowa	Assam	East Himalayas	Golden langur
18.	2011	Panna	Madhya Pradesh	Ken River	Tiger, Chital, Chinkara, Sambhar and sloth bear

### List of Wildlife Sanctuaries, National Parks in India

Sanctuaries/National Parks	States
Bandipur National Park	Karnataka
Buxa Tiger Reserve	West Bengal
Bandhavgarh National Park	Madhya Pradesh
Corbett National Park	Uttarakhand
Chandraprabha Sanctuary	Uttar Pradesh
Dandeli Wildlife Sanctuary	Karnataka
Dachigam Sanctuary	Kashmir
Dudhwa National Park	Uttar Pradesh
Gir National Park	Gujarat

Sanctuaries/National Parks	States
Hazaribagh Sanctuary	Hazaribagh (Jharkhand)
Indian Wild Ass Sanctuary	Rann of Kutch (Gujarat)
Jaldapara National Park	West Bengal
Keoladeo Ghana National Park	Bharatpur (Rajasthan)
Keibul Lamjao National Park	Manipur
Kanha National Park	Madhya Pradesh
Karakoram Wildlife Sanctuary	Jammu and Kashmir
Kaziranga National Park	Assam

Sanctuaries/National Parks	States
Manas National Park	Assam
Mudumalai National Park	Tamil Nadu
Nokrek National Park	Meghalaya
Namdapha National Park	Arunachal Pradesh
Nagarhole National Park	Karnataka
Nawegoan National Park	Bhandare (Maharashtra)
Periyar Sanctuary	Kerala
Panchmarhi	Hoshangabad (Madhya Pradesh)
Ranthambore National Park	Rajasthan
Rohla National Park	Kullu (Madhya Pradesh)
Sunderban Tiger Reserve	West Bengal
Sariska National Park	Rajasthan
Simlipal National Park	Odisha
Tadoba National Park	Chandrapur (Maharashtra)
Tadwai Sanctuary	Warrangal (Andhra Pradesh)
Tungabhadra Sanctuary	Bellary (Karnataka)

#### List of Bird Sanctuaries in India

Bird Sanctuaries in India	Location
Bharatpur Bird Sanctuary (also known as Keoladeo National Park)	Rajasthan
Chilka Lake Bird Sanctuary	Puri (Odisha)
Ghatprabha Bird Sanctuary	Karnataka
Kumarakom Bird Sanctuary (also known as Vembanad Bird Sanctuary)	Kerala
Kaundinya Bird Sanctuary	Chittor (Andhra Pradesh)
Mayani Bird Sanctuary	Satara (Maharashtra)

Nal Sarovar Bird Sanctuary	Ahmedabad (Gujarat)
Nelapattu Bird Sanctuary	Nellore (Andhra Pradesh)
Pulicat Lake Bird Sanctuary	Tamil Nadu
Ranganthittu Bird Sanctuary	Karnataka
Sultanpur Bird Sanctuary	Gurgaon (Haryana)
Salim Ali Bird Sanctuary	Chorao Island (Goa)
Vedanthangal Bird Sanctuary	Tamil Nadu

#### Tiger Reserves in India

S.No.	Tiger Reserve	State
1.	Bandipur Tiger Reserve	Karnataka
2.	Jim Corbett Tiger Reserve	Uttarakhand
3.	Kanha Tiger Reserve	Madhya Pradesh
4.	Manas Tiger Reserve	Assam
5.	Melghat Tiger Reserve	Maharashtra
6.	Palamau Tiger Reserve	Jharkhand
7.	Ranthambore Tiger Reserve	Rajasthan
8.	Simlipal Tiger Reserve	Odisha
9.	Sunderbans Tiger Reserve	West Bengal
10.	Periyar Tiger Reserve	Kerala
11.	Sariska Tiger Reserve	Rajasthan
12.	Buxa Tiger Reserve	West Bengal
13.	Indravati Tiger Reserve	Chhattisgarh
14.	Namdapha Tiger Reserve	Arunachal Pradesh
15.	Dudhwa Tiger Reserve	Uttar Pradesh

16.	Kalakkad Mundanthurai Tiger Reserve	Tamil Nadu
17.	Valmiki Tiger Reserve	Bihar
18.	Pench Tiger Reserve	Madhya Pradesh
19.	Tadoba Andhari Tiger Reserve	Maharashtra
20.	Bandhavgarh Tiger Reserve	Madhya Pradesh
21.	Panna Tiger Reserve	Madhya Pradesh
22.	Dampa Tiger Reserve	Mizoram
23.	Bhadra Tiger Reserve	Karnataka
24.	Pench Tiger Reserve	Maharashtra
25.	Pakhui Tiger Reserve	Arunachal Pradesh
26.	Nameri Tiger Reserve	Assam
27.	Satpura Tiger Reserve	Madhya Pradesh
28.	Anamalai Tiger Reserve	Tamil Nadu
29.	Udanti-Sitanadi	Chhattisgarh
30.	Satkosia Tiger Reserve	Odisha
31.	Kaziranga Tiger Reserve	Assam
32.	Achanakmar Tiger Reserve	Chhattisgarh
33.	Dandeli-Anshi National Park	Karnataka
34.	Sanjay-Dubri Tiger Reserve	Madhya Pradesh
35.	Mudumalai Tiger Reserve	Tamil Nadu
36.	Nagarahole Tiger Reserve	Karnataka
37.	Parambikulam Tiger Reserve	Kerala
38.	Sahyadri	Maharashtra
39.	Biligiriranga Swamy Temple Tiger Reserve	Karnataka

40.	Kawal Tiger Reserve	Telangana
41.	Sathyamangalam Tiger Reserve	Tamil Nadu
42.	Mukandra Hills	Rajasthan
43.	Nawegaon-Nagzira Tiger Reserve	Maharashtra
44.	Nagarjunsagar-Srisailam Tiger Reserve	Telangana
45.	Amrabad Tiger Reserve	Telangana
46.	Pilibhit Tiger Reserve	Uttar Pradesh
47.	Bor Tiger Reserve	Maharashtra
48.	Rajaji Tiger Reserve	Uttarakhand

### Elephant Reserves in India

Elephant Reserve	State
Rayala Elephant Reserve	Andhra Pradesh
Kameng Elephant Reserve	Arunachal Pradesh
Deomali Elephant Reserve	Arunachal Pradesh
Sonitpur Elephant Reserve	Assam
Dihing-Patkai Elephant Reserve	Assam
Kaziranga-Karbi Anglong Elephant Reserve	Assam
Dhansiri-Lungding Elephant Reserve	Assam
Chirang-Ripu Elephant Reserve	Assam
Singhbhum Elephant Reserve	Jharkhand
Mysore Elephant Reserve	Karnataka
Bhadra Elephant Reserve	Karnataka
Wayanad Elephant Reserve	Kerala
Nilambur Elephant Reserve	Kerala
Anamudi Elephant Reserve	Kerala
Periyar Elephant Reserve	Kerala
Garo Hills Elephant Reserve	Meghalaya
Khasi Hills Elephant Reserve	Meghalaya

Intanki Elephant Reserve	Nagaland
Mayurbhanj Elephant Reserve	Odisha
Mahanadi Elephant Reserve	Odisha
Sambalpur Elephant Reserve	Odisha
Baitarni Elephant Reserve	Odisha
South Orissa Elephant Reserve	Odisha
Nilgiri Elephant Reserve	Tamil Nadu
Coimbatore Elephant Reserve	Tamil Nadu
Anamalai Elephant Reserve	Tamil Nadu
Srivilliputtur Elephant Reserve	Tamil Nadu
Shivalik Elephant Reserve	Uttaranchal
Mayurjharna Elephant Reserve	West Bengal
Eastern Dooars Elephant Reserve	West Bengal

## CRITICALLY ENDANGERED ANIMAL SPECIES OF INDIA

### CRITICALLY ENDANGERED MAMMALS

- Pygmy Hog (*Porcula salvania*)
- Andaman White-toothed Shrew (*Crocidura andamanensis*)
- Jenkin's Andaman Spiny Shrew (*Crocidura jenkinsi*)
- Nicobar White-tailed Shrew (*Crocidura nicobarica*)
- Kondana Rat (*Millardia kondana*)
- Large Rock Rat or Elvira Rat (*Cremonomys elvira*)
- Namdapha Flying Squirrel (*Biswamoyopterus biswasii*)
- Malabar Civet (*Viverra civettina*)
- Sumatran Rhinoceros (*Dicerorhinus sumatrensis*)
- Javan Rhinoceros (*Rhinoceros sondaicus*)

### CRITICALLY ENDANGERED BIRDS

- Baer's Pochard
- Forest Owlet

- Great Indian Bustard
- Bengal Florican
- Siberian Crane
- Spoon-billed Sandpiper
- Sociable Lapwing
- Jerdon's Courser
- White-backed Vulture
- Red-headed Vulture
- White-bellied Heron
- Slender-billed Vulture
- Indian Vulture
- Himalayan Quail
- Pink-headed Duck

### CRITICALLY ENDANGERED REPTILES

- Gharial (*Gavialis gangeticus*)
- Hawksbill Turtle (*Eretmochelys imbricata*)
- Leatherback Turtle (*Dermochelys coriacea*)
- Four-toed River Terrapin or River Terrapin (*Batagur baska*)
- Red-crowned Roofed Turtle or the Bengal Roof Turtle (*Batagur kachuga*)
- Sispara day gecko (*Cnemaspis sis-parensis*)

### CRITICALLY ENDANGERED AMPHIBIANS

- Anamalai Flying Frog (*Rhacophorus pseudomalabaricus*)
- Gundia Indian Frog (*Indirana gundia*)
- Kerala Indian Frog (*Indirana phrynoderma*)
- Charles Darwin's Frog (*Ingerana charlesdarwini*)
- Kottigehar Bubble-nest Frog (*Micrixalus kottigeharensis*)
- Amboli Bush Frog (*Pseudophilautus amboli*)
- Chalazodes Bubble-Nest Frog (*Raorchestes chalazodes*)
- Small Bush Frog (*Raorchestes chotta*)
- Green-eyed Bush Frog (*Raorchestes chlorosomma*)
- Griet Bush Frog (*Raorchestes griet*)

### CRITICALLY ENDANGERED FISHES

- Pondicherry Shark (*Carcharhinus hemiodon*)
- Ganges Shark (*Glyptis gangeticus*)

3. Knife-tooth Sawfish (*Anoxypristes cuspidata*)
4. Large-tooth Sawfish (*Pristis microdon*)
5. Long-comb Sawfish or Narrow-snout Sawfish (*Pristis zijsron*)

### **CRITICALLY ENDANGERED CORALS**

1. Fire corals (*Millepora boschmai*)

### **CRITICALLY ENDANGERED SPIDERS**

1. Rameshwaram Ornamental or Rameshwaram Parachute Spider (*Poecilotheria hanumavilasumica*)
2. Gooty Tarantula, Metallic Tarantula or Peacock Tarantula (*Poecilotheria metallica*)

### **Ramsar Wetlands Sites**

S.No.	Name of Site	State/Location
1.	Asthamudi Wetland	Kerala
2.	Bhitarkanika Mangroves	Odisha
3.	Bhoj Wetlands	Madhya Pradesh
4.	Chandertal Wetland	Himachal Pradesh
5.	Chilka Lake	Odisha
6.	Deepor Beel	Assam
7.	East Calcutta Wetlands	West Bengal
8.	Harike Lake	Punjab
9.	Hokera Wetland	Jammu and Kashmir
10.	Kanjli Lake	Punjab
11.	Keoladeo Ghana NP	Rajasthan
12.	Kolleru Lake	Andhra Pradesh
13.	Loktak Lake	Manipur
14.	Nalsarovar Bird Sanctuary	Gujarat
15.	Point Calimere	Tamil Nadu
16.	Pong Dam Lake	Himachal Pradesh
17.	Renuka Wetland	Himachal Pradesh
18.	Ropar Lake	Punjab
19.	Rudrasagar Lake	Tripura
20.	Sambhar Lake	Rajasthan
21.	Sasthamkotta Lake	Kerala

22.	Surinsar-Mansar Lakes	Jammu and Kashmir
23.	Tsomoriri Lake	Jammu and Kashmir
24.	Vembanad Kol Wetland	Kerala
25.	Upper Ganga River (Brijghat to Narora Stretch)	Uttar Pradesh
26.	Wular Lake	Jammu and Kashmir

### **Environmental Institutes**

Institution	Headquarter
Arid Zone Research Institute	Jodhpur
Central Pollution Control Board	New Delhi
Central Museum Authority	New Delhi
Rehabilitation Institute of Social Forestry and Ecology	Allahabad
G. B. Pant Himdoya Environment and Development Institute	Almora
Himalayan Forest Research Centre	Shimla
Indian Forest Research and Education Council	Dehradun
Institute of Indian Forest Management	Bhopal
Institute of Indian Plywood Industry and Research	Bengaluru
Institute of Forest Genetic Tree Breeding	Coimbatore
Forest Productive Centre	Ranchi
Institute of Forest Research and Human Resource Development	Chhindwara
Institute of Rainforest	Jorhat
Institute of Lumbering Science and Technology	Bengaluru
Institute of National Science and Technology	Faridabad
Indian Botanical Survey	Kolkata
Indian Anthropology Survey	Kolkata
Indian Forest Survey	Jorhat
Tropical Institute	Jabalpur





# 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. With the exception of the United Kingdom, almost all democratic countries possess a written constitution.

## EVOLUTION OF INDIAN 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.

## ADMINISTRATIVE AND LEGISLATIVE REFORMS BEFORE 1857

### REGULATING ACT OF 1773

- 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).

### PITTS INDIA ACT OF 1784

- It was enacted to improve upon the provision of Regulating Act of 1773.
- A six-member Board of Controllers was set up which was headed by a minister of the

British Govt. All political responsibilities were given to this board.

### CHARTER ACT OF 1793

- Provided for the payment of salaries of the members of the Board of Controllers from Indian revenue.

### CHARTER ACT OF 1813

- Trade monopoly of the East India Company came to an end.
- The Christian Missionaries were allowed to spread their religion in India.

### CHARTER ACT OF 1833

- The Governor-General and his Council were given vast powers.
- The Council got full powers regarding revenue, and a single budget for the country was prepared by the Governor-General.
- For the first time the Governor-General's Government was known as the 'Government of India' and his Council as the 'Indian Council'.
- The Governor-General of Bengal was to be the **Governor-General of India**.
- All powers, administrative and financial, were handed over to Governor-General in Council.
- A **Law Commission** under Lord Macaulay was constituted for codification of laws.

### CHARTER ACT OF 1853

- A separate Governor for Bengal was to be appointed.
- 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.
- It introduced for the first time, local representation in the Indian (Central) Legislative Council.

## ADMINISTRATIVE AND 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.
- It provided for absolute (British) imperial control over India without any popular participation in the administration of the country.
- The country was divided into provinces headed by a Governor or Lieutenant-Governor aided by his Executive Council.
- 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.
- The power was transferred from Company to the British Crown.
- Court of Directors and Board of Control were abolished. The post of Secretary of State was established. Secretary of State was member of British Cabinet and answerable to British Parliament.
- The Governor-General was made the **Viceroy of India**.

### INDIAN COUNCILS ACT, 1861

- The Secretary of State, who was responsible to the British Parliament, governed India through the Governor-General assisted by an Executive Council.
- It decentralised the legislative powers of the Governor-General's Council and vested them in the Governments of Bombay and Madras.
- The Viceroy could now also nominate some Indians as non-official members in his council.
- It made a beginning of representative institutions by associating Indians with the law-making process.
- The Executive Council was now to be called the **Central Legislative Council**.
- **Portfolio System**, which was introduced by Lord Canning in 1859, was given recognition.

- The Viceroy was given the power to issue ordinances.

### 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.
- It brought an element of representation for the first time by allowing a discussion of budget.

### MORLEY-MINTO REFORMS AND THE INDIAN COUNCILS ACT, 1909

- 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 members of the Legislative Council could ask supplementary questions, discuss bills, move resolutions on financial statements and so on.
- The Muslims were given separate electorates and there were reservations of seats on religious grounds.
- Satyendra Prasad Sinha became the first Indian to join the Viceroy's Executive Council.

### THE GOVERNMENT OF INDIA ACT, 1915

- This Act was passed to consolidate the provisions of the preceding Government of India Acts.

### MONTAGUE-CHELMSFORD REPORT AND THE GOVERNMENT OF INDIA ACT, 1919

- 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 device known as 'Dyarchy' or dual government.
- The subjects of administration were to be divided into two categories **Central** and **Provincial**.

- The **provincial subjects** were sub-divided into ‘transferred’ and ‘reserved’ subjects.
- The ‘**transferred subjects**’ were to be administered by the Governor with the aid or Ministers responsible to the Legislative Council.
- The ‘**reserved subjects**’ were to be administered by the Governor and his Executive Council.
- 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 Indian Legislature was made more representative and for the first time ‘**bi-cameral**’.
- The Upper House was named the **Council of State**.
- The Lower House was named the **Legislative Assembly**.
- 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 passed by the Indian Legislature.
  - (c) He had the converse power of certifying Bill or any grant refused by the 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 GOVERNMENT OF INDIA ACT, 1935**

- The Act of 1935 prescribed a federation, taking the Provinces and the Indian States (native states) as units.
- 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.
- 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).
- In six provinces, the legislature was bi-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 had independent powers of legislation concurrently with those of 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 Legislature had competence.
- **Dominion Status**, which was promised by the Simon Commission in 1929, was **not conferred** by the Government of India Act, 1935.
- **Dyarchy was abolished in the provinces**, but it was introduced at the federal level.
- It provided for the establishment of an **All-India Federation** consisting of provinces and princely states as unit but the federation did not come into effect.
- It introduced **bicameralism** in 6 out of 11 provinces.
- The Federal Legislature had two Chambers: The Council of State and Federal Assembly.

The Council of State was to be a permanent body with one-third of its members, retiring every two years.

- It further extended the principle of communal representation by providing separate electorates for depressed classes, women and labour.
- It provided for the establishment of a Reserve Bank of India to control the currency and credit of the country.
- It provided for the establishment of a Federal Public Service Commission and Joint Public Service Commission for two or more provinces.

### 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.
- According to the proposals the Constitution of India was to be framed by an **elected Constituent Assembly** by the India 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-acceding Provinces the British Government could enter into separate Constitutional arrangements.

### CABINET MISSION PLAN, 1946

- 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.
- 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 Provinces and the States.
- The Union was to have an Executive and a Legislature consisting of representatives of the Provinces and the States.

- The Provinces could form groups with executives and legislatures, and each group could be competent to determine the provincial subjects.
- India was too divided into three groups of provinces, Group A, Group B, and Group C.
- The plan provided that the Union Constitution was to be framed by a **Constituent Assembly**, the members of which were to be elected on a communal basis by the Provincial Legislative Assemblies and the representatives of the states joining the Union.

### 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

- From the 15 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 Central Legislature 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.
- The Interim Government of India, formed on September 2, 1946, from the newly elected Constituent Assembly of India, had the task of assisting the transfer of power from British rule to Independent India.

### 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.
- After the partition of India number of members of the Constituent Assembly came to 299, of

whom 284 were actually present of the 26 November 1949 and signed on the finally approved Constitution of India 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 Pandit Jawaharlal Nehru. The following objectives were embodied in the resolution:
  - The Assembly appointed the Drafting Committee with Dr. B.R. Ambedkar as the Chairman on August 29, 1947.
  - The members of the Drafting Committee were N. Gopalaswamy Ayyangar, Alladi Krishnaswamy Ayya, K.M. Munshi, Mohd. Saadullah, B.L. Mitter (later replaced by N. Madhava Rao), and 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 provisional Parliament, etc. were implemented with immediate effect, that is, from the 26 November 1949. The rest of the provisions of the Constitution came into force on January 26, 1950 and this date is referred to in the Constitution as the date of its commencement.
- **Dr. Sachidanand Sinha** was the first President of the Constituent Assembly.
- **Dr. Rajendra Prasad** was elected the President of the Assembly.
- **B.N. Rao** was appointed as the Constitutional Advisor of the Assembly.
- On **November 26, 1949**, the Constitution was declared as passed. The provisions relating to citizenship, elections and provisional, Parliament, etc. were implemented with

immediate effect, that is, from the November 26, 1949. The rest of the provisions came into force on January 26, 1950.

### DRAFTING COMMITTEE

- The Constituent Assembly appointed a Drafting Committee on August 29, 1947. **Dr. B.R. Ambedkar**, who was the Chairman of the Drafting Committee, submitted a Drafting Constitution of India to the President of the Assembly on February 21, 1948.

### ENACTMENT OF THE CONSTITUTION

- On November 26, 1949, Constitution was adopted, containing Preamble and 395 Articles, 18 Parts and 8 Schedules. The Constitution in its current form consists of a Preamble, 24 Parts, 448 Articles and 12 Schedules.

### ENFORCEMENT OF THE CONSTITUTION

- The Constitution came into force on January 26, 1950, was specifically chosen as the “date of Commencement” of the Constitution because on this day in 1930, the **Poorna Swaraj** day was celebrated [Resolution was passed in Lahore Session (1929) of INC].

Committee Name	Headed by
Union Power Committee	Pandit Jawahar Lal Nehru
Union Constitution Committee	Pandit Jawahar Lal Nehru
Provincial Constitution Committee	Sardar Patel
Drafting Committee	Dr. Bhim Rao Ambedkar
Advisory Committee on Fundamental Rights Minorities and Tribal and Excluded Areas	Sardar Patel
Rules of Procedure Committee	Dr. Rajendra Prasad
State Committee	Pandit Jawahar Lal Nehru
Steering Committee	Dr. Rajendra Prasad

## SALIENT FEATURES OF THE CONSTITUTION

- Lengthiest written constitution:** The Indian constitution is the lengthiest in the world. Originally the constitution had 395 articles and 8 schedules.
- Blend of rigidity and flexibility:** The procedure of amendment of the Indian constitution is partly flexible and partly rigid. Some provisions can be amended easily and some provisions can only be amended by passage in both union parliament and half of the state legislatures.

## PARLIAMENTARY GOVERNMENT

- India has a parliamentary system of government both at the centre and at the states. The president is the head of the union of India and the Governors are head of the states but they act on the advice of the council of ministers. They have nominal powers.
- Federal system with unitary features:** Our constitution contains federal features of government like division of powers written constitution, independent judiciary and bicameralism but a large number of unitary features like a strong center, single citizenship flexibility of constitution, integrated judiciary emergency provisions etc.

## INDEPENDENT JUDICIARY

- There is a single, integrated and independent judiciary in India. The Supreme Court is the highest court of the land. Both Supreme Court and high courts have been given extensive powers to interpret the constitution and law under various provisions of the constitution of India.

## SECULAR STATE

- The Indian constitution stands for a secular state i.e. all religions in our country have the same right and support from the state, it does not uphold any particular religion as the official religion of the Indian state.

## EMERGENCY PROVISIONS

- Indian constitution has special provisions to meet any extraordinary situation or

emergency. During the emergency the central Government becomes powerful and state comes under total control of it. During emergency our federal system becomes unitary without any amendment of the constitution.

### Different Sources of the Indian Constitution

- Government 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 power, etc.
- Constitution of Britain:** Law-making procedures, Rule of law, Single citizenship, Bi-cameral Parliamentary system, office of CAG.
- Constitution of USA:** Independence of 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 residuary powers to the Centre, Supreme Court's advisory jurisdiction.
- Constitution of Ireland:** Directive Principles of State policy, method of presidential elections, and the nomination of members to Rajya Sabha by the President.
- Weimar Constitution of Germany:** Provisions concerning the suspension of fundamental rights during emergency.
- Australian Constitution:** Concurrent List, Provision Regarding Trade, Commerce and industry, Languages of the Preamble.
- South African Constitution:** Procedure of Constitutional Amendment.
- Constitution of France:** Republican of Liberty, Equality and Fraternity.
- Constitution of Australia:** Idea of the Concurrent List.
- Constitution of South Africa:** Amendment with 2/3rd majority in Parliament.
- Onstitution of former USSR:** Fundamental Duties.

## IMPORTANT ARTICLES OF THE CONSTITUTION

### PART I.

#### Articles      Subject

Arts. 1-4 The Union and its territory.

### PART II.

Arts. 5-11 Citizenship

### 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 on 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 of offences.
- Art. 21 Protection of life and personal liberty.
- Art. 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.
- 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.
- Art. 37 Application of the principles contained in this Part.
- Art. 38 State to secure a social order for the promotion of welfare of the people.
- Art. 39 Certain principles of policy to be followed by the State.
- Art. 39A Equal justice and free legal aid.
- Art. 40 Organisation of village panchayats.
- Art. 41 Right to work, to education and to public assistance in certain cases.

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|----------|---|-------------------|--|
| Art. 42  | Provision for just and humane conditions of work and maternity relief.  | Art. 61           | Procedure for impeachment of the President.  |
| Art. 43  | Living wage, etc. for workers.  | Art. 63           | The Vice-President of India.   |
| Art. 43A | Participation of workers in management of industries.   | Art. 64           | The Vice-President to be ex-officio Chairman of the Council or States.   |
| Art. 43B | The State shall endeavour to promote voluntary formation, autonomous functioning, democratic control and professional management of co-operative societies. | Art. 65           | The Vice-President to act as President or to discharge his function during casual vacancies in the office, or during the absence of President. |
| Art. 44  | Uniform civil code for the citizens.  | Art. 66           | Election of Vice-President.  |
| Art. 45  | Provision for early childhood care and education to children below the age of six years.  | Art. 72           | Power of President to grant pardons, etc. and to suspend, remit or commute sentences in certain cases.   |
| Art. 46  | Promotion of educational and economic interest of Scheduled Castes, Scheduled Tribes and other weaker sections.   | Art. 74           | Council of Ministers to aid and advise President.  |
| Art. 47  | Duty of the State to raise the level of nutrition and the standard of living and to improve public health.  | Art. 76           | Attorney-General for India.  |
| Art. 48  | Organisation of agriculture and animal husbandry.   | <b>Parliament</b> |  |
| Art. 48A | Protection and improvement of environment and safeguarding of forests and Wildlife.   | Art. 79           | Constitution of Parliament.  |
| Art. 49  | Protection of monuments and places and objects of national importance.  | Art. 80           | Composition of the Council of States (Rajya Sabha).  |
| Art. 50  | Separation of judiciary from executive.   | Art. 81           | Composition of the House of the People (Lok Sabha).  |
| Art. 51  | Promotion of international peace and security.  | Art. 83           | Duration of Houses of Parliament.  |
| Part IVA | Art. 51A Fundamental Duties.  | Art. 84           | Qualification for membership of Parliament.  |
|          |   | Art. 85           | Sessions of Parliament, prorogation and dissolution.   |
|          |   | Art. 86           | Right of President to address and send messages to Houses.   |
|          |   | Art. 87           | Special address by the President.  |
|          |   | Art. 88           | Rights of Ministers and Attorney General as respect to Houses.   |
|          |   | Art. 89           | The Chairman and Deputy Chairman of the Council of States.   |
|          |   | Art. 93           | The Speaker and Deputy Speaker of the House of the People.   |
|          |   | Art. 98           | Secretariat of Parliament.   |
|          |   | Art. 99           | Oath of affirmation by members.  |

## **PART V. THE UNION**

### **The Executive**

- Art. 52 The President of India.
- Art. 53 Executive power of the Union.
- Art. 54 Election of President.

- Art. 105 Powers, privileges, etc. of the Houses of Parliament and of the members and committees thereof.
- Art. 108 Joint sitting of both House in certain cases.
- Art. 109 Special procedure in respect of Money Bills.
- Art. 110 Definition of "Money Bills."
- Art. 111 Assent of Bills.
- Art. 112 Annual financial statement (Budget).
- Art. 114 Appropriation Bills.
- Art. 115 Supplementary, additional or excess grants.
- Art. 116 Votes on account, votes of credit and exceptional grants.
- Art. 117 Special provisions as to financial Bills.
- Art. 119 Regulation by law of procedure in Parliament in relation to financial business.
- Art. 120 Language to be used in Parliament.
- Art. 122 Courts not to inquire into proceedings of Parliament.

#### **Legislative Powers of the President**

- Art. 123 Power of President to promulgate Ordinances during recess of Parliament.

#### **The Union Judiciary**

- Art. 124 Establishment and Constitution of Supreme Court.
- 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. 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. 136 Special leave to appeal by the Supreme Court.
- Art. 137 Review of judgements or orders by the Supreme Court.
- Art. 141 Law declared by Supreme Court to be binding on all courts.
- Art. 143 Power of President to consult Supreme Court.
- Art. 144 Civil and judicial authorities to act in aid of the Supreme Court.

#### **Comptroller and Auditor-General of India**

- Art. 148 Comptroller and Auditor-General of India.
- Art. 149 Duties and powers of the Comptroller and Auditor-General.

#### **PART VI:**

##### **The States**

- Arts. 152-237 The Government at the State level: The Executive, The State Legislature, The High Courts and Subordinate Courts.

#### **PART VIII:**

- Articles 239-242: The Union Territories

#### **PART IX:**

- Arts. 243 to 243-O The Panchayats.

#### **PART IX A:**

- Arts. 243-P to 243-ZG The Municipalities.

#### **PART IX B:**

- Arts. 243-ZH to 243-ZT The Co-operative Societies.

#### **PART X:**

- Arts. 244-244A The Scheduled and Tribal Areas.

**PART XI:**

Arts. 245-263 Relations between The Union and the States.

**PART XII:**

Arts. 264-300 Finance, property, contracts and suits.

**ARTICLE 300A: RIGHT TO PROPERTY****Part XIII**

Arts. 301-307 Trade, Commerce and Industry within India.

**Part XIV** Services under the Union and the States.

Art. 309 Recruitment and conditions of service 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. 320 Functions of Public Service Commissions.

**PART XIVA****ARTICLES 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. 329 Bar to interference by courts in electoral matters.

**PART XVI**

Arts. 330-342 Special provisions for certain classes.

**PART XVII**

Arts. 343-351 Official languages.

**PART XVIII**

Arts. 352-360 Emergency Provisions.

**Part XIX**

Art. 363 Bar to interference by courts in disputes arising out of certain treaties, agreements, etc.

Art. 365 Effect of failure to comply with, or to give effect to, directions given by the Union.

**PART XX**

Art. 368 Amendment of the Constitution.

**PART XXI**

Arts. 369-392 Temporary, Transitional and Special Provisions Special status of States.

**PART XXII**

Arts. 393-395 Short Title, Commencement, Authoritative text in Hindi and Repeals.

**SCHEDULES OF THE INDIAN CONSTITUTION**

**1st Schedule:** 29 States and 7 Union Territories with Territorial demarcations.

**2nd Schedule:** Part 'A' Salary and emoluments of the President and Governors of 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).

**11th Schedule:** Power, 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).

## IMPORTANT CASES OF THE CONSTITUTION

### GOLAKNATH CASE, 1967

Preamble was not a part of the constitution. Supreme Court held that the Parliament had no power to amend any of the provisions of Part III (Fundamental Rights). The Indira Gandhi government in 1971 carried out the 24th Amendment with a view to assert the right of the Parliament to amend any part of the constitution.

### KESHVANADA BHARTI CASE, 1973

Preamble was a part of the constitution and can be amended by the Parliament under Article 368. Parliament can also amend the Fundamental Rights (Against Golaknath case) but ruled that the Parliament cannot destroy the basic structure of the constitution.

### MINERVA MILLS CASE, 1980

The 42nd amendment carried out in 1976 asserted that the Parliament had unlimited

powers to amend the constitution and tried to accord precedence to directive principles over fundamental rights. But in the Minerva Mills Case, the Supreme Court struck down those provisions.

### MANEKA GANDHI VS. UNION OF INDIA

Right to live is not merely confined to physical existence but includes within its ambit the right to live with human dignity.

## 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.
- The Constitution contains detailed provisions relating to **Centre-State relations** including the emergency provisions.
- Special status has been given to Jammu and 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 Constitution declares certain **Fundamental rights** of the individual.
- It is unique feature of the Indian Constitution that it makes the citizens' duties a part of the basic law of the land.
- 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 Court at the bottom.
- There are provisions in the Constitution to ensure **independence of judiciary**.
- 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 right to elect representatives for the legislature without prescribing any qualification based either on sex, property, education or the like.

- Indian Constitution provides for the establishment of **Secular State**.
- The State cannot 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 procedure of amendment of the Indian Constitution is **partly flexible** and **partly rigid**.
- Single citizenship has been adopted in our Constitution.
- 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 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.
- The authority of the Comptroller and Auditor General and the Chief Election Commissioner uniformly prevails over the Union as well as States.

## 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.

### 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 has to function strictly in accordance with the Constitution.
- Indian Constitution is entirely written. 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.
- Has an independent judiciary as an essential feature.

### UNITARY FEATURES OF INDIAN CONSTITUTION

- The Indian Constitution provides every Indian with single citizenship.
- The centre can legislate on the subjects in the Concurrent List.
- Residuary powers belong to the Centre.

- The Indian Constitution provides 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 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.
- The authority of the Comptroller and Auditor General and the Chief Election Commissioner uniformly prevails over the Union as well as States.

## LAPSE OF PARAMOUNTCY

- When the Indian Independence Act, 1947 was passed, it declared the lapse of suzerainty (paramountcy) of the crown, in Sec. 7 (i) (b) of the Act.
- 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, Phulara, Dir, Swat and Amb) had acceded to the dominion of India by the 15th August, 1947, i.e. before the 'appointed day' itself.

## 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 Vallabhbhai Patel, Minister-in-charge of Home Affairs):
  1. 216 states were merged into respective Provinces, geographically contiguous (connected) to them.
  2. These merged states were included in the territories of the States in Part B in the First Schedule of the Constitution.

3. 61 states were converted into centrally administered areas and included in Part C of the First Schedule of the Constitution.
4. The third form of integration was the consolidation of groups of states into new viable units, known as Union of States.
- 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.

## EVOLUTION OF STATES AND UNION TERRITORIES

### DHAR COMMITTEE

- The Constituent Assembly appointed the S.K. Dhar Commission in 1947 to study the issue of the reorganisation of the states on linguistic basis. The Dhar Commission categorically rejected the basis of linguistic formation of states.

### J.V.P. COMMITTEE

- The Congress in its Jaipur Session in 1948, appointed a three member committee to consider the recommendation of Dhar Commission. Its members were Jawahar Lal Nehru, Vallabh Bhai Patel and Pattabhi Sitaramayya.
- The committee rejected language as the basis for the reorganisation despite popular support for it.

### FAZAL ALI COMMISSION

- After the creation of Andhra State, demand for creation of states on linguistic basic intensified and Fazal Ali Commission was constituted in December 1953, which was also known as States Reorganisation Commission.
- By the States Reorganisation Act (1956) and the 7th Constitutional Amendment Act, the distinction between states was abolished. Some of them were merged with the adjacent states and some others were designated as Union Territories. As a result 14 States and 6 Union Territories were created on November 1, 1956.

- In October 1953, the Government of India was forced to create the First Linguistic State, known as Andhra Pradesh, by separating the Telugu speaking area from Madras state. (after the death of Sriramulu, a Congress person).

## THE PREAMBLE

- The ideals embodied in the Objectives Resolution are faithfully reflected in the Preamble to the Constitution, which, as amended in 1976, summarises 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, expression, belief, faith and worship, **Equality** of status and of opportunity; and to promote among them all **Fraternity** assuring the dignity of the individual and the unity and integrity of the Nation in our Constituent Assembly on this twenty-sixth day of November, 1949, do hereby adopt, enact and give to ourselves this constitution.”
- N.A. Palkivala, an eminent jurist and constitutional expert, called the Preamble as the **Identity**.
- The Preamble to the Indian Constitution is based on the **Objectives Resolution** drafted and moved by Pandit Nehru and adopted by the Constituent Assembly.
- The Preamble is **not enforceable in a court of law**.
- The Preamble has been amended only once so far, in 1976, by 42nd Constitutional Amendment Act, which added three new words **Socialist, Secular** and **Integrity**. This amendment was held to be valid.
- In case of doubt, the Supreme Court has referred to the Preamble to elucidate vague aspects of the Constitution.
- In the Berubari case, the Supreme Court held that the Preamble was not part of the Constitution, but later, in the Keshavananda Bharti case, it declared that it was part of the Constitution.

## 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 affecting their boundaries or names is introduced.

## TIMELINE OF STATES AND UNION TERRITORIES

- In **1956** there were 14 States and 6 Union Territories. Andhra Pradesh was created in **1953** and Kerala in **1956**.
- In **1956**, Karnataka was created.
- In **1960**, Bombay was bifurcated into Gujarat and Maharashtra.
- In **1962**, Nagaland was created as separate state.
- In **1966**, Haryana was carved out of Punjab and Chandigarh became a Union Territory.
- In **1970**, the Union Territory of Himachal Pradesh was elevated to the status of state.
- In **1971**, Manipur, Tripura and Meghalaya were granted statehood.
- In **1974**, Sikkim became an associate state of the Indian Union. By the 36th Constitutional Amendment Act (1975), Sikkim became a full fledged State of the India Union.
- In **1986**, Mizoram and Arunachal Pradesh came into being.
- In **1987**, Goa came into existence.
- In **2000**, three more new states Chhattisgarh, Uttarakhand and Jharkhand were created.
- On 2 June **2014**, Telangana was made a new 29th state after separating from Andhra Pradesh, with the city of Hyderabad as its capital.

## THE UNION AND ITS TERRITORIES

- Article 1 describes India, i.e. Bharat, as a Union of States.
- According to **Article 1**, the Territory of India can be classified into the three categories:
  1. Territories of the States.
  2. Union Territories.
  3. Territories that may be acquired by the Government of India at any time.
- At present, there are **29 States** and **7 Union Territories**.
- **Article 2** empowers the Parliament to admit into the Union of India, or establish new states on such terms and conditions as it thinks fit.
- **Article 3** authorises the Parliament to:
  - (a) Form a new state by separation from any state or by uniting two or more states or parts of states or by uniting any territory to a part of any state;
  - (b) Increase the area of any state;
  - (c) Diminish the area of any state;
  - (d) Alter the boundaries of any state;
  - (e) Alter the name of any state.

## CITIZENSHIP

- 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
  - Who had been ordinarily residing in the territory of India for not less than five years immediately preceding commencement of the Constitution?
- 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 and 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.

- 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 or 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 residing in India for more than seven years can seek citizenship 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.

### **OVERSEAS CITIZENS OF INDIA (OCI)**

- Citizenship Act has been amended in 2003, by which people of Indian origin, except in Pakistan and Bangladesh, will become eligible to be registered as the **Overseas Citizens of India (OCI)**.

## **FUNDAMENTAL RIGHTS**

- The Fundamental Rights have been described in **Articles 12-35**, Part III of Indian Constitution.
- The **Right to Property** (Article 31) was deleted from the list of Fundamental Act, 1978. By the 44th Amendment Act, 1978, it is made a normal constitutional right under Act 300A in Part XII of the Constitution.
- **Article 14 of the Constitution States that:** The State shall not discriminate against any citizen on grounds only of religion, race, caste, sex, place of birth or any of them.
  - No citizen shall, on grounds only of religion, race, caste, sex, place of birth

or any of them be subjected to any disability, liability restriction or condition with regard to access to shops, public restaurants, hotels and places of public entertainment or the use of wells, tanks, bathing ghats, roads and places of public resort maintained wholly or partly out of State funds or dedicated to the use of general public.

- Nothing in this article shall prevent the State from making any special provisions for women, children or any socially and educationally backward classes.
- **Article 15:** Prohibition of discrimination on certain grounds. It says that the State shall not discriminate against any citizen on grounds of religion, race, caste, sex or place of birth.
- **Article 16 guarantees equality of opportunity** in matters of public employment. It says that:
  - There shall be equality of opportunity for all citizens in matters relating to employment or appointment to any office under the State.
  - No citizen shall, on grounds only of religion, race, caste, sex, descent, place of birth or any of them, be ineligible for any employment under the State.

### **THE MANDAL COMMISSION CASE**

A nine-judge Bench of the Supreme Court has laid down in Indra Sawhney's case (popularly known as the Mandal Commission (Case) regarding reservation in government employment, that:

- Under Article 16 (4) provisions can be made in favour of the backward classes in the matter of employment by Executive orders also.
- The backwardness contemplated by Art. 16 (4) is mainly social. It need not be both social and educational.
- The reservations contemplated in Art. 16 (4) should not exceed 50%.
- Reservation of posts under Art. 16 (4) is confined to initial appointment only and cannot extend to providing reservation in promotion.

**Note:** Mandal Commission was set up in 1979 under the Chairmanship of B.N. Mandal, M.P. (Former Chief Minister of Bihar).

- The 77th Amendment has provided to continue reservation in promotion for the S.C. and S.T.
- **Article 17 ensures Abolition of Untouchability.**
- **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 such as universities.
- The State is not debarred from awarding military or academic distinctions, even though they may be used as titles.
- Bharat Ratna or Padma Vibhushan cannot be used by the recipient as a title and therefore does not come within the Constitutional prohibition.

## RIGHT TO FREEDOM

### Article (19–22)

- (a) Right to freedom of speech and expression.
- (b) Right to assemble peacefully and without arms.
- (c) Right to form association or unions or co-operatives.
- (d) Right to move freely throughout the territory of India.
- (e) Right to reside and settle in any part of the territory of India.
- (f) Right to practice 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.
- Restriction can be imposed on the right to form associations in the interests of the sovereignty and integrity of India or public

order of morality. Restrictions can also be imposed on freedom of movement and reside and settle in the interest of the general public order or morality. Restrictions can also be imposed on freedom of movement and reside and settle in the interest of the general public or for the protection of the interests of any scheduled tribe.

- Freedom of the press is included in the wider freedom of expression which is guaranteed by freedom of expression under Art. 19.
- **Article 20:** Protection in respect of conviction for offences. It grants protection against arbitrary and excessive punishment to an accused person, whether citizen or foreigner or legal person like a company or a corporation.
- **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.
- In England courts have no power to invalidate a law made by Parliament.
- In Manka'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 a 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 ground for such arrest.
- 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 Constitution authorises the Legislature to make laws for **preventive detention**.

## RIGHT AGAINST EXPLOITATION (ARTICLE 23-24)

- Article 23 provides **Right against Exploitation** in following respects:
- Traffic in human beings and beggar and other similar forms of forced labour are prohibited.
- 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.

## RIGHT TO FREEDOM OF RELIGION (Article 25-28)

- Article 25 provides freedom of conscience and free profession, practice and propagation of religion subject to public order, morality and health.
- 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**].

## CULTURAL AND EDUCATIONAL RIGHTS (Article 29-30)

- 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

institution, discriminate against such an educational institution 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)**].

## RIGHT TO CONSTITUTIONAL REMEDIES (ARTICLE-32)

- 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

- 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 Court [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 of illegality.
- A writ of **Habeas Corpus** calls upon the person who has detained another to produce the latter before the court. The words 'habeas corpus' literally mean 'to have a body'.
- **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 cannot be enforced by any other adequate legal remedy.
- The write of **prohibition** is a writ issued by the Supreme Court or a High Court to an inferior court forbidding the latter to continue proceeding therein in excess if its jurisdiction or to usurp a jurisdiction with which it is not legally vested.
- Though prohibition and certiorari are both issued against court or Tribunals exercising judicial or quasi-judicial powers, **Certiorari**

is issued to quash order or decision of the court or Tribunal while **prohibition** is issued to prohibit the court or Tribunal from making the ultra vires order or decision.

- **Quo warranto** is a proceeding whereby the court enquires into the legality of the claim which a party asserts to a public office.
- Parliament has the power to modify the application of the Fundamental Rights of the members of the armed forces, police forces or intelligence organizations 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].

### 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 12 October 2005.
- It is not Fundamental Right.

### LIMITATIONS ON THE ENFORCEMENT OF FUNDAMENTAL RIGHTS

- Parliament has the power to modify the application of the Fundamental Rights to the members of the **Armed Forces, Police Force or intelligence organisations** so as to ensure proper discharge of their duties and maintenance of discipline among them (Article 33).
- **Article 34:** Restriction on rights conferred by this part while martial law is in force in any area.
- **Article 35:** Legislation to give effect to the provisions of this part.

### DIRECTIVE PRINCIPLES OF STATE POLICY

- The Directive Principles of State Policy are enumerated in Part IV of the Constitution from **Articles 36 to 51**.
- They embody the concept of a **welfare state**.
- These are fundamental in the governance of the country.
- They are non-justifiable.
- They apply to both Union and State Governments and all other authorities coming under the definition of 'State'.

### SOCIALISTIC PRINCIPLES

These principles reflect the ideology of socialism.

- **Article 38:** To promote the welfare of the people by securing a social order permeated by justice—social, economic and political and to minimise inequalities in income, status facilities and opportunities.
- **Article 39:** To secure (a) the right to adequate means of livelihood for all citizens; (b) the equitable distribution of material resources of the community for the common good; (c) prevention of concentration of wealth and means of production; (d) equal pay for equal work for men for men and women; (e) preservation of the health and strength of workers and children against forcible abuse; and (f) opportunities for healthy development of children.
- **Article 41:** To secure the right to work, education and public assistance in cases of unemployment, old age, sickness and disablement.
- **Article 42:** To make provision for just and humane conditions for work and maternity relief.

### GANDHIAN PRINCIPLES

These principles are based on Gandhian ideology.

- **Article 40:** To organise village Panchayat of function as units of self-government.
- **Article 43:** To promote cottage industries on an individual or co-operation basis in rural areas.
- **Article 46:** To promote the educational and economic interests of SCs, STs and other weaker sections of the society and to protect them from social injustice and exploitation.
- **Article 47:** To prohibit the consumption of intoxicating drinks and drugs which are injurious to health.
- **Article 48:** To organise agriculture and animal husbandry on modern and scientific lines.

### LIBERAL-INTELLECTUAL PRINCIPLES

The principles included in this category represent the ideology of liberalism.

- **Article 44:** To secure for all citizens a **uniform civil code** throughout the country.
- **Article 45:** To provide early childhood care and education for all children until they complete the age of six years.

- **Article 49:** To protect all monuments of historic interest and national importance.
- **Article 50:** To separate the judiciary from the executive in the public services of the state.
- **Article 51:** To promote international peace and security and to maintain just and honourable relations between nations; to foster respect for international law and treaty obligations, and to encourage settlement of international disputes by arbitration.

#### New Directive Principles

- **Article 39A:** To provide free legal aid to the poor (42nd Amendment Act, 1976).
  - **Article 39F:** To secure opportunities for healthy development of children (42nd Amendment Act, 1976).
  - **Article 43A:** To take steps to secure the participation of workers in the management of industries (42nd Amendment Act, 1976).
  - **Article 43B:** To promote professionally run **co-operative societies** added by the 97th Constitutional Amendment Act, 2011.
  - **Article 48A:** To protect and improve the environment and to safeguard forests and wildlife (42nd Amendment Act, 1976).
  - **Article 38 (2)** added one more Directive Principle, which requires the state to minimise inequalities in income status facilities and opportunities under Article 38. (44th Amendment Act)
- DIFFERENCE BETWEEN FUNDAMENTAL RIGHTS AND DIRECTIVE PRINCIPLES**
- The Directives are not enforceable in the courts and do not create any Justifiable rights in favour of the individuals, while the Fundamental Rights are enforceable by the courts [Ref.: Arts. 32, 37, and 226 (1)].
  - In case of any conflict between fundamental rights and directive principles, the former should prevail in the courts.
  - State and every local authority within the State to provide adequate facilities for instruction in the mother-tongue at the

primary stage of education to children belonging to linguistic minority groups [Ref.: Art. 350A].

- 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. 251].
- 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 of a state [Ref.: Art. 335].

## FUNDAMENTAL DUTIES

- In 1976, the FDs of citizens were added by 42nd **Constitutional Amendment Act** on the basis of Swaran Singh Committee Report.

#### LIST OF FUNDAMENTAL DUTIES

- According to **Article 51A**, of Part IV A, it shall be the duty of every citizen of India:
- to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
  - to cherish and follow the noble ideals that inspired the national struggle for freedom;
  - to uphold and protect the sovereignty, unity and integrity of India;
  - to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities and to renounce practices derogatory to the dignity of women;
  - to defend the country and render national service, when called upon to do so;
  - to value and preserve the rich heritage of the country's composite culture;
  - to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures;
  - to develop scientific temper, humanism and the spirit of inquiry and reform;
  - to safeguard public property and to abjure violence;

- to strive for excellence in all spheres of individual and collective activity.
- to provide opportunities for education to his child or as the case may be ward between the age of six and fourteen years.
- to strive toward excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement; and
- to provide opportunities for education to his child or ward between the age of 6 to 14 years. This duty was added by the 86th Constitutional Amendment Act, 2002.

## PROCEDURE FOR AMENDING THE CONSTITUTION

- 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, ratification by the Legislatures of at least half of the states, is required before the Bill is presented to the President for his assent.
- 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**, e.g., 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 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 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

- In the case of Keshvananda Bharati, the Supreme Court overruled its own decision given in the case of Golak Nath and held that the Parliament could amend any provision of the Constitution including fundamental rights in accordance with.

## 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.
- The 42nd Amendment Act "shall be called in Question in any court on any ground". These clauses were nullified by the Supreme Court in the Minerva Mill's 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.
  3. Basic features of the Constitution cannot be amended.

## EXECUTIVE OF THE UNION

### THE PRESIDENT

- 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; and
  - The elected members of the Legislative Assemblies of Union Territories of Delhi and Pondicherry (now Puducherry).

## QUALIFICATION OF THE PRESIDENT

Under **Article 58**, a person to be eligible for election as President should fulfill the following qualifications:

- He should be a citizen of India.
- He should have completed 35 years of age.
- He should be qualified for election as a member of the Lok Sabha.
- He should **not hold any office of profit** under the Union Government or any State Government or any local authority or any other public authority.

## ELECTION OF THE PRESIDENT (ARTICLE 54)

- The President is elected by members of Electoral College consisting of the elected members of both the Houses of Parliament;
- The elected members of the Legislative Assemblies of the states; and
- The elected members of the Legislative Assemblies of the Union Territories of Delhi and Puducherry.
- All disputes regarding election of the President are **adjudicated** by the Supreme Court.
- Nomination for election of President must be supported by at least 50 electors as proposers and 50 electors as seconds.
- Security deposit for the nomination as President is ₹ 15000 in RBI.**

Value of the vote of an M. L. A.

$$= \frac{\text{Total population of state}}{\text{Total number of elected M.L.As.}} \times \frac{1}{1000}$$

Value of the vote of an M.P.

$$= \frac{\text{Total value of votes of all M.L. As of all states}}{\text{Total number of elected M.Ps.}}$$

The presidential election is held in accordance with the system of proportional representation by means of the single transferable vote and the voting is through secret ballot.

## CONDITIONS OF PRESIDENT'S OFFICE

**Article 59** of the Constitution lays down the following condition of the President's office:

- He should not be a member of either House of Parliament or a House of the State Legislature. If any such person is elected as President he is deemed to have vacated his seat in that House on the date on which he enters upon his office as the President.
- His emoluments and allowances cannot be diminished during his term of office.
- Article 60:** Oath and Affirmation of the President.
- The oath of the President is administered by the Chief Justice of India and in his absence, the seniormost Judge of the Supreme Court.

## TERM OF OFFICE OF THE PRESIDENT

- Under Article 56, the President shall hold office for a term of five year from the date on which he enters upon his office.
- He may resign from his office by writing under his hand addressed to the Vice-President (he can communicate to the Speaker of the Lok Sabha).

## IMPEACHMENT OF THE PRESIDENT

Under **Article 61**, President can be impeached from office for "violation of the Constitution".

- The impeachment can be initiated by either House of the Parliament. The resolution must be moved after at least 1/4 days notice in writing signed by not less than 14th of total members of the House and passed by two thirds of the total membership.

## VACANCY IN THE PRESIDENT'S OFFICE

Under **Article 62**, a vacancy in the President's office can occur in any of the following ways:

- On the expiry of his tenure of five years.
- By his resignation.
- On his removal by the process of impeachment.
- By his death.

- An election to fill the vacancy (due to expiration of term) must be held before the expiry of the term.
- If the office fall vacant by resignation, removal, death or otherwise, then election to fill the vacancy should be completed **within six months** from the date of the occurrence of such a vacancy.
- 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.
- The outgoing President continues to hold office, notwithstanding that his term has expired, until his successor enters upon the office. There is no scope for the Vice-President getting a chance to act as President in this case.

#### Smart Facts about 'President'

V.V. Giri is the only person, who won the Election of the President as an independent candidate in 1969.

In July 1977, **Neelam Sanjeeva Reddy** was elected unopposed as no one else filed nomination for the post of the President.

**Justice M. Hidayatullah** is the only person to perform the function of the President two times in two different capacities, the first time in 1969, being the Chief Justice of the Supreme Court and the second time being the Vice-President of India in 1982.

- The Attorney-General for India
- The Comptroller and Auditor General of India\*
- The Judges of the Supreme Court\*
- The Judges of the High Courts of the states\*
- The Governors of states\*
- Chief election commissioner and other members of Election Commission.
- Chairman and members of UPSC.

 \*Can be removed from office through special constitutional provisions (by impeachment).

#### FINANCIAL POWERS

- Money Bills can be introduced in the Parliament only with his prior recommendation.
- No demand for a grant can be made except on his recommendation.
- He through his representative presents the annual financial statement before the parliament.
- He can make advance out of the Contingency Fund of the India to meet any **unforeseen expenditure**.
- He constitutes a **Finance Commission** after every five years.

#### JUDICIAL POWERS

- He appoints the Chief Justice and the Judges of Supreme Court and High Courts.
- He can seek **advice from the Supreme Court** on any question of law of fact. However, the advice tendered by the Supreme Court is not binding on the President (Article 143).

#### MILITARY POWERS

- The Supreme command of the Defense Forces is vested in the President of India, but the Parliament can regulate or control the exercise of such power.
- Declares war or concludes peace, subject to the approval of the Parliament.

#### DIPLOMATIC POWERS

- President of India represents India in international affairs, appoints Indian representatives to other countries and receives diplomatic representatives of other States.

## 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.
- The President shall have the power to appoint and remove high dignitaries including:
  - The Prime Minister of India
  - Other Ministers of the Union

## LEGISLATIVE POWERS

- President has the power to summon or prorogue the Houses of Parliament and to dissolve the Lok Sabha.
- He also has the power to summon a joint sitting of both Houses of Parliament in case of a deadlock between them.
- The President addresses both Houses of Parliament assembled together, at the first session after each general election to the Lok Sabha and at the commencement of the first session of each year.
- 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.
- 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.
- 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; or
  - He may withhold his assent to the Bill; or
  - 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.
- The veto power of the Indian President is a **combination of the absolute, suspense 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. A Money Bill so reserved, cannot be returned by the President.
- He can **promulgate ordinances**, when the Parliament is not in session. The ordinances must be approved by the Parliament within six weeks from its reassembly. He

can also withdraw an ordinance at any time (Article 123).

- He lays the reports of CAG, UPSC, Finance Commission etc., before the Parliament.

## Presidents of India

S.No.	Name	Period
1.	Rajendra Prasad	26 Jan. 1950 to 13 May 1962
2.	Sarvapalli Radhakrishnan	13 May 1962 to 13 May 1967
3.	Zakir Hussain	13 May 1967 to 3 May 1969
4.	Varahagiri Venkata Giri	3 May 1969 to 20 July 1969
5.	Muhammad Hidayatullah	20 July 1969 to 24 Aug. 1969
6.	Varahagiri Venkata Giri	24 Aug. 1969 to 24 Aug. 1974
7.	Fakhruddin Ali Ahmed	24 Aug. 1974 to 11 Feb. 1977
8.	Basappa Danappa Jatti	11 Feb. 1977 to 25 July 1977
9.	Neelam Sanjiva Reddy	25 July 1977 to 25 July 1982
10.	Giani Zail Singh	25 July 1982 to 25 July 1987
11.	Ramaswamy Venkataraman	25 July 1987 to 25 July 1992
12.	Shankar Dayal Sharma	25 July 1992 to 25 July 1997
13.	Kocheril Raman Narayanan	25 July 1997 to 25 July 2002
14.	A.P.J. Abdul Kalam	25 July 2002 to 25 July 2007
15.	Pratibha Patil	25 July 2007 to 25 July 2012
16.	Pranab Mukherjee	25 July 2012 to 25 July 2017
17.	Ramnath Kovind	25 July 2017 to till date

### Pardoning Powers of the President (Article 72)

- Pardon
- Reprieve
- Remission
- Respite
- 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.
- Governor has no power to pardon in case of sentence of death, only President can pardon a death sentence.

## EMERGENCY POWERS

- The President of India can proclaim emergency in three conditions after getting the written recommendation of the Cabinet.
- National Emergency** (Article 352) arising out of war, external aggression or armed rebellion within the country.
- Constitutional Emergency** (Article 356) arising out of the failure of the constitutional machinery in the States. It is also known as **President's Rule**.
- Financial Emergency** (Article 360) arising out of a threat to financial stability or credit of India.

## MISCELLANEOUS POWERS

- Hershel 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 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.

## TYPES OF VETO

- Absolute Veto:** Withholding of assent to the bill passed by the legislature.
- Qualified Veto:** Sending back of bill, which can be overridden by the legislature with a higher majority.
- Suspensive Veto:** Sending back of

a bill which can be over sided by the legislature with ordinary majority.

- Pocket Veto:** Taking no action on the bill passed by the legislature. It was used in 1986 in postal bill by the president of that time Giani Zail Singh.

## 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.
- Electoral College of Vice-President consists of elected and nominated members of both the Houses of Parliament.
- All disputes regarding election of Vice-President are adjudicated by the Supreme Court.
- 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.

## QUALIFICATION [ARTICLE 66 (3)]

- Should be a citizen of India.
- Should have **completed 35 years** of age.
- Should be qualified for election as Member of Rajya Sabha.
- Should not hold any office of profit.

## OATH

Under **Article 69** the oath of office of the Vice-President is administered by the President or some person appointed in that behalf by him.

## TERM OF OFFICE UNDER ARTICLE 67

- Holds office for a **term of 5 years** from the date on which he enters upon his office.
- Can be removed by a resolution of the Rajya Sabha passed by an absolute majority and agreed by the Lok Sabha [Article 67 (b)].

## VACANCY OF OFFICE

A vacancy in the Vice-President's office can occur in any of the following ways:

- On the expiry of his tenure, by his resignation, on his removal, by his death.
- He draws his salary in his capacity as the ex-officio Chairman of Rajya Sabha.

## ■ POWERS AND FUNCTIONS

- He acts as the ex-officio Chairman of Rajya Sabha. In this capacity, his powers and functions are similar to those of the Speaker of Lok Sabha.
- He acts as President when a vacancy occurs in the office of the President due to his resignation, removal, death or otherwise. He can act as President only for a maximum period of six months.
- If the offices of both the President and the Vice-President fall vacant by reason of death, resignation, removal, etc. the Chief Justice of India or in his absence the senior most Judge of the Supreme Court acts as President. For the first time in 1969, when the President Dr. Zakir Hussain died and the Vice-President V.V. Giri resigned, the Chief Justice M. Hidayatullah acted as President.
- A sitting Vice-President is eligible for re-election. **Dr. S. Radhakrishnan** was elected as the Vice-President of India for a second term in 1957.
- The normal function of the Vice-President is to act as the ex-officio Chairman of the Rajya Sabha.
- When the Vice-President acts as President, he gets the emoluments of the President.
- Determination of doubts and disputes relating to the election of President or Vice-President is described in Article 71. Main provisions are as follows:
- Such disputes are decided by the Supreme Court whose jurisdiction is exclusive and final. No such dispute can be raised if the President or the Vice-President is declared void by the Supreme Court, act done by him prior to the date of such decision of the Supreme Court is to be invalidated. Matters other than the decision of such disputes are regulated by law made by the Parliament.

### **Election of the Vice-President**

S.No.	Victorious Candidate	Year and date of Election
1.	S. Radhakrishnan	12 May, 1952
2.	S. Radhakrishnan	11 May, 1957
3.	Zakir Hussain	07 May, 1962

4.	V.V. Giri	6 May, 1967
5.	G.S. Pathak	30 Aug, 1969
6.	B.D. Jatti	27 Aug, 1974
7.	M. Hidayatullah	27 Aug, 1979
8.	R. Venkataraman	23 Aug, 1984
9.	Shankar Dayal Sharma	7 Sept, 1987
10.	K. R. Narayanan	19 Aug, 1992
11.	Krishan Kant	16 Aug, 1997
12.	Bhairoon Singh Shekhawat	12 Aug, 2002
13.	Mohd. Hamid Ansari	10 Aug, 2007
14.	Mohd. Hamid Ansari	7 Aug, 2012
15.	Venkaiah Naidu	2017

## **THE PRIME MINISTER AND THE UNION COUNCIL OF MINISTERS**

### **■ PRIME MINISTER**

- Prime Minister is the head of the government while President is the head of the State of the Republic of India. **Article 75 says** that the Prime Minister shall be appointed by the President.

### **■ OATH, TERM AND SALARY**

- The **term of the Prime Minister is not fixed** and he holds office during the pleasure of the President. However, this does not mean that the President can dismiss the Prime Minister at any time. So long as the Prime Minister enjoys the majority support in the Lok Sabha, he cannot be dismissed by the President. However, if he loses the confidence of the Lok Sabha, he must resign or the President can dismiss him.

### **■ IN RELATION TO COUNCIL OF MINISTERS**

- He allocates and reshuffles various portfolios among the ministers.
- He can ask a minister to resign or advise the President to dismiss him in case of difference in opinion.

- He can bring about the collapse of the Council of Ministers by resigning from office.

### Prime Ministers of India

S.No.	Name	Period
1.	Jawahar Lal Nehru	15 Aug. 1947 to 27 May 1964
2.	Gulzarilal Nanda	27 May 1964 to 9 June 1964
3.	Lal Bahadur Shastri	09 June 1964 to 11 Jan. 1966
4.	Gulzarilal Nanda	11 Jan. 1966 to 24 Jan. 1966
5.	Indira Gandhi	24 Jan. 1966 to 24 March 1977
6.	Morarji Desai	24 March 1977 to 28 July 1979
7.	Charan Singh	28 July 1979 to 14 Jan. 1980
8.	Indira Gandhi	14 Jan. 1980 to 31 Oct. 1984
9.	Rajiv Gandhi	31 Oct. 1984 to 2 Dec. 1989
10.	Vishwanath Pratap Singh	2 Dec. 1989 to 10 Nov. 1990
11.	Chandra Shekhar	10 Nov. 1990 to 21 June 1991
12.	P.V. Narasimha Rao	21 June 1991 to 16 May 1996
13.	Atal Behari Vajpayee	16 May 1996 to 1 June 1996
14.	H.D. Deve Gowda	1 June 1996 to 21 April 1997
15.	Atal Behari Vajpayee	19 March 1998 to 22 May 2004
16.	Dr. Manmohan Singh	22 May 2004 to 26 May 2014
17.	Narendra Modi	26 May 2014 to till date

### IN RELATION TO THE PRESIDENT

- Under **Article 78**, it is the duty of the Prime Minister—
- To communicate to the President, for **all decisions** of the Council of Ministers relating to the administration of the affairs of the Union and proposals for legislation.
- To furnish such information relating to the administration of the affairs of the

Union and proposals for legislation as the President may call for.

- If the President requires, to submit for the consideration of the Council of Ministers any matter on which a decision has been taken by a minister but which has not been considered by the council.
- As the head of the Council of Ministers, the Prime Minister (PM) is the head of the Government. Also, she/he is the leader of his/her party or/and of a coalition of parties in Parliament and usually the Leader of the Popular House.
- 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.

### APPOINTMENT OF MINISTERS

- Ministers are appointed by the President on the advice of the Prime Minister.
- The Prime Minister and other Ministers have to be member of either House of Parliament or should become members within six months of their appointment, failing, which they are removed.

### OATH AND SALARY OF MINISTERS

- President administers the oath to the Ministers.

### RESPONSIBILITY OF MINISTERS

- Under Article 75, the CoMs is collectively responsible to Lok Sabha for all their acts.

### DEPUTY PRIME MINISTER

- The post of Deputy Prime Minister is not mentioned in the Constitution.
- 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 member of the House.

Name	Tenure
Sardar Vallabhbhai Patel	1947–1950
Morarji Desai	1967–1969
Charan Singh and Jagjivan Ram	1979–1979

Name	Tenure
Y. B. Chavan	1979–1980
Devi Lal	1989–1990
Devi Lal	1990–1991
L. K. Advani	2002–2004

## THE ATTORNEY GENERAL OF INDIA

- The Attorney General is the first Law Officer of the Government of India.
- Under Article 76, 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 required to be a Judge of the Supreme Court.
- The Attorney General for India is not a member of the Cabinet. But he has the right to speak in the Houses of Parliament or in any Committee thereof, but he has no right to vote.
- He is entitled to the privileges of a Member of Parliament. In the performance of his official duties, the Attorney General has the right of audience in all Courts in the territory of India.

## THE COMPTROLLER AND AUDITOR GENERAL OF INDIA

- Though appointed by the President, under Articles 148-151, the Comptroller and Auditor General can be grounded of proved misbehaviour or incapacity.
- His salary and conditions of service are laid down by Parliament and cannot 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.
- His salary is equal to that of a Judge of the Supreme Court.
- 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.

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.
- He is an officer of the parliament and is called Ears and Eyes of the Public Accounts Committee.

## THE PARLIAMENT OF INDIA

- The Parliament of India consists of the President, the Lok Sabha and the Rajya Sabha (Article 79).
- Out of seven UTs only two (Delhi and Puducherry) have representation in the Rajya Sabha.

## RAJYA SABHA [ARTICLE 80]

- Rajya Sabha is a permanent body and **not subject to dissolution**. Its maximum strength is 250. The total membership of the present Rajya Sabha is 245 however one-third members retire every second year. Their seats are filled up by fresh elections and presidential nomination at the beginning of every third year.
- There are no seats reserved for SCs and STs in Rajya Sabha.
  - Representation of People Act (1951) provided the term of office of a member of the Rajya Sabha shall be **six years**.

## LOK SABHA [ARTICLE 81]

- Its maximum strength is 550+2 members of its Anglo-Indian Community, which includes 530 members from States and 20 from Union Territories. Present strength of Lok Sabha is 545.

- The 84th Amendment Act 2001 extended the freeze on Lok Sabha and assembly seats till 2026 during the A.B. Vajpayee government.
- 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.
- The Council of State is not subject to dissolution. It is a permanent body. One-third 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 cannot be made for a period exceeding one year at a time.
- Such extension cannot 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.
- 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.
- On dissolution of the Lok Sabha all matters pending before the House lapse.
- But a Bill pending in the Rajya Sabha which has not yet been passed by the Lok Sabha not lapse on dissolution.
- A dissolution does not affect a joint sitting of the two Houses, if the President has notified his intention to hold a joint sitting before the dissolution.

### QUALIFICATION (ARTICLE 84)

For a person to be chosen as a Member of the Parliament:

- Must be a citizen of India.
- Must make and subscribe before the person authorised by the Election Commission on

oath or affirmation according to the form prescribed in the Third Schedule.

- Must not be less than 30 years of age in the case of **Rajya Sabha** and not less than 25 years of age in the case of the **Lok Sabha**.
- Must possess other qualification as prescribed by Parliament.

### DISQUALIFICATION (ARTICLE 102)

A person shall be disqualified for being elected as a Member of Parliament:

- If he holds any office of profit under the Union or State Government (except that of a Minister or any other office exempted by the Parliament).
- If he is of unsound mind.
- If he is declared insolvent.
- If he is not a citizen of India or has voluntarily acquired the citizenship of a foreign state or is under any acknowledgement of allegiance to a foreign State; and if he is so disqualified under any law made by the Parliament.

### SPEAKER AND DEPUTY SPEAKER OF THE LOK SABHA

- He is elected by Lok Sabha from amongst its members, as soon as, after the first meeting.
- He remains in his office during the life of the Lok Sabha. He vacates office earlier in any of the following cases:
  - If he ceases to be member of Lok Sabha;
  - If he resigns by writing to the Deputy Speaker; and
  - If he is removed by a resolution passed by a majority of all the members of the Lok Sabha. Such a resolution can be moved only after giving 14 days advance notice.

### ROLE, POWERS AND FUNCTIONS OF SPEAKER

- He **maintains order and decorum** in the House for conducting its business.
- He adjourns the House to suspend the meeting in the absence of quorum (presence of only 1-10th of the total strength of the House).
- He does not vote in the first instance, but he can **exercise a casting vote** in the case of a tie (dead lock).
- He **presides over a joint sitting** of two Houses of the Parliament.

- He certifies a Bill and his decision cannot be challenged.
- While a resolution for his removal is under consideration, the Speaker cannot preside but he can speak in, take part in the proceedings of the House and vote except in the case of equality of votes.
- At other meetings of the House the Speaker cannot vote in the first instances but can exercise a casting vote in case of equality of votes.
- When a Money Bill is transmitted from the Lok Sabha to the Rajya Sabha the Speaker may certify that it is Money Bill.
- 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 the House, the Deputy Speaker presides, except when a resolution for his own removal is under consideration.

#### Speakers of Lok Sabha

1.	Ganesh Vasudev Mavalankar	15 May 1952–27 February 1956
2.	M. Ananthasayanam Ayyangar	8 March 1956 –10 May 1957
3.	M. Ananthasayanam Ayyangar	11 May 1957–16 April 1962
4.	Hukum Singh	17 April 1962 –16 Mar, 1967
5.	Neelam Sanjiva Reddy	17 March 1967 –19 July 1969
6.	Dr. G.S. Dhillon	8 August 1969 –19 March 1971
7.	Dr. G.S. Dhillon	20 March 1971 –1 December 1975
8.	Bali Ram Bhagat	5 January 1976–25 March 1977
9.	Neelam Sanjiva Reddy	26 March 1977 –13 July 1977
10.	K. S. Hegde	21 July 1977–21 January 1980
11.	Dr. Balram Jakhar	22 January 1980–15 January 1985
12.	Dr. Balram Jakhar	16 January 1985 –18 December 1989
13.	Rabi Ray	19 December 1989 –9 July 1991
14.	Shivraj Patil	10 July 1991–21 May 1996
15.	P. A. Sangma	22 May 1996–23 March 1998
16.	G. M. C. Balayogi	24 March 1998–20 October 1999
17.	G. M. C. Balayogi	22 October 1999–3 March 2002
18.	Manohar Joshi	10 May 2002–2 June 2004
19.	Somnath Chatterjee	9 June 2004–1 June 2009
20.	Meira Kumar	4 June 2009–4 June 2014
21.	Sumitra Mahajan	6 June 2014–till date

#### DEPUTY SPEAKER

- **Anthasayanam Ayyangar** was the First Deputy Speaker of Lok Sabha.

#### SPECIAL POWER OF RAJYA SABHA

Due to its federal character, the Rajya Sabha has been given two exclusive or special powers that are not enjoyed by the Lok Sabha.

1. It can authorise the Parliament to make a law on a subject enumerated in the State List (Article 249).

2. It can authorise the Parliament to create new all-India Service (Common for both the Centre and States (Article 312).

#### 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 to 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.

### PRIVILEGES OF PARLIAMENT

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 Houses to give evidence as a witness while Parliament is in session.
- There is freedom of speech within the walls of each House.

### MONEY BILLS AND FINANCIAL BILLS

A Bill is called 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 expenditure charged on the Consolidated Fund of India.
- The receipt money on account of the Consolidated Fund of India or the Public accounts of India or the custody or issue of such money or the audit of the account of the Union or of a State.
- A Money Bill cannot 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 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.
- 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.
  - (a) A Bill which contains any of the matters specified in Article 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.

### JOINT SESSION (ARTICLE 108)

- The President can summon Lok Sabha and Rajya Sabha for a joint sitting in case or 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.
  - More than six months have lapsed 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 in the same order.
- So far, joint sittings have been held thrice in the history of Indian Parliament (1960, 1977 and 2002).

## EXTENTS OF THE POWERS OF RAJYA SABHA

- Though the Rajya Sabha can discuss, it cannot vote for the public expenditure and demands for grants are not submitted for the vote of the Rajya Sabha.
- The Council of Ministers is responsible to the Lok Sabha and not to the Rajya Sabha.
- Parliament can legislate on a State subject only if Rajya Sabha resolves for this by a 2/3rd majority.
- New All-India services can be created only after Rajya Sabha resolves for this with a 2/3rd majority.

## 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.”
- No demand for a grant can be made except on the recommendation of the President.
- The scrutiny of budget proposals is done by the Parliament’s **Committee on Estimates** in order to:
- The Comptroller and Auditor General is the **guardian of the public fund** and it is his function to see that not a paisa is spent without the authority of Parliament.
- The report of Comptroller and Auditor General laid before the Parliament is examined by the Public Accounts Committee.

## DIFFERENCE BETWEEN POWERS OF LOK SABHA AND THE RAJYA SABHA

- A Money Bill can be introduced only in the Lok Sabha and not in the Rajya Sabha.

- The speaker of Lok Sabha Presides over the joint sitting of both the houses of Parliament.
- A resolution for the discontinuance of the National Emergency can be passed only by the Lok Sabha and not by the Rajya Sabha.
- The Rajya Sabha **cannot remove** the Council of Ministers by passing a no-confidence motion.

## LEADER OF THE OPPOSITION

- Government has given statutory recognition to the leaders of the Opposition in the Lok Sabha and Rajya Sabha.
- 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.

## STAGES OF BILLS

### *Introduction of the Bill*

- It involves introduction of the Bill like provisions of the proposed law accompanied by the ‘Statement of Object and Reason’. Private member must give one month notice to introduce the Bill.
- After that it is published in the Gazette of India. The introduction of the Bill and its publication in the Gazette constitutes the First Reading of the Bill.

### *Second Reading of the Bill*

- In the second reading, principles of the Bill are discussed in detail and the treasury and the opposition members give their views either in support or opposition of the Bill.
- The second reading is divided into two stages: (i) consist of a general discussion of the principles of the Bill and (ii) relates to discussion of clauses, schedules and amendments.
- If the Bill is referred to the selected committee or joint committee, it is expected to give its report within a specified date.
- The Bill then undergoes long discussions clause by clause and may undergo substantial change.

### *Third Reading of the Bill*

- The third reading is the final reading. It is more or less formal affair. The debate is

confined to the acceptance or rejection of the Bill. The Bill is submitted to the vote of the house and has to be accepted or rejected altogether.

### **Bill in the Second House**

- After the Bill has been passed by one House, it is transmitted to the other House.
- In case the Bill is also passed by the second House or the first House agrees with the amendments made by the second House, the Bill is sent to the President of his assent.
- In case the Bill is rejected by the second House or it is kept by the second House with it for six months without any action or the first House disagrees with the amazements suggested by the second House a deadlock is deemed to have taken place.

### **Assent of the President**

- After being passed by both Houses, the Bill is presented to the President.
- If the President assents to the Bill, it becomes an Act.
- If the President withholds his assent, the Bill ends.
- If the President returns the Bill for reconsideration and it is passed again by both the Houses, he has to give his assent after the second passage.

## **THE BUDGET**

- The budget is contained in Articles 112 to 117.
- According to Article 112, the President shall in respect of every financial year cause to be laid before both the Houses of Parliament a statement of the estimated receipts and expenditure of the Government of India for that year, in this part referred to as the 'annual financial statement'.
- It is a statement of the estimated receipts and expenditures both revenue and capital of that financial year.
- The expenditure of government is classified as 'charged' and made from the consolidated fund of India.
- The General Budget is usually presented in the Lok Sabha by Finance Minister on the last working day of February.
- The General Budget is presented with the Budget speech by the Finance Minister.

- The Budget speech has two parts. Part A deals with general economic survey of the country and policy statements. Part B contains Tax proposals.
- At the end of the Budget speech in Lok Sabha, the Budget is laid in Rajya Sabha.
- Rajya Sabha can only discuss the budget.
- After the general discussion the house is adjourned for the period of a month.
- During this time the 24 standing committees carry out detailed scrutiny of the budget.
- Voting on demands for grants takes place in Lok Sabha.
- The time allotted for the discussion is decided by the business advisory committee headed by the speaker.
- After the completion of voting on demands for grants, appropriation bill is introduced.
- Finance Bill includes taxation Proposals and introduced with the General Budget, it has to be passed within 25 days of its introduction.
- No amendments can be moved to an amount appropriation bill to vary the amount or alter the destination which is unlike the finance bill.

### **Consolidated Fund of India (Article 266)**

- It is a fund to which all receipts are credited and all payments are debited. In other words:
  - (a) all revenues received by the government of India,
  - (b) all loans raised by the government by the issue of treasury bills, loans or ways and means of advances,
  - (c) all money received by the government in repayment of loans from the Consolidated Fund of India.

### **Contingency Fund of India**

- **Article 267:** The Constitution authorised the Parliament to establish a 'Contingency Fund of India'.
- This fund is placed at the disposal of the President.
- The fund is held by the finance secretary on behalf of President.

### **Public Account of India**

- Article 266 (2) provides that all other public moneys (other than those in the Consolidated Fund of India) received by or

on behalf of the Government of India or the Government of India or the Government of a State shall be credited to the Public Account of India or the Public Account of the State, as the case may be.

- This account is operated by executive action and payments from it do not need Parliamentary approval.

### COMMITTEE SYSTEM

- The **Public Accounts Committee** was setup first in **1921**. At present, it consists of 22 members (15 from the Lok Sabha and 7 from the Rajya Sabha). Since, 1967, a convention has developed whereby the Chairman of the Committee is selected invariably from the opposition.
- The first Estimates Committee was set up in 1950. It has thirty members, all from the Lok Sabha only.
- The **Committee on Public Undertakings** was created in 1964 on the recommendations of the Krishna Menon Committee. It has 22 members (15 from the Lok Sabha and 7 from the Rajya Sabha).
- In case, Speaker is a member of a committee, he becomes **Exofficio Chairman** of the Committee

### Allocation of Seats in Parliament

S. No.	States/UTs	Rajya Sabha	Lok Sabha
1.	Andhra Pradesh	11	25
2.	Arunachal Pradesh	1	2
3.	Assam	7	14
4.	Bihar	16	40
5.	Chhattisgarh	5	11
6.	Goa	1	2
7.	Gujarat	11	26
8.	Haryana	5	10
9.	Himachal Pradesh	3	4
10.	Jammu and Kashmir	4	6
11.	Jharkhand	6	14
12.	Karnataka	12	28
13.	Kerala	9	20

14.	Madhya Pradesh	11	29
15.	Maharashtra	19	48
16.	Manipur	1	2
17.	Meghalaya	1	2
18.	Mizoram	1	1
19.	Nagaland	1	1
20.	Odisha	10	21
21.	Punjab	7	13
22.	Rajasthan	10	25
23.	Sikkim	1	1
24.	Tamil Nadu	18	39
25.	Tripura	1	2
26.	Uttarakhand	3	5
27.	Uttar Pradesh	31	80
28.	West Bengal	16	42
29.	Telangana	7	17
<b>Union Territories</b>			
1.	Andaman and Nicobar Islands	—	1
2.	Chandigarh	—	1
3.	Dadra and Nagar Haveli	—	1
4.	Daman and Diu	—	1
5.	Delhi (The Capital Territory of Delhi)	3	7
6.	Lakshadweep	—	1
7.	Puducherry	1	1
<b>Nominated Members</b>		12	2
<b>Total</b>		245	545

### PARLIAMENTARY TERMS

**Question Hours:** 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:

- Starred Question** is one for which an oral answer is required to be given by

the Minister on the floor of the House.

- ii. **Unstarred Question** is one for which the Minister lies on the table written answer.
- iii. **Short Notice Question** is one for which can be asked by members on matters of public importance of an urgent nature.

## ■ QUORUM

A Quorum is the minimum number of members of a deliberative assembly necessary to conduct the business of that group. Quorum for either House [Article 100 (c)] is 1/10th of the total number of members.

There are three types of cut motions:

- i. **Disapproval of policy cut** says that 'the amount of the demand be reduced by ₹1'.
- ii. **Economy cut** asks for a reduction of the amount of the demand by a specific amount.
- iii. **Token cut** says that, the amount of the demand be reduced by ₹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.

**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.

**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.

**Zero Hour:** From 12-1 pm daily. This time is allotted everyday for miscellaneous business, call-attention notices, question on official statements and adjournment motions.

## ■ TYPES OF MOTIONS

- **Censure Motion:** It can be moved only in the Lok Sabha and only by the opposition. It can be brought against the ruling Government or against any Minister for the failure of an act of seeking disapproval of their policy.
- **No Confidence Motion:** It can be moved only in the Lok Sabha and only by the opposition. It needs the support of 50 members to be admitted. It can be brought only against the Council of Ministers and not against any individual Minister.
- **Cut Motions:** They are **moved in the Lok Sabha only**. They are related to the budgetary process which seeks to reduce the amount for grants.

## ■ WHIP

- A directive issued by any political party to ensure the support of its members voting in favour or against a particular issue on the floor of the House.

## ■ GUILLOTINE

- When due to lack of time, demand for grants are put to vote whether they are discussed or not in the House on the last day of the allotted time, it is called Guillotine and it concludes the discussion on demands for grants.

## EXECUTIVE OF THE STATES: THE GOVERNOR

- If a member of a Legislature is appointed governor, he ceases to be a Member immediately upon such appointment.
- The Governor is the Constitutional Head of the State and the same Governor can act as Governor of more than one State (Articles 153 and 154).
- Under **Article 155**, the Governor is appointed by the President. **Article 156** states that the

Governor holds office during the pleasure of the President.

## QUALIFICATION OF GOVERNOR

Under **Article 158**, the Constitution lays down the following conditions for the Governor's office:

- Must be citizen of India.
- Completed 35 years of age.
- Shall not be a member of both the Houses of Parliament or of a House of Legislative Assembly or Legislative Council (if any).
- Shall not hold office of profit.

## OATH (ARTICLE 159)

- His oath is administered by the Chief Justice of the concerned State High Court and in his absence, the seniormost Judge of that Court.

## TENURE OF GOVERNOR UNDER ARTICLE 156

- (a) The Governor shall hold office during the pleasure of the President;
- (b) He may resign by writing under the hand addressed to the President;
- (c) He holds office for a period of 5 years.
- (d) There is no bar to a person being appointed Governor more than once.

## SARKARIA COMMISSION REPORT ON THE OFFICE OF GOVERNOR

- The State must be consulted before the appointment of a person to the office of the Governor.
- The Governor should not belong to the same State.
- He should be an eminent figure in any walk of life.
- He should be a detached figure and not too intimately connected with the local politics of the state.
- He should not have been actively involved in politics in recent past.
- He should not be a politician of the ruling party at the Centre, if the State to which he appointed is ruled by some other party (parties).
- Persons of the minority groups should continue to be given a chance.

- System of sending fortnightly report to the President by the Governor must continue.
- The power of the Governor to refer any Bill to the Centre for the President's assent must continue.

## ARTICLES RELATED WITH GOVERNOR

Article-153	: Provision for the office of the Governor.
Article-154	: Executive powers of Governor.
Article-155	: Appointment of the Governor.
Article-156	: Terms of the office.
Article-157	: Qualifications for the appointment of the Governor.
Article-158	: Conditions for the Governor's office.
Article-159	: Oath of the office to the Governor.
Article-161	: Judicial powers of the Governor.
Article-164	: Appointment of Ministers by the Governor.
Article-165	: Appointment of the Advocate-General.
Article-166	: All executive actions of state are formally taken in his name.
Article-168	: Governor is an integral part of the state legislature.
Article-174	: Right of summoning, proroguing and dissolving.
Article-200	: Reservation of Bill for President's consideration.
Article-202	: Laying of state budget before the legislature.
Article-213	: Power to promulgate Ordinances.
Article-233	: Appointment and posting of District Judges by the Governor.

## POWERS OF GOVERNOR

**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 jointly by the President on the report of the Supreme Court and in some cases on the happening of certain disqualification.
- 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.
- Like the President the Governor has the power to nominate members of the Anglo-Indian Community to the Legislative Assembly of his State.

### LEGISLATIVE POWERS

- Governor is an integral part of the State Legislature. He has the right of addressing and sending message and of summoning proroguing and dissolving the State Assembly.
- He has the power to nominate one member of Anglo-Indian Community to the Legislative Assembly of the State.
- He appoints 1/6th members of Legislative Council.

### FINANCIAL POWERS

- State budget is laid before the State Legislature by him.
- He constitutes a State Finance Commission after every five years.

### JUDICIAL POWERS (ARTICLE 161)

- He can grant pardons, reprieves, respites and remissions of punishment or suspend, remit and commute the sentence of any person convicted of any offence against any law relating to a matter, to which the executive power of the State extends.

### EMERGENCY POWERS

- He reports to the President, if the State Government is not running constitutionally and recommends to the Union Government, President's Rule (Article 356).

### 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 licenses 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 Saurashtra. The Governor of Nagaland has similar special responsibility with respect to law and order in that State. Governor of Sikkim has special responsibility for peace and equitable arrangement and has the power to dismiss an individual Minister at any time. 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.

### CHIEF MINISTER'S (CM) APPOINTMENT

**Article 164**, says that Chief Minister shall be appointed by the Governor of the State.

### OATH, TERM AND SALARY

- Oath of the office of Chief Minister is administered by the Governor to person appointed for this purpose.
- A person, who is not a member of State Legislature can be appointed but he has to get himself elected within 6 months otherwise he is removed.
- The **term of the CM is not fixed** and he holds office during the pleasure of the Governor.
- He cannot be dismissed by the Governor as long as he enjoys the majority support in the Legislative Assembly. But, if he loses the confidence of the Assembly, he must resign or the Governor can dismiss him.
- The salary and allowances of the Chief Minister are determined by the State Legislature.

### POWERS AND FUNCTIONS

#### A. In Relation to Council of Ministers (CoMs)

The CM as a head of the CoMs, enjoys the following powers:

- The Governor appoints only those persons as Ministers, who are recommended by the Chief Minister.
- He allocates and reshuffles the portfolios among Ministers.
- He can ask a minister to resign or advise the Governor to dismiss him in case of difference of opinion.
- As the Chief Minister is the head of the Council of Ministers, his resignation or death automatically dissolves the Council of Ministers.

#### **B. In Relation to the Governor**

- He is the **principle channel of communication** between the Governor and the Council of Ministers.

#### **C. In Relation to State Legislature**

- Advises the Governor with regard to summoning and proroguing the sessions of the State Legislature.
- Recommend the **dissolution** of the Legislative Assembly to the Governor at any time

#### **State Council of Ministers**

- Articles 163 and 164** deal with Council of Ministers, in states.

#### **Oath and Salary**

- Oaths** of office and secrecy is administered by the Governor or person appointed by him for this purpose.

### **THE ADVOCATE GENERAL**

- 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**

Only 6 States, Andhra Pradesh, Bihar, Jammu and Kashmir, Karnataka, Maharashtra, and Uttar Pradesh are having Bicameral (Double House).

- As per **Article 169**, if the Legislative Assembly passes a resolution for abolishing or creating of the **Legislative Council** by a majority of the total membership of the Assembly and by a majority of not less than two-thirds of the members present and voting, the Parliament may approve the resolution by a simple majority to create or abolish the Legislative Council.
- The size of the Legislative Council may vary, but its membership should not be more than 1/3rd of the membership of the Legislative Assembly but not less than 40.
- 5/6th of the total number of members of the Council is indirectly elected and 1/6th is nominated by the Governor.

Of the total number of members of a Legislative Council:

- 1/3rd** elected from local bodies (municipalities and district boards).
- 1/12th** elected by graduates of 3 years standing and residing in the state.
- 1/12th** elected by teachers of 3 years standing in the State, not lower in standing than secondary school.
- 1/3rd** elected by the members of the Legislative Assembly of the State from amongst persons, who are not members of the assembly.
- Rest (1/6th)** are nominated by the Governor from person of special knowledge or practical experience of literature, science, art, co-operative movement and social service.
- The **Legislative Assembly** (Vidhan Sabha) consists of not more than 500 members and not less than 60 members. However, the Legislative Assemblies of **Sikkim, Goa, Mizoram** and **Puducherry** have less than 60 members each.
- Governor can nominate one member of the Anglo-Indian community in the Assembly.
- 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.
- The Legislative Council is not dissolved. One-third of the members of Legislative Council retire on the expiry of every second year.
  - 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 offices 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.

### MEMBERSHIP OF THE STATE LEGISLATURE

Under **Article 173**, they must fulfill the following conditions:

- He must be a citizen of India.
- He must make and subscribe before the person authorised by the Election Commission an oath or affirmation according to the form prescribed in the Third Schedule.
- He must be **not less than 30 year** of age in the case of the Legislative Council and **not less than 25 years** of age in the case of the Legislative Assembly.
- He must possess other qualifications prescribed by Parliament, under Representation of People Act, 1951.

### OATHS OR AFFIRMATION

Administered by Governor or persons appointed by Governor or a person appointed by him for this purpose.

### VACATION OF SEATS (IN CASES OF)

- Double membership
- Disqualification
- Resignation

- Absence (more than 60 days without permission)

### OTHER CASES

- if his election is declared void by the court,
- if he is expelled by the House,
- if he is elected for the office of the President or office of Vice-President, and
- if he is appointed to the office of Governor of a State.

### DURATION OF THE TWO HOUSES

- Legislative Assembly Same as Lok Sabha.
- Legislative Council Same as Rajya Sabha.

### PRESIDING OFFICERS OF STATE LEGISLATURE

- Speaker/Deputy Speaker in Legislative Assembly (Article 178).
- Chairman/Deputy Chairman in Legislative Council (Article 182).

**Speaker of Assembly** is elected by the Assembly itself from amongst its members. He can vacate his office earlier in any of the following three cases:

- If he ceases to be a member of the assembly;
- If he resigns by writing to the Deputy Speaker, and
- If he is removed by a resolution passed by a majority of all the members of the Assembly. Such a resolution can be moved only after giving 14 days' advance notice (Article 179).

### POWERS AND DUTIES OF SPEAKER

- He adjourns the Assembly or suspends the meeting in the absence of a quorum.
- He decides whether **a Bill is a Money Bill or not** and his decision on this question is final.
- He decides the questions of disqualification of a member of the Assembly, arising on the ground of defection under the provisions of the Tenth Schedule.

### Strength of Legislative Assembly

S. No.	State/Union territory	Number of Seats
1.	Andhra Pradesh	175
2.	Arunachal Pradesh	60
3.	Assam	126

S. No.	State/Union territory	Number of Seats
4.	Bihar	243
5.	Chhattisgarh	90
6.	Goa	40
7.	Gujarat	182
8.	Haryana	90
9.	Himachal Pradesh	68
10.	Jammu and Kashmir	87
11.	Jharkhand	81
12.	Karnataka	224
13.	Kerala	140
14.	Madhya Pradesh	230
15.	Maharashtra	288
16.	Manipur	60
17.	Meghalaya	60
18.	Mizoram	40
19.	Nagaland	60
20.	Odisha	147
21.	West Bengal	295
22.	Punjab	117
23.	Rajasthan	200
24.	Sikkim	32
25.	Tamil Nadu	235
26.	Telangana	119
27.	Tripura	60
28.	Uttarakhand	70
29.	Uttar Pradesh	403
<b>Union Territories</b>		
1.	Delhi	70
2.	Puducherry	30
<b>Legislative Council</b>		
1.	Uttar Pradesh	100
2.	Andhra Pradesh	58
3.	Karnataka	75
4.	Bihar	75
5.	Maharashtra	78
6.	Jammu and Kashmir	36
7.	Telangana	40

## ■ CHAIRMAN OF LEGISLATIVE COUNCIL

The Chairman is elected by the Council itself from amongst its members. The Chairman vacates his office in any of the following three cases:

- If he ceases to be a member of the council;
- If he resigns by writing to the Deputy Chairman; and
- If he is removed by a resolution passed by a majority of all the members of the Council. Such a resolution can be moved only after giving 14 days' advance notice.

## ■ LEGISLATIVE PROCEDURE

- A Money Bill can be introduced only in the Legislative Assembly.
- In case of an Ordinary Bill, the Legislative Council can hold the Bill for a maximum period of three months.
- There is no provision for joint sitting in case of difference between the two houses.

## ■ 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 reservation 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 reassembles.

- An Ordinance ceases to have effect after 6 weeks from the date of reassembly, unless disapproved earlier by that Legislature.
- The Governor himself is competent to withdraw the Ordinance at any time.
- Governor cannot promulgate Ordinances without instructions from the President if:
  - A Bill containing the same provisions would require previous sanction of the President.
  - Bill is required to be reserved for consideration of the President.

### PRIVILEGES OF STATE LEGISLATURE

- Privileges of State Legislature are similar to those of Union Parliament.
- No House of the Legislature can create any new privilege for itself. Court can determine whether the House possesses a particular privilege.

### UNION TERRITORIES

- National Capital Territory of Delhi and Puducherry are headed by the Lieutenant Governors.
- Daman and Diu, Dadra and Nagar Haveli have a common administrator. Lakshadweep is also governed by an administrator.
- Chandigarh and Andaman and Nicobar Islands are governed by a Chief Commissioner. Delhi and Puducherry have Legislative Assemblies.
- By the **69th Constitutional Amendment Act**, Delhi was given the status of National Capital Territory of India.

### SPECIAL POSITION OF JAMMU AND KASHMIR

- **Article 370** of the Indian Constitution accords special status to the State of Jammu and Kashmir.
- Proclamation of Emergency under Article 352 on the ground of internal disturbance has no effect in the State of Jammu and Kashmir, without the concurrence of the Government of the State.
- 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 Government has no power to suspend the Constitution of the State or the ground of failure to comply with the directions given by the Union Government under Article 365.
- Articles 356-357 relating to suspension of constitutional machinery have been extended to Jammu and Kashmir by the Amendment Order of 1964.
- The Union has no power to make a Proclamation of Financial Emergency with respect to the State of Jammu and Kashmir under Article 360.
- Directive Principles of States Policy do not apply to the State of Jammu and Kashmir.
- Jammu and Kashmir has its own Constitution made by a separate Constituent Assembly and promulgated in 1957.
- No alteration of the area or boundaries of Jammu and Kashmir can be made by Parliament without the consent of the Legislature of the State.
- It has **dual citizenship**. Only the citizens of Jammu and Kashmir can take part in the election of the State Assembly and only they can buy immovable property in Jammu and Kashmir.
- The residuary powers in respect of Jammu and Kashmir rest with the State Government and not the Union Government.

### PANCHAYATS

#### BALWANT RAI MEHTA COMMITTEE

- The Government of India appointed a committee in 1957.
  - This committee was set up to examine the work of Community Development Programme (1952), and National Extension Service (1953).
  - The committee submitted its report in 1958.
- Recommendations**
- This committee recommends three level of governance viz zila parishad, Panchayat Samiti (Block) and Gram Panchayat (village).
  - District collector should be a chairperson of Zila Parishad.
  - The members of Zila Parishad and Panchayat samiti should be elected indirectly while the members of Gram Panchayat should be elected directly.

- These recommendations were accepted by NDC in Jan 1958.
- Rajasthan was the first state to establish the institution of Panchayati Raj.
- The scheme was inaugurated by the then P.M. Jawahar Lal Nehru on October 2, 1959 in Nagaur District in Rajasthan.
- Rajasthan adopted a three tier system.
- Tamil Nadu accepted a two tier system and West Bengal a four tier system.

### ASHOK MEHTA COMMITTEE

- The Janata Government appointed a committee in 1977 on Panchayati Raj institutions under the chairmanship of Ashok Mehta.

#### Recommendations

- This committee recommends a two tier Panchayati Raj system—Zila Parishad & Mandal Panchayat.
- Nyaya Panchayat should be kept as separate body.
- Seats for SCs and STs should be reserved on the basis of their population.
- These recommendations could not be implemented.

### G.V. K. RAO COMMITTEE

- This committee was appointed by the planning commission in 1985.

#### Recommendations

- Zila Parishad should be of pivotal role in the scheme for democratic decentralisation.
- Create the post of district development commissioner.
- He should act as the chief executive officer of Zila parishad.
- Reservation for SCs, STs & women
- Recommendations could not be accepted.

### L.M. SINGHVI COMMITTEE

- Appointed by the Rajiv Gandhi Government in 1986.
- Chairman: L.M. Singhvi

### 73RD AMENDMENT ACT OF 1992

- The Act gives a constitutional status to the Panchayati Raj institutions.
- The Act has added new part IX and 11th schedule to the constitution.

- It is entitled as “The Panchayats” and consists of provisions from Articles 243 to 243 (O).
- It contains 29 functional items of the Panchayats and deals with Article 243 (G).
- The provisions of the Act can be grouped into two categories—compulsory and voluntary.
- The compulsory provisions of the Act are to be included in the State Laws creating the new Panchayati Raj System.
- The voluntary provisions may be included at the discretion of the States.

#### Main Characteristics

- This Panchayati Raj system is for only those states having population of more than 20 lakhs.
- The tenure of every Panchayat should be 5 years.
- The election of the new Panchayat should be held before the expiry of its tenure or within 6 months of its dissolution.
- Every Panchayat should have a chairperson.
- The total number of the seats in every Panchayat should be filled by direct election.
- Seats should be reserved for SCs & STs.
- 1/3rd of the seats should be reserved for women.
- The State Legislature may authorize a Panchayat to levy, collect and appropriate taxes, duties, tolls and fees.
- State Legislature may also provide grants-in-aid to Panchayat.
- All elections of Panchayats are conducted, supervised, directed and controlled by the State Election Commission.
- The State Election Commissioner is appointed by the Governor.
- He can be removed in the same manner as the Judge of the High Court.
- The Chairperson of each Panchayat is elected according to the law passed by a State.
- Seats are reserved in Panchayat for Scheduled Castes and Scheduled Tribes in proportion to their population [Article 243D].
- Out of the reserved seats, 1/3rd is reserved for women belonging to Scheduled Castes and Scheduled Tribes. 1/3rd of the total seats to be filled by direct election in every Panchayat are reserved for women.
- 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 [Article 243F].
- 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 [Article 243K].
- The Community Development Programme was launched on October 2, 1952.
- The Panchayati Raj was introduced for the first time on October 2, 1959 in Nagaur District of Rajasthan by the Prime Minister Jawaharlal Nehru.

## THREE-TIER SYSTEM

### (a) Village Panchayat

- It consists of elected representatives of the people.
- Chairman, i.e., **Sarpanch** is elected in a manner as the State Legislature may provide directly or indirectly.
- Gram Sabha comprises the residing adults of the Panchayat.

### (b) Block and Panchayat Samiti

- It is governed by the elected members of village Panchayat, which is called Panchayat.
- **Pradhan** is the head or Chairman of Panchayat Samiti.
- States with population less than 20 lakh need not constitute a Block Panchayat.

### (c) Zila Parishad

- Members of the Zila Parishad are elected from the district by direct election on the basis of adult franchise for a term of 5 years.
- Chairman of Zila Parishad is elected from amongst the members.

## MUNICIPALITIES

- Most provisions for municipalities are similar to those contained in Part IX, e.g., Structure, Reservation of Seats, Functions, Sources of Income, etc.
  - The Constitution of India provides the provision of local self-government units in urban area by inserting Part IX-A through the 73rd Amendment Act, 1992.
  - The Constitution provides for three types of Municipalities.
    - **Nagar Panchayat**
    - **Municipal Council**
    - **Municipal Corporation**
  - Ward Committees shall be constituted in those Municipalities having a population of three lakh or more.
  - Seats shall be reserved for Scheduled Castes and Scheduled Tribes.
  - One-third of the seats shall be reserved for women.
  - The Constitution provides for a State Finance Commission.
  - Under **Article 243ZD, a District Planning Committee** shall be constituted to consolidate the plans prepared by the Panchayats and Municipalities in the district.
  - Under **Article 243ZE, a Metropolitan Planning Committee** shall be constituted.
  - 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 lakh or more, Ward Committees are constituted.

## 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.

- Article 124 states the establishment and constitution of Supreme Court.
- At present, the Supreme Court consists of 31 Judges (one CJI and 30 Judges).

## ■ QUALIFICATIONS

Under Article 124 (3), a person to be appointed as a Judge of the Supreme Court should have the following qualifications:

- He should be a citizen of India. He should have been a Judge of a High Court (or High Courts in succession) for ten years. Or
- He should have been an advocate of a High Court (or High Courts in succession) for ten years. Or
- He should be a distinguished jurist in the opinion of the President.

## ■ OATH OR AFFIRMATION

Administered by the President or some person appointed by him for this purpose.

## ■ TENURE OF JUDGES

The Constitution makes the following provisions:

- Holds office until he attains the age of 65 years.
- Resign his office by writing to the President.
- Removed from his office by the President on the recommendation of the Parliament.

## ■ REMOVAL OF JUDGES OF IMPEACHMENT

Under Article 124 (4), a Judge of the Supreme Court shall not be removed from his office except by an order of the President passed after an address by each House of the Parliament by special majority.

Judges can be removed only on the grounds of proved misbehaviour or incapacity.

- No Judge of the Supreme Court has been impeached so far.

## ■ SALARIES AND ALLOWANCES

Under Article 125, the salaries, allowances, privileges, leave and pension of the Judges of the Supreme Court are determined from time-to-time by the Parliament.

## ■ ACTING CHIEF JUSTICE

Under Article 126, The President can appoint a Judge of the Supreme Court as an acting CJI, when:

- office of CJI is vacant; or
- the CJI is temporarily absent; or
- the CJI is unable to perform the duties of his office.

## ■ AD HOC JUDGE

Under Article 127, if at any time there should not be a quorum of the Judges of the Supreme Court to hold or continue any session. CJI can appoint a Judge of the High Court as an Ad hoc Judge of the Supreme Court for a temporary period.

## ■ CONSTITUTIONAL BENCH

A bench consisting of at least 5 judges constituted by the CJI to hear a case involving a substantial question of law.

## ■ ORIGINAL JURISDICTION (ARTICLE 131)

The Supreme Court decides the dispute between:

- the Centre and one or more States;
- the Centre and any State or States on one side and one or more States on the other; or
- between two or more States.

## ■ APPELLATE JURISDICTION (ARTICLE 132)

- It enjoys a wide appellate jurisdiction, which can be classified under four heads:
  - Appeals in constitutional matters.
  - Appeals in civil matters (Article 133).
  - Appeals in criminal matters (Article 134).
  - Appeals by special leave (Article 136).

## ■ ADVISORY JURISDICTION

- The Constitution (Article 143) authorises the President to seek the opinion of the Supreme Court. It is duly bound to give its opinion which is not binding on President.

## ■ POWER OF JUDICIAL REVIEW (ARTICLE 137)

- Judicial review is the power of the Supreme Court to examine the **constitutionality** of **legislative enactments** and executive orders of both Central and State Governments.

- Article 141:** Law declared by Supreme Court to be binding on all courts, within the territory of India.
- Article 144:** All authorities, civil and judicial in the territory of India to act in aid of the Supreme Court.
- It was during **Chief Justice P.N. Bhagwati's tenure** the concept of PIL was started in India.
- The jurisdiction of the Supreme Court to entertain an application under Article 32 for the issue of writs for the enforcement of Fundamental Rights is treated as an 'original' jurisdiction of the Supreme Court though called writ jurisdiction.
- The Supreme Court is the highest court of appeal from all courts in the territory of India.
- Supreme Court is the highest authority for interpretation of the Constitution.
- Supreme Court may hear appeals by granting special leave against any kind of judgment or order made by any court of tribunal (except a military tribunal).

#### Chief Justices of India

1.	Hiralal J. Kania	26 January 1950–6 November 1951
2.	Patanjali Shastri	7 November 1951–3 January 1954
3.	Mehr Chand Mahajan	4 January 1954–22 December 1954
4.	B.K. Mukherjee	23 December 1954–31 January 1956
5.	S.R. Das	1 February 1956–30 September 1959
6.	B.P. Sinha	1 October 1959–31 January 1964
7.	Prahlad Balacharya Gajendragadkar	1 February 1964–15 March 1966
8.	Amal Kumar Sarkar	16 March 1966–29 June 1966
9.	Koka Subba Rao	30 June 1966–11 April 1967

10.	Kailash Nath Wanchoo	12 April 1967–24 February 1968
11.	Mohammad Hidayatullah	25 February 1968–16 December 1970
12.	Jayantilal Chhotalal Shah	17 December 1970–21 January 1971
13.	Sarv Mittra Sikri	22 January 1971–25 April 1973
14.	Ajit Nath Ray	26 April 1973–27 January 1977
15.	Mirza Hameedullah Beg	28 January 1977–21 February 1978
16.	Yeshwant Vishnu Chandrachud	22 February 1978–11 July 1985
17.	Prafullachandra Natwarlal Bhagwati	12 July 1985–20 December 1986
18.	Raghunandan Swarup Pathak	21 December 1986–18 June 1989
19.	Engalaguppe Seetharamiah Venkataramiah	19 June 1989–17 December 1989
20.	Sabyasachi Mukherjee	18 December 1989–25 September 1990
21.	Ranganath Mishra	26 September 1990–24 November 1991
22.	Kamal Narain Singh	25 November 1991–12 December 1991
23.	Madhukar Hiralal Kania	13 December 1991–17 November 1992
24.	Lalit Mohan Sharma	18 November 1992–11 February 1993
25.	Manepalli Narayana Rao Venkatachaliah	12 February 1993–24 October 1994
26.	Aziz Mushabber Ahmadi	25 October 1994–24 March 1997

27.	Jagdish Sharan Verma	25 March 1997–17 January 1998
28.	Madan Mohan Punchhi	18 January 1998–9 October 1998
29.	Adarsh Sein Anand	10 October 1998–31 October 2001
30.	Sam Piroj Bharucha	1 November 2001–5 May 2002
31.	Bhupinder Nath Kirpal	6 May 2002–7 November 2002
32.	Gopal Ballav Pattanaik	8 November 2002–19 December 2002
33.	V. N. Khare	19 December 2002–1 May 2004
34.	S. Rajendra Babu	2 May 2004–1 June 2004
35.	Ramesh Chandra Lahoti	1 June 2004–31 October 2005
36.	Yogesh Kumar Sabharwal	1 November 2005–14 January 2007
37.	K. G. Balakrishnan	14 January 2007–12 May 2010
38.	S. H. Kapadia	12 May 2010–28 September 2012
39.	Altamas Kabir	29 September 2012–18 July 2013
40.	P. Sathasivam	19 July 2013–26 April 2014
41.	Rajendra Mal Lodha	27 April 2014–27 September 2014
42.	H. L. Dattu	28 September 2014–2 December 2015
43.	T. S. Thakur	3 December 2015–3 January 2017
44.	J. S. Khehar	4 January 2017–
45.	Dipak Misra	28 August 2017 – 2 October 2018
46.	Ranjan Gogoi	3 October 2018 – incumbent

## THE HIGH COURT

- Accordingly, the President determines the strength of a High Court from time-to-time depending upon its workload.
- The territorial jurisdiction of a High Court is co-terminus with the territory of a State.

### APPOINTMENT OF JUDGES

- Under **Article 217**, The Judges of the High Court are appointed by the President.
- The Chief Justice of the High Court is appointed by the President after consultation with the Chief Justice of Supreme Court and Governor of the concerned state.

### QUALIFICATION OF JUDGES

- He should be a citizen of India.
- He should have held a judicial office in the territory of India for ten years or
- He should have been an advocate of a High Court (or High Courts in succession) for ten years.

### OATH (ARTICLE 219)

Administered by Governor or person appointed by him for this purpose.

### TENURE (ARTICLE 217)

- He holds office until he attains the **age of 65 years**.

### REMOVAL

- He can resign from his office by writing to the President.
- He can be removed from his office on the recommendation of the Parliament (same as Judge of Supreme Court).
- He vacates his office when he is appointed as a Judge of the Supreme Court or when he is transferred to another High Court.

### SALARIES AND ALLOWANCES

- Determined by Parliament from time-to-time.

### JURISDICTION AND POWER OF HIGH COURT

- The Supreme Court can issue writ jurisdiction, only where a Fundamental Right

has been infringed. High Court can issue these writs under Article 226 not only in such cases but also where an ordinary legal right has been infringed.

- 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 qualifications for being a Judge of the High Court are:
  - Should 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.

#### Jurisdiction and Seats of High Court

Name	Year of Estab.	Territorial Jurisdiction	Seat
Madhya Pradesh	1956	Madhya Pradesh	Jabalpur (Benches at Gwalior and Indore)
Bombay	1862	Maharashtra, Dadra and Nagar Haveli, Goa, Daman and Diu	Mumbai (Bench at Nagpur, Panji and Aurangabad)
Calcutta	1862	West Bengal and Andaman and Nicobar Islands	Kolkata (circuit bench) at Port Blair
Madras	1862	Tamil Nadu and Puducherry	Chennai
Allahabad	1866	Uttar Pradesh	Allahabad (Bench at Lucknow)
Karnataka	1884	Karnataka	Bengaluru
Patna	1916	Bihar	Patna
Orissa	1948	Odisha	Cuttack
Guwahati	1948	Assam, Nagaland, Mizoram and Arunachal Pradesh	Guwahati (Benches at Kohima, Aizawl and Itanagar)
Rajasthan	1949	Rajasthan	Jodhpur (Bench at Jaipur)
Andhra Pradesh	1954	Andhra Pradesh and Telangana	Hyderabad
Kerala	1958	Kerala and Lakshadweep	Ernakulam
Jammu and Kashmir	1928	Jammu and Kashmir	Srinagar and Jammu
Gujarat	1960	Gujarat	Ahmedabad
Delhi	1966	Delhi	Delhi
Punjab and Haryana	1875	Punjab, Haryana and Chandigarh	Chandigarh
Himachal Pradesh	1971	Himachal Pradesh	Shimla
Sikkim	1975	Sikkim	Gangtok

Uttarakhand	2000	Uttarakhand	Nainital
Jharkhand	2000	Jharkhand	Ranchi
Chhattisgarh	2000	Chhattisgarh	Bilaspur
Manipur	2013	Manipur	Imphal
Meghalaya	2013	Meghalaya	Shillong
Tripura	2013	Tripura	Agartala

### APPOINTMENT OF DISTRICT JUDGES (ARTICLE 233)

The appointment, posting and promotion of district judges in a State are made by Governor of the State in consultation with the High Court.

A person to be appointed as district judge should have the following qualifications:

- He should not already be in the service of the Central or the State Government.
- He should have been an advocate or a pleader for seven years.
- He should be recommended by the High Court.

### APPOINTMENT OF OTHER JUDGES

Appointments of person (other than district judges) to the judicial services of a State are made by the Governor of the State after consultation with the State Public Service Commission and the High Court.

### LOK ADALAT

- This first Lok Adalat was held in Chennai in 1986.
- The Lok Adalat is presided over by a sitting or retired judicial officer as Chairman, with two of other member, usually a lawyer and a social worker.
- Lok Adalats have been given the status of a Civil Court and every award made by the Lok Adalat is final and binding on all parties and no appeal lies to any court against its award.

### LOKPAL

- The Administrative Reforms Commission (ARC) of India (1966-1970) recommended the setting up of two special authorities designated as Lokpal and Lokayukta for the redressal of citizens' grievances.
- The Lokpal deals with the complaints against ministers and secretaries at central and state level.

- According to the ARC, the Lokpal would be appointed by the president after consultation with the Chief Justice of India, the speaker of Lok Sabha and the chairman of Rajya Sabha.
- Ist time Lokpal bill was introduced in Parliament in May 1968, by the Congress Government headed by Indira Gandhi.

### LOKAYUKTAS

- According to ARC Report (1966-70) the Lokayukta (one at the centre and one in each state) would deal with the complaints against other specified higher officials which are not included in Lokpal.
- Lokayukta was established first in Maharashtra in 1971. Although Odisha had passed the Act in this regard in 1970, it came into force only in 1983.

#### Establishment of Lokayukta in states:

Odisha (1974), Maharashtra (1971), Rajasthan (1973), Bihar (1974), Uttar Pradesh (1975), Madhya Pradesh (1981), Himachal Pradesh (1983), Karnataka (1985), Gujarat (1986), Punjab (1995), Kerala (1999), Jharkhand (2001), Chattisgarh (2002), Haryana (2002), Uttarakhand (2002), Goa (2011).

### INTER-STATE COUNCIL

- Inter-State Council was constituted in April, 1990 under Article 263.
- Inter-State Council consists of Prime Minister, 6 Union Cabinet Ministers, the Chief Ministers of all the States and administrators of all UTs.
- Inter-State Council is chaired by the Prime Minister and it meets thrice a year.

### FINANCE COMMISSION

- The Constitution provides for the establishment of a Finance Commission

- (Articles 272, 273, 275, and 280) by the President.
- 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.
  - 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.
  - The main functions or duties of the Finance Commission are:
    - To recommend to the President the basis for distribution of the net proceeds of taxes between the Centre and States.

- To recommend the principles which should govern the grants-in-aid to be given to States out of the Consolidated Fund of India.
- To tender advice to the President on any other matter referred to the Commission in the interest of sound finance.
- To suggest amounts to be paid to the States of Assam, Bihar, Odisha and West Bengal in lieu of the assignment of system of export duty on Jute products.
- The Commission submits its recommendations to the President which are generally accepted by the Central Government. The recommendations of the Commission are applicable for a period of five years.

#### Finance Commissions

Finance Commission	Year of Establishment	Name of Chairman	Period of implementation of Report
First	1951	K. C. Neogi	1952–57
Second	1956	K. Santhanam	1957–62
Third	1960	A. K. Chanda	1962–66
Fourth	1964	P. V. Rajamannar	1966–69
Fifth	1968	Mahavir Tyagi	1969–74
Sixth	1972	K. Brahmananda Reddy	1974–79
Seventh	1977	J. M. Shelat	1979–84
Eighth	1983	Y. B. Chavan	1984–89
Ninth	1987	N. K. P. Salve	1989–95
Tenth	1992	K. C. Pant	1995–2000
Eleventh	1998	A. M. Khusro	2000–2005
Twelfth	2002	C. Rangarajan	2005–2010
Thirteenth	2007	Dr. Vijay L. Kelkar	2010–2015
Fourteenth	2013	Dr. Y.V. Reddy	2015–2020

### NATIONAL DEVELOPMENT COUNCIL (NDC)

- The National Development Council was formed in 1952, to associate the States in the formulation of the Plans.
- All members of the Union Cabinet, Chief Ministers of States, the Administrators of the Union Territories and members of the Planning Commission are members of the NDC.

- It is extra-constitutional and extra-legal body.

### NATIONAL INTEGRATION COUNCIL

- National Integration Council was set-up in 1986.

### INTER-STATE RELATIONS

- Under Article 262 Parliament has constituted the Inter-State Water Disputes Tribunal for adjudication of disputes between States

for the waters of any inter-State river or river valley.

- Inter-State river water disputes are excluded from the jurisdiction of all Courts including the Supreme Court.
- An inter-State Council has been constituted for co-coordinating in inter-State disputes.
- Six Zonal Councils have been established to discuss and advise on matters of Common interest.
- Each Zonal Council consists of the Chief Minister and two other Ministers of each of the States in the Zone and the Administrator in the case of a Union Territory.
- The Union Home Minister has been nominated to be the common Chairman of all the Zonal Councils.

### A. LEGISLATIVE RELATIONS

- The Constitution divides the subjects into the Union List (**99 subjects**), the State List (**66 subjects**) and the Concurrent List (**47 subjects**). Enumerated in the Seventh Schedule under Article 246.
- Parliament has exclusive power to legislate on subjects mentioned in the Union List.
- State Legislatures have exclusive power to legislate on subjects mentioned in the State List.
- Both Parliament and State Legislatures can legislate on subjects mentioned in the Concurrent List.
- **Residual Power** (i.e. subjects not included in any of the list) rest with Union Government.

### B. ADMINISTRATIVE RELATIONS

- All disputes between States regarding the use, distribution or control of water are decided by the Centre (Article 262).

### C. FINANCIAL RELATIONS

- The Union Government has the power to borrow from within India or outside, subject to the limits laid down by the Parliament: the borrowing power of the States is subject to several limitations and cannot borrow from outside India.

## EMERGENCY PROVISIONS

- President can make proclamation of emergency under Article 352 in case of war, external aggression or armed rebellion or threat thereof 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 the Houses of the 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.
- During an emergency, the 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.
- Effects of emergency on Fundamental Rights:
  - Article 358 provides that the rights provided by Article 19, would be non-existent against the State during emergency.
  - Under Article 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 even during emergency.
- The first proclamation of emergency under Article 352 was made by the President on October 26, 1962 in view of Chinese aggression in the NEFA.
- 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.
- Under a proclamation of emergency under Article 352, Parliament can legislate in respect of State subjects only by itself; but under a proclamation under Article 356 of the other kind, it can delegate its power to

- Legislature for the State, to the President or any other authority specified by him.
- Proclamation of emergency for failure of constitutional machinery can be extended by Parliament up to three years.

## PUBLIC SERVICE COMMISSIONS

- 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.
- 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 State in the case of a State Commission.
- Half of the members of Commission should be persons who have held office under the Government of India or of a State for at least 10 years (Article 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.
- Even in the case of a State Commission, only the President can remove a member, while governor has only the power to pass in 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).
- 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.

## FUNCTIONS OF PUBLIC SERVICE COMMISSION

- To conduct examination for appointments to the services of the Union and State.
  - 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 [Article 320].
  - To exercise such additional functions as may be provided for by an act of Parliament or of the Legislature of a State.

## ELECTION

- 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.
- The exclusive forum for adjudicating disputes relating to the election of the President and Vice-president is the Supreme Court (Article 71).

## ELECTION COMMISSION

- The Election Commission was established in accordance with the Constitution on 25 January 1950.
- The Election Commission prepares, maintains and periodically updates the electoral roll, which shows who is entitled to vote, supervises the nominations of candidates,

registers political parties, and monitors the election campaign. It also organises the polling booths, counting of votes, and declaration of results, to ensure the orderly and fair manner of elections.

- 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 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.

## DELIMITATION COMMISSION OF INDIA

- The main task of the Commission is to redraw the boundaries of the various Assembly and Lok Sabha Constituencies based on a recent census.
- The representation from each State is not changed during this exercise. However, the number of SC and ST seats in a State is changed in accordance with the census.
- The Commission in India is a high-power body whose orders have the force of law and cannot be called in question before any court.
- In India, such Delimitation Commissions have been constituted 4 times—in 1952, 1963, 1973 and in 2002.

- The recent Delimitation Commission was set up on 12 July 2002 with Justice Kuldip Singh as its Chairperson.
- The Constitution of India was specifically amended in 2002 (84th Amendment Act, 2001, which amended the provisions of Article 82) not to have delimitation of constituencies till the first census after 2026.
- Election Commissioners of all the States and Union Territories, along with the Chief Election Commissioner (CEC) of India are the members of the Delimitation Commission.

## THE OFFICIAL LANGUAGES

- Part XVII** of the Constitution deals with the official language in **Articles 343 to 351**.
- Hindi written in **Devanagari Script** is to be the official language of the Union.
- Originally** there were **fourteen** languages in Eighth Schedule, but **eight** were **added** during amendments.
- The first Official Language Commission was appointed in 1955 under Shri B.G. Kher as Chairman.

### LANGUAGE OF THE STATE/LINK LANGUAGE:

- 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.

### LANGUAGE OF THE SC AND HCL 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 under 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 only privileges gained by the languages included in the Eighth Schedule are:
  - To have a member in the Official Language Commission.
  - To be considered for contribution towards the development of Hindi language.

## ADMINISTRATIVE TRIBUNALS

- The 42nd Amendment Act of 1976 added a new Part XIVA to the Constitution. This Part is entitled as 'Tribunals' and consist of only two Articles. Article 323A dealing with administrative tribunals and Article 323B dealing with tribunals for other matters.
- The Central Administrative Tribunal (CAT).

## ANTI-DEFLECTION LAW

- The 52nd Amendment Act of 1985 provided for the disqualification of the Members of Parliament and the State Legislatures on the ground of defection from one Political Party to another.
- Disqualification on ground of defection not to apply in case of split.
- A member of a House belonging to any political party becomes disqualified for being a member of the House,
  - (a) If he voluntarily gives up his membership of such political party; or
  - (b) If he votes or abstains from voting in such House contrary to any direction issued by his political party without obtaining prior permission of such party and such act has not been condoned by the party within 15 days.
- An **Independent member** of a House becomes disqualified to remain a member of the House, if he joins any political party after such election.
- A **Nominated member** of a House become disqualified for being a member of the House, if he joins any Political Party after the expiry of six months from the date, on which he takes his seat in the House.
- Member of Parliament or a State Legislature can be disqualified for defying a **whip** only

on two counts, when voting against the government or not agreeing to policies and programmes of the government.

## POLITICAL PARTIES

- To be **recognised as a National Party**, a party needs to secure at least 6% of the valid votes polled in any four or more states in a general election to the Lok Sabha or State Assembly. In addition to it, it has to win at least four seats in the Lok Sabha from any State or States as well.
- For getting **recognition as a State Party**, a political party has to secure at least 6% of the valid votes in the State during a general election, either to that of the Lok Sabha or the State Assembly. Apart from this, the party should also win minimum two seats in the Assembly of the State concerned.

## NCRWC

- The National Commission to Review the Working of the Constitution (NCRWC) was set up by a resolution of the Government of India in 2000.
- The 11-Member Commission was headed by M.N. Venkatachaliah. It submitted its report in 2002.

## RIGHT OF INFORMATION

- Right to information became an Act in 2005. The aim is to make the governments more transparent in its working. It came into operation on 12th October, 2005.
- The Chief Information Commissioner and other Information Commissioners shall be **appointed by the President** on the **recommendation of a committee** consisting of the Prime Minister. The leader of the opposition in Lok Sabha and a Union Cabinet Minister are to be nominated by the PM.

## NATIONAL SYMBOLS

### NATIONAL FLAG

- 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 new-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.

- In an important judgement in January, 2004 the Supreme Court (under the chairmanship of the Chief Justice B. N. Khare) pronounced that unfurling (hoisting) of National Flag is a fundamental right under Article 19 (1) (A).

## STATE EMBLEM

- The State Emblem is an adaptation from the Sarnath Lion Capital of Ashoka.
- In the State Emblem, adopted by the Government of India on 26 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 **Satyameva Jayate** from **Mundakka Upanishad**, meaning 'Truth Alone' Triumphs, are inscribed below the abacus in **Devanagari** script.

## 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, 1911 at the Kolkata Session of the Indian National Congress.
- 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.

## NATIONAL SONG

- The song '**Vande Mataram**' was composed in Sanskrit by Bankim Chandra Chatterji. It has an equal status with **Jana-gana-mana**. The first political occasion was when it was sung at the 1896 session of Indian National Congress.
- The song was published in the novel 'Anandmath', authored by Bankim Chandra Chatterji and was adopted as the National Song on 26 January, 1950.

## 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.

**National Animal:** The magnificent tiger (*Panthera tigris*).

**National Bird:** The Indian peacock (*Pavo cristatus*).

**National Flower:** Lotus (*Nelumbo Nucifera*).

**National Tree:** The Banyan Tree (*Ficus benghalensis*).

**National Fruit:** Mango (*Mangifera indica*).

**National Aquatic Animal:** The mammal Ganges River Dolphin (*Platanista gangetica*).

## CONSTITUTIONAL AMENDMENTS

Under **Article 368** of the Constitution, Parliament has the power of amending the Constitution. There are three methods:

- **Method of Simple Majority:** The Constitution can be amended by simple majority in matters relating to citizenship, abolishing or creating second chambers in the states creation of states or alteration of boundaries of existing states, etc.
- **In the Second Method**, apart from passing through a special majority in Parliament, it should also be passed by half the state legislatures.

## SOME IMPORTANT AMENDMENTS OF THE CONSTITUTION

- **1st Constitutional Amendment Act, 1951:** This amendment added Article, 15 (4) and Article, 19 (6). Ninth schedule to the Constitution was also added by it.
- **7th Constitutional Amendment Act, 1956:** The categorisation of States into Part A, Part B and Part C ceased henceforth. Part C states were redesignated as Union Territories.
- **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.
- **13th Constitutional Amendment Act, 1962:** Insertion of Art. 371 A to make special provisions for the administration of the State of Nagaland.
- **14th Constitutional Amendment Act, 1962:** Pondicherry, Karaikal, Mahe and Yanam, the former French territories were specified in the Constitution as the Union Territory of Pondicherry (now Puducherry).
- **15th Constitutional Amendment Act, 1963:** It raised the age of retirement of a High Court Judge from 60 to 62.
- **16th Constitutional Amendment Act, 1963:** Charges were effected in Art. 19 to enable the Parliament to make laws providing reasonable restrictions on the freedom of expression in the larger interests of sovereignty and integrity of India.
- **19th Constitutional Amendment Act, 1966:** Art. 324 was amended to clarify the duties of the Election Commission.
- **21st Constitutional Amendment Act, 1967:** Sindhi language was included as 15th regional language in the Eighth Schedule.
- **24th Constitutional Amendment Act, 1971:** It affirmed the Parliament's power to amend any part of the Constitution, including Fundamental Rights by amending Arts. 368 and 13.
- **25th Constitutional Amendment Act, 1971 (came into force on 20.04.1972):** 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.
- **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 UTs Lok Sabha from 25 to 20.
- **36th Constitutional Amendment Act, 1975:** Made Sikkim a full-fledged State of the Union of India.
- **42nd Constitutional Amendment Act, 1976 (Mini Constitution):** It incorporated the words '**Socialist**', '**Secular**' and '**Integrity**' in the Preamble. Fundamental Duties were added in Part IVA. 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 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.**
- **44th Constitutional Amendment Act, 1978 (w.e.f. June-September 1979):** The amendment was brought by the Janata Party Government. Right to property was taken away from the list of Fundamental Rights and placed in a new Art. 300A as an ordinary legal right. Constitutionality of the Proclamation of Emergency by the President could be questioned in a court on the ground of malafide. In Article 352 regarding National

Emergency, the words ‘internal disturbance’ were substituted by the words ‘armed rebellion’. It authorised the President to refer back the advice to the Council of Ministers for reconsideration, but made it binding for the President to act on the reconsidered advice. Constitutional protection on publication of proceedings of Parliament and State Legislatures was provided.

- **52nd Constitutional Amendment Act, 1985:** It added the Tenth Schedule to the Constitution.
- **55th Constitutional Amendment Act, 1986 (w.e.f. February 20, 1987):** The formation of Arunachal Pradesh took place with special powers given to the Governor.
- **56th Constitutional Amendment Act, 1987:** Goa was made a full-fledged State with a State Assembly but Daman and Diu stayed as UT.
- **58th Constitutional Amendment Act, 1987:** An authoritative text of the Constitution in Hindi was provided to the People of India by the President.
- **61st 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 nomination in case of their inadequate representation was also extended up to 2000 A.D.
- **65th 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 provided for the inclusion of 55 new land reform acts passed by the States into the Ninth Schedule.
- **69th Constitutional Amendment Act, 1991:** Arts. 239 AA and 239 AB were inserted in the Constitution to provide 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.
- **73rd Constitutional Amendment Act, 1992:** The institution of Panchayati Raj received Constitutional guarantee, status and legitimacy. The XI Schedule was added to deal with it. It also inserted part IX, containing Arts. 243, 243A.
- **74th Constitutional Amendment Act, 1992:** Provided for constitutional sanctity to Municipalities by inserting Part IX-A, containing Arts. 243P to 243ZG and the XII Schedule which deals with the items concerning Municipalities.
- **77th Constitutional Amendment Act, 1995:** By this amendment a new clause 4A 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.
- **80th Constitutional Amendment Act, 2000:** Amended Art. 269 and substituted a new Article for Art. 270 and abolished Art. 272A of the Constitution.
- **81st Constitutional Amendment Act, 2000:** Amended Art. 16 (1) of the Constitution and added a new clause (4B) after clause (4A) to Art. 16 (1) of the Constitution. The new clause (4B) ends the 50% ceiling on reservation for Scheduled Caste and Scheduled Tribes and other Backward Classes in backlog vacancies.
- **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 Castes and Scheduled Tribes.
- **85th Constitutional Amendment Act, 2001:** It amended clause (4A) of Art. 16

and substituted the words “in matters of promotion, with consequential seniority, to any class” for the words “in matter of promotion to any class.”

The amendment provided for ‘consequential seniority’ to the SCs/STs for promotion in government service.

- **86th Constitutional Amendment Act, 2002:** Added a new Art. 21A after Art. 21 which makes the right of education for children of the age of 6 to 14 years a Fundamental Right. Substitutes Article 45 to direct the State to endeavour to provide early childhood care and education for all children until they complete the age of six years. Added a new Fundamental Duty to Part IV (Art. 51A) of the Constitution.
- **87th Constitutional Amendment Act, 2003:** Provided that the allocation of seats in the Lok Sabha and division of each State into territorial Constituencies will be done on the basis of population as ascertained by the ‘2001 census’ and not by ‘1991’ census.
- **88th Constitutional Amendment Act, 2003:** This amendment inserted new Article 268A after Article 268 which empowered the Union of India to levy ‘service tax’.
- **89th Constitutional Amendment Act, 2003:** Provided for the establishment of a separate National Commission for Scheduled Castes and Scheduled Tribes.
- **90th Constitutional Amendment Act, 2003:** It stated that the representation of Scheduled Tribes and non-Scheduled Tribes in the Constitution of the Bodoland Territorial Area District shall be maintained. It meant that the representation of the above categories shall remain the same as existed prior to the creation of Bodoland Territorial Area District.
- **91st Constitutional Amendment Act, 2003:** According to new clause (1A) the total number of Ministers, including the Prime Minister in the Central Council of Ministers or Chief Minister in the State Legislative Assemblies shall not exceed 15 per cent of the total members of the Lok Sabha in the Centre of Vidhan Sabha in the states. The new clause (1B) of Article 75 provides that a member of either House of Parliament belonging to any political party who is disqualified for being member of that House on the ground of defection shall also be disqualified to be appointed as a minister under clause (1) of Arts. 75 and 164 until he is again elected. However, the number of Ministers, including the Chief Minister in a State shall not be less than 12 (in smaller States like Sikkim, Mizoram and Goa).
- **92nd Constitutional Amendment Act, 2003:** It amended Eighth Schedule of the Constitution and has inserted four new languages in it, namely Bodo, Dogri, Maithili and Santhali. After this amendment the total number of constitutionally recognised official languages has become 22.
- **93rd Constitutional Amendment Act, 2005:** Provided reservation in admissions in private unaided educational institutions for students belonging to scheduled castes/ tribes and other backward classes.
- **94th Constitutional Amendment Act, 2006:** Excluded Bihar from the provision to clause (1) of Art. 164. It extends the provisions of clause (1) of Art. 164 to the newly formed States of Chhattisgarh and Jharkhand.
- **95th Constitutional Amendment Act, 2009:** Through this amendment in Art. 334 the words ‘sixty years’ have been substituted by ‘seventy years’.
- **96th Constitutional Amendment Act, 2011:** Substituted ‘Odia’ for ‘Oriya’.
- **98th Constitutional Amendment Act, 2013:** To empower the Governor of Karnataka to take steps to develop the Hyderabad Karnataka Region.
- **100th Constitutional Amendment Act, 2015:** Exchange of certain enclave territories with Bangladesh and conferment of citizenship rights to residents of enclave consequent to signing of Land Boundary Agreement Treaty between India and Bangladesh.
- **101st Constitutional Amendment Act, 2016:** The One Hundred and twenty second Amendment Bill of the constitution of India, officially known as the one hundred and first amendment Act 2016, introduced

National Goods and Services Tax in India from 1 July, 2017.

- Addition of articles: 246 A, 269 A, 279 A
- Deletion of article-268A.
- Amendment of articles and schedule: 248, 249, 250, 268, 269, 270, 271, 286, 366, 368 and VI, VII,
- **123rd Constitutional Amendment Act, 2017:** It gives constitutional status to National Commission for Backward classes, inserts new articles 338B and 342 A which deal with composition of NCBC etc. and the power of president to notify the list of socially and educationally backward classes of State and Union Territory respectively.

## 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.

**Adjournment Motion**, if Speaker given 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.

**Affirmation** is a solemn declaration without oath.

**Anglo-Indian** is of a British birth but living or having lived long in India.

**Appropriation Bill** is the act of devoting or reserving for special or distinct purpose or of destining to a particular end; anything set aside especially money for a specific use.

**Backward Classes**, the list of OBCs are prepared by the Central Government and are revised after the expiry of every 10 years.

**Beggar**, 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.

**Breach of privilege**, disregard of any of the privileges, rights and immunities either 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.

**Bulletin**, is an official notice of a public transaction or matter of public importance.

**Censure Motion** is motion moved against the Government censuring its policy in some direction or an individual Minister or ministers of the Government.

**Chief whip** is the Chief of the whips of different political parties in Parliament (generally the Minister of Parliamentary Affairs).

**Closure**, is the Parliamentary Procedure by which debate is closed and the measure under discussion brought up for an immediate vote.

**Coalition**, usually takes place in multi-party system in which no single party is able to command support of a working majority.

**Concurrent List**, is 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.

**Constituent Assembly** is a legislative body charged with task of framing or revising a Constitution, set up for India after it became independent in 1947 for the purpose of framing its Constitution.

**Contempt of court** is a disobedience to or disregard of the rules, orders, process, or dignity of a court, which has power to punish for such offence by committal.

**Delegated Legislation**, the Parliament gives the Executive the power to make rules and regulations regarding an act of the Parliament. Such rules are called Delegated Legislation.

**Doctrine of severability** is a rule of interpretation; it means that where some particular provision of statute offends against a constitutional limitation, but that provision is severable from the rest of the statute, only the offending provision will 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.

**Electoral College** is an intermediary body chosen by electors to choose the representatives in an indirect election.

**Electoral Roll:** It is commonly known as voter's list. It gives the names of all those people, who are eligible to vote.

**Equal protection**, all individuals and classes will be equally subjected to the ordinary law administered by the law courts.

**Expulsion** is the unseating of members of offences committed against the House or for grave misdemeanours.

**Gazette**, is the official newspaper of the government.

**Hung Parliament** is a Parliament wherein no party has won a working majority.

**Judicial review** is the power of the court to review statutes or administrative acts and determine their constitutionality. It is the examination of federal and State legislature statutes and the acts of executive officials by the courts to determine their validity according to written Constitutions.

**Legislature** is the body of persons in a State authorised to make, alter and repeal law. It may consist of one or two Houses with similar or different powers.

**Locus standi** means a place for standing, right to be heard.

**Martial law** is arbitrary in its decisions and is not built on any settled principles.

**Minority** is racial, religious or political groups smaller than and differing from larger, controlling group of which it is a party.

**Motion**, is a proposal made in the House of a legislature to elicit its decision on a subject.

**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".

**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.

**Proportional representation** is a method of representation designed to secure the election of candidates in proportion to the numerical strength of each section of political opinion thus accurately reflecting the political feeling of the country in Parliament.

**Question hour** is the time fixed for asking and answering oral questions in a sitting in a legislature; it is fixed under the rules of the House or standing orders.

**Quorum** is a minimum number required to be present at an assembly before it can validly proceed to transact business.

**Res judicata** is final judgement already decided

between the same parties or their privies on the same questions by a legally constituted court having jurisdiction is conclusive between the parties, and the issue cannot be raised again.

**Rule of law** is absolute supremely or predominance of regular law as opposed to the influence of arbitrary power's equality before the law or the equal subjection of all classes to the ordinary law court; constitution is the result of the ordinary law of the land.

**Shadow cabinet** is a body of opposition leaders meeting from time to time and ready to take office.

**State** comprises people, territory, government through which its policies are implemented and sovereignty having authority to make final legal decisions and having physical power to enforce them.

**Subordinate legislation** is a making of statutory instruments or orders by a body subordinate to the legislature in exercise of the power within specific limits conferred by the legislature, also covers statutory instruments themselves.

**Untouchability** is a social disability historically imposed on certain classes of people by reason of their birth in certain castes.

**Vote on account** is estimate of an advance payment to enable government departments to carry on their work from beginning of financial year till the passing of appropriation Act.

**Vote of Credit:** The Lok Sabha can grant vote of credit of meet expenditure whose amount or details cannot be precisely stated on account of magnitude or the indefinite character of service.

**Walk out** is a strike, an informal or unauthorised strike, an action of leaving a meeting or organisation as an expression of disapproval; continued absence from the meetings of an organisation as an expression of disapproval.

**Zero hour** is usually noisy interregnum between the Question Hour and the beginning of the rest of day's business in a legislature; members raise often without notice various matters during this period.





## INDIAN ECONOMY

## CHARACTERISTICS OF INDIAN ECONOMY

Main characteristics of Indian economy are:

- i. **Agrarian Economy:** In an Agrarian economy, agriculture dominance prevails in both the Gross National Product (GNP) and employment.
- ii. **Mixed Economy:** It is an economy, where both public and private sector co-exist.
- iii. **Developing Economy:** Following features show that Indian economy is a developing economy:
  - (a) Low per capita income.
  - (b) Occupational pattern is primary producing.
  - (c) Heavy population pressure.
  - (d) Prevalence of chronic unemployment and underemployment.
  - (e) Steadily improving rate of capital formation.
  - (f) Low capital per head.
  - (g) Unequal distribution of wealth/assets.

### BROAD SECTORS OF INDIAN ECONOMY

- **Primary Sector:** Agriculture, forestry, fishing.
- **Secondary Sector:** Mining, manufacturing, electricity, gas and water supply, construction.
- **Tertiary Sector:** (also called service sector) Business, transport, telecommunication, banking, insurance, real estate, community and personnel services.

### IMPORTANT FACTS RELATED 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 contribution of public sector in the gross production is less than 20%.
  - 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.

## AGRICULTURE AND LAND DEVELOPMENT

- Agriculture is the mainstay of the Indian Economy.

### IMPORTANCE OF AGRICULTURE

- **Contribution to GDP(About one-fifth)**
- **Contribution to Employment:** Agriculture provides livelihood to more than half of the population (about 60 percent).
- **Contribution to Trade**
- It is also an important source of raw material for a vast segment of industry.

### AGRICULTURE AND FIVE YEAR PLANS

- The highest outlay on agriculture was during the First Plan, it was 31%.
- Agriculture and allied sectors contribute nearly 18% of national income (GNI of India), while about 60% of the population is dependent on agriculture for their livelihood.

- The agricultural output depends on monsoon as nearly 60% of area sown in is dependent on rainfall.
- Land utilisation** data is available for 92.9% of total geographical area of 3,287.3 lakh hectares.
- 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 of their business from 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.
- Commercial crops are those crops which are produced for trade purpose and not for self-consumption by the farmers. It includes—oilseeds crops, sugar crops, fibre crops, narcotic crops, beverage crops.
- Government announces **Minimum Support Prices** (MSPs) for 25 agricultural crops taking into accounts the recommendation of the Commission for Agricultural Cost and Prices (CACP). MSP is that price at which government is ready to purchase the crop from the farmers directly, if crop price falls below the MSP.
- For sugarcane instead of MSP “Fair and Remunerative Price” is declared.
- Kisan Credit Cards** (KCCs) was introduced in 1998-99 by NABARD.
- Commission for Agricultural Costs and Prices (CACPs) was set up in 1965 with the name Agricultural Price Commission and was renamed as CACP in 1985.
- The function of Agriculture Cost and Price Commission (ACPC) is to decide the minimum support prices on behalf of the government.
- For providing facilities relating to storage of agriculture products, “National Co-operative Development and Warehousing Board” was established in 1957. Thereafter in States also the State Warehousing Corporation were established.

#### Major Crops of India

Types of Crops	Meaning	Major Crops
Foodgrains	Crops that are used for human consumption	Rice, Wheat, Maize, Millets, Pulses and oil seeds
Commercial Crops	Crops which are grown for sale either in raw form or in semi processed form	Cotton, Jute, Sugarcane, Tobacco and oil seeds
Plantation Crops	Crops which are grown on plantations covering large estates	Tea, Coffee, Coconut and Rubber
Horticulture	Sections of agriculture in which fruits and vegetables are grown	Fruits and vegetables

#### ■ GREEN REVOLUTION

- It was launched in the year 1966 and was the brainchild of Norman Borlaug, though in India, it was made successful by **Dr. M.S. Swaminathan**. The term ‘Green Revolution’ was coined by Dr. William Gide.
- The achievements of Green Revolution were rise in cereal production especially wheat

and rice, change in cropping pattern in favour of wheat, and increase in employment opportunities.

- The Green Revolution demanded high-yielding seeds, increasing irrigation pesticides in fertilizer.
- A National Commission on Farmers was appointed in 2004, under the Chairmanship

of **Dr. M.S. Swaminathan**, which *inter alia* suggested an **Agricultural Renewal Action Plan** (ARAP).

### SECOND GREEN REVOLUTION

- The call for Second Green Revolution was given by the then Prime Minister Manmohan Singh at the 93rd Science Conference in 2006.

### EVERGREEN REVOLUTION

- Concept given by renowned agricultural scientist Dr. M.S. Swaminathan.
- The cause of the evergreen revolution is ‘Sustainability’.
- 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, Operation Flood was started.
- In milk production of the country the share of buffalo, cow and goat is 50%, 46%, respectively.
- The **Father of Operation Flood** was Dr. Verghese Kurien.
- The Operation Flood was the largest integrated dairy development Programme of the world. It was started by National Dairy Development Board in 1970.
- India is the fourth largest producer of natural rubber.
- India is the second largest consumer of natural rubber. Kerala accounts for 9/10th of total rubber production in India.
- The increase in oil seeds production was due to “Yellow Revolution”.
- The progress in increase of fish production was called “Blue Revolution”.
- Assam is the biggest tea producer in the country.
- India ranks **sixth in world coffee production** and contributes only 4% of world coffee production.
- Cuba is known as the Sugar Bowl of the world.
- India holds first position in the world in the production of sugar cane and sugar.
- India consumes coffee comprising both Arabica (32%) and Robusta (68%) coffee.

- India is the largest producer and consumer of **black tea** in the world.
- India holds second position in the world for the production of sugar cane and sugar.
- India is third in egg production.
- Agricultural production can be divided into two parts—Food grains and Non-food grains, in which the share of food grains is two-third and non-food grains is one-third.
- The Tenth Plan was the first plan which did not fix targets of crop production.
- Green Revolution did not cover barley, ragi and minor-millets.
- 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.

### FOOD SECURITY IN INDIA

- Food security implies access by all people at all times to sufficient quantities of food to lead an active and healthy life.

### PUBLIC DISTRIBUTION SYSTEM (PDS)

- PDS was envisaged in 1967 to act as a price support programme for the consumer during the periods of food shortage of the 1960s.
- PDS is the largest distribution network of its kind in the world.

### TARGETED PUBLIC DISTRIBUTION SYSTEM (TPDS)

Following the criticism of PDS, the government in June 1997, replaced the PDS with TPDS. The system envisaged issuing special cards to BPL families and selling food grains to them at subsidised prices.

- National Co-operative Development Corporation (NCDC) was set up in 1963.

### AGRICULTURE INSURANCE COMPANY OF INDIA LIMITED (AIC)

- AIC was incorporated under the Companies Act, 1956 on 20 December 2002 as a specialised insurer with the capital participation from GIC, four public sector General Insurance Companies and NABARD.

## FOOD PROCESSING INDUSTRY

- India is the third largest producer of food in the world after China and the US.
- Food processing industry is the fifth largest industry in India in terms of production, consumption, exports and expected growth.

## MEGA FOOD PARK SCHEME

- The Tenth Plan Scheme of Food Parks was renamed as the Mega Food Park Scheme (MFPS) in 2008.

## 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).
- The following measures were made effective for the betterment of farmers:
  - Regulation of tax.
  - Security for the rights of farmers.
  - Right of land ownership for the farmers.
- Land ceiling determines the maximum land which can be held by a farmer.
- Chakbandi of land means to aggregate the divided and broken land.
- The land having area less than 1 hectare, is called marginal land holding, 1 to 4 hectare 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.
- The most positive effect of Green Revolution was on wheat. There was 500% increase in crop production.
- 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.

**National Bank for Agriculture and Rural Development** (NABARD) is the apex institution of Rural Credit. It was established on 12 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 Shivraman Committee.

- Food stocks are maintained by the Central Government for three purposes:
  - Maintaining prescribed buffer stock norms for food security,
  - Monthly supply through Public Distribution System (PDS),
  - Market intervention to stabilise open market prices.
- Major crops of India:
  - Kharif Crops:** Sown in July and harvested in October. They include rice, jowar, bajra, maize, cotton, sugarcane, soyabean and groundnut.
  - Rabi Crops:** Sown in October and harvested in March/April. They include wheat, barley, gram, tuar, rapeseed and mustard.
  - Zayad Crops:** Sown during March to June. It includes watermelons, vegetables, moong, etc.

## NATIONAL INCOME

- Comparison between National Income and 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 1 April to 31 March).
- The base of one year is taken for calculating national income, as all the seasons come in a year.

## NATIONAL INCOME AGGREGATES

- 1. Gross Domestic Product (GDP):** It is the total money value of all final goods and services produced within the geographical boundaries of the country during a given period of time.

$$\text{GDP} = C + G + I$$

- ∴
- C = Consumption expenditure
- G = Government expenditure
- I = Investment expenditure

### GDP at Market Price (GDP)

- It refers to the total value of all the goods and services at market price produced during a year within the geographical boundaries of the country.
- Market price refers to the actual transacted price and G.S.T. etc. It excludes Government subsidies.

### GDP at Factor Cost (GDP<sub>fc</sub>)

- GDP can be calculated at factor cost. This measure more accurately reveals the income paid to factors of production. The factor cost means the total cost of all factors of production consumed or used in producing a good or service. The difference between market price and cost price is of the indirect taxes.

### Nominal GDP and Real GDP

Nominal GDP is evaluated at current market prices. Therefore, nominal GDP will include all of the change in market prices that have occurred during the current year due to inflation or deflation. Real GDP is better measurement of GDP. Since it reflects the increase in quantity of goods and services by adjusting for any increase in prices. Real GDP is generally measured by using base year prices of goods and services.

- 2. Gross National Product (GNP):** GNP refers to the money value of total output of production of final goods and services produced by the nationals of a country during a given period of time, generally a year.

- 3. Net National Product (NNP):** NNP is obtained by subtracting depreciation value (i.e. capital stock consumption) from GNP.

- 4. Personal Income (PI):** It is that income, which is actually obtained by the individual or nationals.

- 5. Personal Disposable Income (PDI):** When personal direct taxes are subtracted from personal income, the obtained value is called personal disposable income.

- 6. National Income (NI):** When NNP is calculated at factor cost (FC) it is called National Income. The measure is calculated by deducting indirect taxes and adding subsidies in NNP at Market Price (MP).

- In India, Wholesale Price Index (WPI) is the weighted average of price of 676 items with the base year 2011-12.

## METHODS OF MEASURING NATIONAL INCOME

### 1. Product Method

In this method, net value of final goods and services produced in a country during a year is obtained, which is called total final product. This represents Gross Domestic Product. Net income earned in foreign boundaries by nationals is added and depreciation is subtracted from G.D.P.

### 2. Income Method

In this method a total of net income earned by working people in different sectors and commercial enterprises is obtained. Incomes of both categories of people paying taxes and not paying taxes are added to obtain national income.

### 3. Consumption Method

It is also called expenditure method. Income is either spent on consumption or saved. Hence, national income is the addition of total consumption and total savings.

- In India, a combination of production method and income method is used for estimating national income.

## ESTIMATES OF NATIONAL INCOME IN INDIA

- In 1868, the first attempt was made by **Dadabhai Naoroji** in his book '**Poverty and Un-British Rule in India**'.
- The first scientific attempt to measure national income in India was made by **Professor V.K.R.V. Rao** in 1931-32.

- National Income Committee:** In 1949, National Income Committee under the Chairmanship of **Professor P.C. Mahalanobis** was constituted.
- National Statistical Commission (NSO) was set up on 1 June 2005.

### CSO AND NSSO

- In 1949, Central Statistical Organisation (CSO) was constituted to publish national income data.
- The CSO released the new series of national accounts with base year 2011-2012 instead of the base year 2004-05.
- NSSO (National Sample Survey Organisation) was set up in 1950.

## ECONOMIC PLANNING

- The concept of Economic Planning in India, is derived from Russia (the 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 Vishveshwariya titled **Planned Economy for India**. Thereafter in 1938, the All India Congress Committee demanded for the same. In 1944, efforts were made by eight industrialists under "Bombay Plan".
- National Planning Committee** was set-up under the Chairmanship of Jawaharlal Nehru in 1938.
- Thereafter, in the same year, 'Gandhian 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.
- The Planning Commission was constituted in India in 1950 as a non-constitutional and advisory corporation.

### FIRST FIVE-YEAR PLAN (1951-56)

- First Five-year Plan was based on the 'Herrod-Domar Model'.
- Agriculture was on top priority in this plan.
- This plan was successful and achieved the growth rate of 3.6%, which was more than its aim.

### SECOND FIVE-YEAR PLAN (1956-61)

- This plan was based on the P.C. Mahalanobis Model.
- In this plan, industries and minerals were on top priority and 20.1% of total outlay was allocated for this sector.
- This plan was also successful and it achieved 4.1% rate of growth.
- Various important large industries like Steel Plant at Durgapur, Bhilai and Rourkela were established during this plan.

### THIRD FIVE-YEAR PLAN (1961-66)

- This plan is also called "Gadgil Yojana."
- This plan could not achieve its aim of 5.6% growth rate.
- The main reason of failure of this plan was Indo-China war, Indo-Pakistan war and unprecedented drought.

### PLAN HOLIDAY (FROM 1966-67 TO 1968-69)

- The main reason of Plan holiday was Indo-Pakistan war, lack of resources and increase in price-level. Three Annual Plans were enacted.

### FOURTH FIVE-YEAR PLAN (1969-74)

- 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.

### FIFTH FIVE-YEAR PLAN (1974-79)

- The Fifth Plan draft as originally drawn up was part of a long-term Perspective Plan covering a period of 10 years from 1974-75 to 1985-86.
- The two main objectives of this plan were poverty eradication and attainment of self-reliance.
- Top priority was given to agriculture, next came industry and mines.
- This plan, which was started by the then ruling Janata Government was later terminated in the year 1978.

## ■ ROLLING PLAN (1978-80)

- The rolling plan started with an annual plan for 1978-79 and as a continuation of the terminated Fifth Plan.

## ■ SIXTH FIVE-YEAR PLAN (1980-85)

- 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 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 (1985-90)

- Main aim of the plan was to increase production in all sectors and to generate opportunities for employment.
- 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.

## ■ ANNUAL PLANS

The new government, which assumed power at the Centre in June 1991, decided that the Eighth Five-year Plan would commence on April 1, 1992 and that 1990-91 and 1991-92 should be treated as separate Annual Plans.

## ■ EIGHTH FIVE-YEAR PLAN (1992 AD-1997 AD)

- 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, Pradhanmantri Rozgar Yojana (PMRY) was started in the year 1993.

## ■ NINTH FIVE-YEAR PLAN (1997 AD-2002 AD)

- The Planning Commission released the draft Ninth Plan document on March 1, 1998. The focus of the plan is "**Growth with Social justice and Equity**".
- The recession in international economy was held responsible for the failure of Ninth Plan.

## ■ TENTH FIVE-YEAR PLAN (2002-07)

- Though the 10th Plan could not achieve its target of 8% growth of GDP, yet has taken the economy to a higher trajectory of growth rate at 7.6% as against 5.5% in the 9th Plan.

## ■ ELEVENTH FIVE-YEAR PLAN (2007-12)

- Emphasis on social sector and delivery of service therein.
- Reduction of gender inequality.
- Rapid and inclusive growth.
- Environment sustainability.
- Increase agriculture growth to 4%.

## ■ TWELFTH FIVE-YEAR PLAN (2012-2017)

### *Vision of 12th Five-year Plan (2012-17)*

- Twelfth Five Year Plan focusses on Growth. Growth which is:
  - Faster
  - Inclusive
  - Sustainable
- The 12th Five-Year Plan of the Government of India has decided for the growth rate at 8.2% but the National Development Council (NDC) on 27 December, 2012 approved 8% growth rate for 12th five-year plan.
- The final growth target has been set at 8% by the endorsement of plan at the National Development Council meeting held in New Delhi.
- The government intends to reduce poverty by 10 per cent during the 12th Five-year Plan.

## ■ ECONOMIC GROWTH

- Real GDP growth at 8%.
- Agriculture growth at 4%.
- Manufacturing growth at 10%.

- Every state must attain higher growth rate than the rate achieved during 11th plan.
- Poverty and employment
- Poverty rate to be reduced by 10% than the rate at the end of 11th plan.
- 5 crore new work opportunities and skill certifications in non-farm sector.

## EDUCATION

- Mean years of schooling to increase to 7 years.
- 20 lakh seats for each age bracket in higher education.
- End gender gap and social gap in school enrollment.

## HEALTH

- Reduce: IMR to 25; MMR to 1. Increase Child Sex Ratio to 950.
- Reduce Total Fertility Rate to 2.1.
- Reduce undernutrition of children in age group 0-3 to half of NFHS-3 levels.

## INFRASTRUCTURE

- Investment in infrastructure at 9% of GDP.
- Gross Irrigated Area: 103 million hectare (from 90 million hectare).
- Electricity to all villages; Reduce AT&C losses by 20%.
- Connect Villages with All Weather Roads.
- National and State highways to a minimum of 2-lane standard.
- Complete Eastern and Western Dedicated Freight Corridors.
- Rural Tele-Density to 70%.
- 40 litres per capita per day drinking water to 50% of rural population; Nirmal Gram Status to 50% of all Gram Panchayats.

## ENVIRONMENT AND SUSTAINABILITY

- Increase green cover by 1 million hectares every year.
- 30,000 MW renewable energy during Five-year Period.
- Emission intensity of GDP to be reduced to 20-25% of 2005 levels by 2020.

## SERVICE DELIVERY

- Banking services to 90% of Indian households.
- Subsidies and welfare-related payment to be routed through Aadhar-based Direct Cash Transfer Scheme.

## 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 delineated to achieve them are to be strictly followed. This 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 was adopted in our country since the 8th Five-year Plan, as practised in many developed countries.

### PERSPECTIVE PLANNING

It's type of planning for a long period of time, usually 15-20 years.

### 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.

#### 1. Planning by Direction

- It is an integral part of a socialist society and entails absence of laissez faire.

#### 2. Planning by Inducement

- It is a democratic planning and planning is through manipulating the market.

### **3. Financial Planning**

- It is a technique of planning, in which resources are allocated in terms of money.

### **4. Physical Planning**

- It refers to the allocation of resources in terms of men, material and machinery.

### **5. Perspective Planning**

- It refers to long-term planning in which long-range targets are set in advance for a period of 15, 20 or 25 years. Sixth Plan (1978-83) by Janata Government was such plan.

## **NITI AAYOG**

- NITI Aayog or National Institution for Transforming India Aayog is the replacement of Planning Commission of India.
- National Institution for Transforming India (NITI) Aayog has been created in accordance to the announcement made by the Prime Minister, Narendra Modi on 15 August, 2014.

### **COMPOSITION OF NITI AAYOG**

- Chairperson: Prime Minister.
- Vice Chairperson: Rajiv Kumar.
- Governing Council: CM's (States) and Lieutenant Governors (Union Territories)
- Regional Councils: Formed on need-basis, incorporates CMs and Lieutenant Governors of the region.
- Members: Economist Bibek Debroy and Former DRDO Chief V.K. Saraswat.
- Part-time Members: Maximum 2, Rotational, from relevant institutions.
- Ex-officio Members: Rajnath Singh, Arun Jaitley, Suresh Prabhu and Radha Mohan Singh.
- Special Invitees: Experts, specialists, practitioners with domain knowledge.
- CEO: Mr. Amitabh Kant
- Secretariat: If necessary.

### **FUNCTIONS**

- An administration paradigm in which the Government is an 'enabler' rather than a 'provider of the first and last resort'.
- Progress from 'food security' to focus on a mix of agricultural production, as well as actual returns that farmers get from their produce.

- Ensure that India is an active player in the debates and deliberations on the global commons.
- Ensure that the economically vibrant middle-class remains engaged, and its potential is fully realised.
- Leverage India's pool of entrepreneurial, scientific and intellectual human capital.
- Incorporate the significant geo-economic and geo-political strength of the Non-resident Indian Community.
- Use urbanisation as an opportunity to create a wholesome and secure habitat through the use of modern technology.
- Use technology to reduce opacity and potential for misadventures in governance.

### **OBJECTIVES**

- To foster cooperative federalism through structured support initiatives and mechanisms with the States on a continuous basis, recognising that strong States make a strong nation.
- To develop mechanisms to formulate credible plans at the village level and aggregate these progressively at higher levels of government.
- To ensure, on areas that are specifically referred to it, that the interests of national security are incorporated in economic strategy and policy.
- To pay special attention to the sections of our society that may be at risk of not benefitting adequately from economic progress.
- To design strategic and long-term policy and programme frameworks and initiatives, and monitor their progress and their efficacy. The lessons learnt through monitoring and feedback will be used for making innovative improvements, including necessary mid-course corrections.
- To provide advice and encourage partnerships between key stakeholders and national and international like-minded Think Tanks, as well as educational and policy research institutions.

### **NATIONAL DEVELOPMENT COUNCIL**

- National Development Council was constituted on 6 August 1952.

- The Prime Minister is the ex-officio Chairman and the Secretary of Planning Commission is the ex-officio Secretary of this council.
- Chief Ministers of all the states and the members of Planning Commission are the members of National Development Council (NDC) is an extra-constitutional body.

### Functions

- It aims to make co-operative environment for economic planning between States and the Planning Commission.
- It evaluates the management of plans from time to time.
- It analyses the policies affecting development.
- It gives suggestions to achieve the fixed aim in the plans.
- It gives **final approval** to the Five Year Plans.

### ECONOMIC GROWTH

- Economic growth has been defined as "an increase in real terms of the output of goods and services that is sustained over a long period of time, measured in terms of value added. Economic growth is a dynamic concept and refers to continuous increase in output.

### GROWTH AND DEVELOPMENT

- The term economic growth refers over time in country's real output of goods and services i.e. product per capita, the term economic development in contrast is more comprehensive. It implies progressive changes in the socio-economic structure.

#### Difference between economic growth and development

Economic Growth	Economic Development
It indicates quantitative improvement in the economic progress of a country.	It indicates qualitative improvement in the economic progress of country.
It shows growth in national income and per capita income over time.	It shows not only a sustained increase in national and per capita income but also qualitative changes which leads to higher standard of living.

Economic Growth	Economic Development
A country may grow but it may not develop.	Economic development includes the nation of economic growth.

### 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 formulations of the Second Five-year Plan and has continued right up to the eighties.
- Growth with social justice was the goal of Nehru-Mahalanobis model.
- 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 re-affirmed 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.
- The Gandhian model's primary aim is the attainment of maximum self-sufficiency in village communities.

#### LPG Model of Development

- The LPG Model of Development was introduced in 1991 by the then Finance Minister Dr. Manmohan Singh.
- LPG Model of Development emphasises a bigger role for the private sector.
- It envisages a much larger quantum of foreign direct investment to supplement our growth process.
- It aims at a strategy of export led growth as against import substitution practised earlier.

#### PURA Model of Development

- The Union Cabinet on 20 January, 2004 accorded in principle approval for the execution of PURA within the gross budgetary support for bridging the rural-urban divide and achieving balanced socio-economic development.
- Though Dr. A.P.J. Abdul Kalam, ever since he became the President of India has been

advocating his Vision 2020, and, to eradicate poverty from India, he has been emphasising the adoption of **PURA** (Providing Urban Amenities in Rural Areas); however, it was Mahatma Gandhi who underlined the exploitation of rural society by its urban counterpart.

- The objective of PURA is to propel economic development without population transfers.
- The PURA model, however, attempts reconciliation between employment and GDP growth objectives.

## UNEMPLOYMENT

- 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.
- In India, unemployment is structural in nature due to lack of productive capacity and resources.
- In India, a person working eight hours a day for 273 days of the year is regarded as employed on a standard person year basis.
- **Bhagawati Committee** on unemployment estimates (1973), set up by the Planning Commission, gave three estimates of unemployment.

## TYPES OF UNEMPLOYMENT

### Cyclical Unemployment

- It is the result of depression in an economy.

### 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.

### Open Unemployment

- It refers to those who have no work to do even though they are able and willing to do work.

### Classical Unemployment

- It is a component of overall unemployment caused by too high wage expectation.

### Chronic Unemployment

- When unemployment tends to be a long-term feature of a country, it is called chronic unemployment.

### Structural Unemployment

- This type of unemployment is associated with economic structure of the country, i.e. productive capacity is inadequate to create a sufficient number of jobs.
  - i. **Seasonal unemployment:** This occurs at a certain period of the time when workload is comparatively less, and, hence, people are rendered jobless. It also means the unemployment of the farmers and farm labourers during non-crop seasons.
  - ii. **Educated unemployment:** This is mainly found in urban areas. Those educated persons who are unable to get work come under this category.
  - iii. **Underemployment (Disguised unemployment):** It results when a person contributes to production less than what he or she is capable of.
  - iv. **Compulsory unemployment:** It means the labour power which is ready to work on the current rate but does not get the work.
- The Planning Commission collects data of unemployment on the basis of '**Lakadawala Formula**' effective from 11 March 1997 and prior to this the process to collect data was on the basis of surveys of National Sample Survey Organisation (NASO).
- In India, the data relating to unemployment are collected by National Sample Survey Organisation (NASO). 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.
  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.

### Bharat Nirman Yojana

The Union Government launched a new comprehensive scheme, named '**Bharat Nirman Yojana**' on December 16, 2005. The six major sectors and their targets for next four years are:

- Irrigation
- Roads
- Housing
- Water supply
- Electrification
- Rural Communication

### MAHATMA GANDHI NATIONAL RURAL EMPLOYMENT GUARANTEE ACT (MNREGA)

- The National Rural Employment Guarantee Bill was passed by Parliament on September 7, 2005. It secured Presidential assent later in 2005 itself and became an Act.
- The Act provides for at least 100 days of employment to one able bodied person in every rural household every year.
  - Employment to be given within 15 days of application for work.
  - If employment is not provided within 15 days, daily unemployment allowance in cash has to be paid.
  - At least one-third beneficiaries have to be women.
  - PRIs have a principal role in planning and implementation.
- The wages admissible are around ₹ 120 per day.
- The Act (NREGA) came into force from Feb. 2, 2006.

**Note:** The Govt. of India, October 2, 2009 renamed the NREGA as the Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA).

### EMPLOYMENT GUARANTEE ACT, 2005

The main features of the Act are:

1. Every household in rural India will have a right to at least 100 days of guaranteed employment every year for at least one adult member. The wages shall be paid

within seven days of the week during which work was done.

2. Work should be provided within 15 days of demanding it, and the work should be located within five kilometer distance.
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 of 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 provision of the Workmen Compensation Act.
5. 5% of wages may be deducted as contribution to welfare schemes.
6. The District Collector/Chief Executive Officer will be responsible for the programme at the district level.
7. The Gram Sabha will monitor the work of the Gram Panchayat by way of social audit.

### SOME IMPORTANT DEVELOPMENT AND EMPLOYMENT PROGRAMMES

#### JAWAHAR ROZGAR YOJANA

- During the Seventh Five-year Plan, a scheme called '**Jawahar Rozgar Yojana**' was introduced from April 1989 to solve the problem of unemployment in the rural sector. The former ongoing two main rural employment programmes National Rural Employment Programme (NREP) 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.
- 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)

It was introduced on October 2, 1993, in selective 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 18 years to 60 years) in rural area. Since January 1, 1996, the Integrated Jawahar Rozgar Yojana (IJRY) has been merged with Employment Assurance Scheme (EAS).

## THE INTEGRATED RURAL DEVELOPMENT PROGRAMME (IRDP)

It was started on. 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.

- Development of Women and Children in Rural Areas (**DWCRA**) and Training Rural Youth for Self-Employment (**TRYSEM**) were the sub-plans of Integrated Rural Development Programme (IRDP).
- The objective of TRYSEM was to provide training to those rural youth (ages 18-35 years) who belong to the families living below the poverty line. This programme was started on August 15, 1979. **Development of Women and Children in Rural Area Programme (DWCRA)** was started in September 1982.

## INDIRA AWAS YOJANA (IAY, LAUNCHED IN 1985)

- IAY addresses housing shortage as an important component of poverty alleviation in rural India.
- The cost is shared by the Centre and State in the ratio of 75:25.

## RAJIV GANDHI GRAMIN VIDYUTIKARAN YOJANA (RGGVY LAUNCHED IN 2005)

- Aims at providing electricity in all villages and habitations and access to electricity to all rural households.
- Connections to BPL families are given free of cost. 90% cost of the scheme is released as grant, where 10% as loan.

## JAWAHARLAL NEHRU NATIONAL URBAN RENEWAL MISSION (JNNURM LAUNCHED ON 3RD DECEMBER, 2005)

- (JNNURM) is to encourage reforms and fast track-planned development of identified cities.

## HEALTH-ORIENTED PROGRAMMES

- **National Rural Health Mission** (NRHM) (set up in 12 April 2005).
- **Janani Suraksha Yojana** (JSY) a core component of NRHM (set up in April 2005).
- **Pradhanmantri Swasthya Suraksha Yojana** (PMSSY) (set up in 2010).

## SWARN JAYANTI SHAHARI ROZGAR YOJANA

- The Urban Self-employment Programme and Urban Wage-employment Programmes of the Swaran Jayanti Shahari Yojana, which substituted (in December 1997) various programmes operated earlier for poverty alleviation.
- SJSRY is funded on 75:25 basis between the Centre and the States.

## SWARNA JAYANTI GRAM SWAROZGAR YOJANA (SGSY)

The government has introduced Swarna Jayanti Gram Swarojgar 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 scheme is funded on 75:25 basis by the Centre and States.

## RURAL LANDLESS EMPLOYMENT GUARANTEE PROGRAMME (RLEGPM)

RLEGPM began on August 15, 1993 and National Rural Employment Programme (NREP) on October 2, 1980. During Seventh Five-year Plan, these programmes were merged with Jawahar Rozgar Yojana.

- Council for Advancement of Peoples Action and Rural Technology (CAPART) is an independent section of the Rural Development Department of the Government of India, which was established on September 1986.
- The Nehru Rozgar Yojana began on October 1989 which was revised in March 1990. Under this Yojana, following schemes were included: (i) Scheme of Urban Micro Enterprises-SUME; (ii) Scheme of Urban Wage Employment-SUWE; (iii) 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 it was in operation in the urban areas. Since April 1, 1994, it was extended to the whole country.

### SARVA SHIKSHA ABHIYAN (SSA; LAUNCHED IN 2001)

- The main objective of this programme was to provide educational facility to all children of 6-14 age-group in the state, to complete the primary education by 2007 and upper primary education by 2010 of all enrolled children and to ensure universal stay of all children up to the year 2010.

### NATIONAL RURAL HEALTH MISSION (NRHM, LAUNCHED IN 2005)

- The National Rural Health Mission (NRHM) aims to provide accessible, affordable and accountable quality health services to the rural poor.

### INTEGRATED CHILD DEVELOPMENT SCHEME (ICDS, LAUNCHED IN 1975)

- The Integrated Child Development Services (ICDs) Scheme aims at enhancing the health, nutrition and learning opportunities of infants, young children (0-6 years) and their mother.

### MID-DAY MEAL (MDM, LAUNCHED IN 1995)

- Under the scheme, hot cooked meal of a minimum 300 calories and 8-12 gms of protein are being provided to children studying in primary schools/Education Guarantee Scheme (EGS)/Alternative and Innovative Education (AIE) centres.

### NATIONAL RURAL DRINKING WATER PROGRAMME (NRDWP, LAUNCHED IN 2009)

- This programme's instrument is Accelerated Rural Water Supply Programme (ARWSP) under implementation since 1972-93.
- The ARWSP has been modified as National Rural Drinking Water Programme (NRDWP) in 2009-10.

### TOTAL SANITATION PROGRAMME (TSP)

- TSP was started in the state in the year 2000.

### NATIONAL SOCIAL ASSISTANCE PROGRAMME (NSAP)

- The National Social Assistance Programme (NSAP) envisages the pension schemes, National Family Benefit Scheme and scholarship to up to two children of BPL families studying in classes 9th to 12th.

### List of Government Schemes

Scheme	Ministry	Date of Launch	Sector	Provisions
Atal Pension Yojana	MoF	May 9, 2015	Pension	Social Sector Scheme pertaining to Pension Sector.
Bachat Lamp Yojna	MoP	2009	Electrification	Reduce the cost of compact fluorescent lamps.
Central Government Health Scheme	MoHFW	1954	Health	Comprehensive medical care facilities to Central Government employees and their family members.
Deendayal Disabled Rehabilitation Scheme	MoSJE	2003	Social Justice	Create an enabling environment to ensure equal opportunities, equity, social justice and empowerment of persons with disabilities.

Scheme	Ministry	Date of Launch	Sector	Provisions
Deen Dayal Upadhyaya Gram Jyoti Yojana	MoP	2015	Rural Power Supply	It is a Government of India program aimed at providing 24x7 uninterrupted power supply to all homes in Rural India.
Digital India Programme	MoC&IT	July 1, 2015	Digitally Empowered Nation	Aims to ensure that government services are available to citizens electronically and people get benefited from the latest information and communication technology.
Gramin Bhandaran Yojana	MoA	March 31, 2007	Agriculture	Creation of scientific storage capacity with allied facilities in rural areas to meet the requirements of farmers for storing farm produce, processed farm produce and agricultural inputs. Improve their marketability through promotion of grading, standardization and quality control of agricultural produce.
Pradhanmantri Gramin Awaas Yojna	MoRD	1985	Housing, Rural	Provides financial assistance to rural poor for constructing their houses themselves.
Indira Gandhi Matritva Sahyog Yojana	MoWCD	2010	Mother Care	A cash incentive of ₹4000 to women (19 years and above) for the first two live births.
Integrated Child Development Services	MoWCD	October 2, 1975	Child Development	Tackle malnutrition and health problems in children below 6 years of age and their mothers.
Integrated Rural Development Programme	MoRD	1978	Rural Development	Self-employment program to raise the income-generation capacity of target groups among the poor and the scheme has been merged with another scheme named Swarnajayanti Gram Swarozgar Yojana (SGSY) since 01.04.1999.
Janani Suraksha Yojana	MoHFW	2005	Mother Care	One-time cash incentive to pregnant women for institutional/home-births through skilled assistance.
Jawaharlal Nehru National Urban Renewal Mission (JNNURM)	MoUD	December 3, 2005	Urban Development	A programme meant to improve the quality of life and infrastructure in the cities. To be replaced by Atal Mission for Rejuvenation and Urban Transformation.
Kasturba Gandhi Balika Vidyalaya	MoHRD	July 2004	Education	Educational facilities (residential schools) for girls belonging to SC, ST, OBC, minority communities and families below the poverty line (BPL) in educationally backward blocks.
INSPIRE Programme	Department of Science and Technology (India)			Scholarships for top science students, Fellowships for pursuing PhD, Research Grants to researchers.
Kishore Vaigyanik Protsahan Yojana	MoST	1999		Scholarship program to encourage students to take up research careers in the areas of basic sciences, engineering and medicine.

Scheme	Ministry	Date of Launch	Sector	Provisions
Livestock Insurance Scheme (India)	MoA		Education	Insurance to cattle and attaining qualitative improvement in livestock and their products.
Mahatma Gandhi National Rural Employment Guarantee Act	MoRD	February 6, 2006	Rural Wage Employment	Legal guarantee for one hundred days of employment in every financial year to adult members of any rural household willing to do public work-related unskilled manual work at the statutory minimum wage of ₹ 120 per day in 2009 prices.
Members of Parliament Local Area Development Scheme	MoSPI	December 23, 1993		Each MP has the choice to suggest to the District Collector for, works to the tune of Rs.5 Crores per annum to be taken up in his/her constituency. The Rajya Sabha Member of Parliament can recommend works in one or more districts in the State from where he/she has been elected.
Midday Meal Scheme	MoHRD	August 15, 1995	Health, Education	Lunch (free of cost) to school-children on all working days.
Namami Gange Programme	MoWR	March 1995	Clean & Protect Ganga	Integrates the efforts to clean and protect the River Ganga in a comprehensive manner.
National Literacy Mission Programme	MoHRD	May 5, 1988	Education	Make 80 million adults in the age group of 15-35 literate
National Pension Scheme	MoHRD	January 1, 2004	Pension	Contribution based pension system.
National Scheme on Welfare of Fishermen	MoA		Agriculture	Financial assistance to fishers for construction of house, community hall for recreation and common working place and installation of tube wells for drinking water.
National Service Scheme	MoYAS			Personality development through social (or community) service.
National Social Assistance Scheme	MoRD	August 15, 1995	Pension	Public assistance to its citizens in case of unemployment, old age, sickness and disablement and in other cases of undeserved want.
Pooled Finance Development Fund Scheme				
Pradhan Mantri Adarsh Gram Yojana	MoRD	July 23, 2010	Model Village	Integrated development of Scheduled Caste-majority villages in four states.
Pradhan Mantri Suraksha Bima Yojana	MoF	May 9, 2015	Insurance	Accidental Insurance with a premium of ₹ 12 per year.
Pradhan Mantri Jeevan Jyoti Bima Yojana	MoF	May 9, 2015	Insurance	Life insurance of ₹ 2 lakh with a premium of ₹ 330 per year.
Pradhan Mantri Kaushal Vikas Yojana	MoSDPE	April 2016	Skill Development Initiative Scheme	To provide encouragement to youth for development of employable skills by providing monetary rewards by recognition of Prior Learning or by Undergoing training at affiliated centres.

Scheme	Ministry	Date of Launch	Sector	Provisions
Pradhan Mantri Jan Dhan Yojana	MoF	August 28, 2014	Financial Inclusion	National Mission for Financial Inclusion to ensure access to financial services, namely Banking Savings and Deposit Accounts, Remittance, Credit, Insurance, Pension in an affordable manner.
Pradhan Mantri Gram Sadak Yojana	MoRD	December 25, 2000	Rural Development	Good all-weather road connectivity to unconnected villages.
Rajiv Awas Yojana	MhUPA	2013	Urban Housing	It envisages a 'Slum-free India' with inclusive and equitable cities in which every citizen has access to basic civic infrastructure and social amenities and decent shelter.
Rajiv Gandhi Grameen Vidyutikaran Yojana	MoP	April 2005	Rural Electrification	Programme for creation of Rural Electricity Infrastructure and Household Electrification for providing access to electricity to rural households.
Rashtriya Krishi Vikas Yojana	MoA	August 1, 2007	Agriculture	Achieve 4% annual growth in agriculture through development of agriculture and its allied sectors during the XI Plan period.
Rashtriya Swasthya Bima Yojana	MoHFW	April 1, 2008	Insurance	Health insurance to poor (BPL), Domestic workers, MGNREGA workers, Rikshaw-pullers, Building and other construction workers, and many other categories as may be identified by the respective states.
RNTCP	MoHFW	1997	Health	Tuberculosis control initiative.
Saksham or Rajiv Gandhi Scheme for Empowerment of Adolescent Boys	MoWCD	2014	Skill Development	Aims at all-round development of Adolescent Boys and make them self-reliant, gender-sensitive and aware citizens, when they grow up. It covers all adolescent boys (both school-going and out-of-school) in the age-group of 11 to 18 years subdivided into two categories, viz. 11-14 and 14-18 years. In 2014-15, an allocation of ₹25 crore is made for the scheme.
Sabal or Rajiv Gandhi Scheme for Empowerment of Adolescent Girls	MoWCD	2011	Skill Development	Empowering adolescent girls (Age) of 11-18 years with focus on out-of-school girls by improvement in their nutritional and health status and upgrading various skills like home skills, life skills and vocational skills. Merged Nutrition Programme for Adolescent Girls (NPAG) and Kishori Shakti Yojana (KSY).
Sampoorna Grameen Rozgar Yojana	MoRD	September 25, 2001	Rural Self-employment	Providing additional wage employment and food security, alongside creation of durable community assets in rural areas.
Skill India Programme (National Skill Development Mission)	MoSDE	July 15, 2015	Skill Development	Seeks to provide the institutional capacity to train a minimum 40 crore skilled people by 2022.

Scheme	Ministry	Date of Launch	Sector	Provisions
Swabhiman	MoF	February 15, 2011	Financial Inclusion	To make banking facility available to all citizens and to get 5 crore accounts opened by March 2012. Replaced by Pradhan Mantri Jan. Dhan Yojana.
Swarnajayanti Gram Swarozgar Yojana	MoRD	April 1, 1999	Rural Employment	Bring the assisted poor families above the poverty line by organising them into Self-Help Groups (SHGs) through the process of social mobilisation, their training and capacity-building and provision of income-generating assets through a mix of bank credit and government subsidy.
Swavalamban	MoF	September 26, 2010	Pension	Pension scheme to the workers in unorganised sector. Any citizen who is not part of any statutory pension scheme of the Government and contributes between ₹ 1,000/- and ₹ 12,000/- per annum, could join the scheme. The Central Government shall contribute ₹ 1,000 per annum, to such subscribers.
Udisha	MoWCD		Child Care	Training Program for ICDS workers.
Voluntary Disclosure of Income Scheme		June 18, 1997		Opportunity to the income tax/ wealth tax defaulters to disclose their undisclosed income at the prevailing tax rates.
National Rural Livelihood Mission (NRLM)	MoRD	June 2011		This scheme will organise rural poor into Self-Help Group (SHG) groups and make them capable for self-employment. The idea is to develop better livelihood options for the poor.
HRIDAY—Heritage City Development and Augmentation Yojana	MoUD	Jan. 2015	Urban Development	The scheme seeks to preserve and rejuvenate the rich cultural heritage of the country.
Sukanya Samridhi Yojana (Girl Child Prosperity Scheme)	MoWCD	Jan. 2015		The scheme primarily ensures equitable share to a girl-child in resources and savings of a family in which she is generally discriminated as against a male child.
Smart Cities Mission	MoUD	June 25, 2015	Urban Development	To enable better living and drive economic growth stressing on the need for people-centric urban planning and development.
Atal Mission for Rejuvenation and Urban Transformation (AMRUT)	MoUD	June 25, 2015	Urban Development	To enable better living and drive economic growth stressing on the need for people-centric urban planning and development.
Pradhan Mantri Awas Yojana (PMAY)	MoUD	June 25, 2015	Housing	To enable better living and drive economic growth stressing on the need for people-centric urban planning and development.

Scheme	Ministry	Date of Launch	Sector	Provisions
National Child Labour Projects (NCLP)	Ministry of Labour and Employment	Launched in 9 districts in 1987 and has been expanded in January 2005 to 250 districts in 21 different states of the country		The objective of this project is to eliminate child labour in hazardous industries by 2010. Under this scheme, the target group is all children below 14 years of age who are working in occupations and processes listed in the Schedule to the Child Labour (Prohibition & Regulation) Act, 1986 or occupations and processes that are harmful to the health of the child.
National Career Service (India) (NCS)	Ministry of Labour and Employment	20 July 2015	Employment	The objective of this project is to help job-seekers land up at the job they deserve
Antyodaya Anna Yojana	NDA government	25 December 2000		Under the scheme, 1 crore of the poorest among the (Below Poverty Line) BPL families covered under the targeted public distribution system are identified. Issue of Ration Cards Following the recognition of Antyodaya families, unique quota cards to be recognised as 'Antyodaya Ration Card' must be given to the Antyodaya families by the chosen power. The scheme has been further expanded twice by additional 50 lakh BPL families each in June 2003 and in August 2004, thus covering 2 crore families under the AAY scheme.
National Food Security Mission	Government of India	2007 for 5 years		It launched in 2007 for 5 years to increase production and productivity of wheat, rice and pulses on a sustainable basis so as to ensure food security of the country. The aim is to bridge the yield gap in respect of these crops through dissemination of improved technologies and farm management practices.
Pradhan Mantri Ujjwala Yojna	MoP&NG	May 1, 2016		Launched to provide free LPG connections to women from below poverty line families
Jan Aushadhi	Government of India	15 July 2017	Health	Generic Medicine Campaign

## TRADE AND COMMERCE

- Indian Trade was extremely developed during ancient time.
- After the British East India Company was established in 1600, the trade between Indian and Britain was in India's favour till 1857.
- 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 completely ruined.
  - First factory of cotton textile in India was established in 1818 at Ghughari near Kolkata, which failed.

- The second factory of cotton textile was established by a businessman Kawas Ji Nana Bhai in Mumbai in 1853.
- In 1885, first Jute factory was established in Rishara (West Bengal).
- Jamsetji Tata established first steel factory in Jamshedpur in 1907.

## NEW ECONOMIC POLICY

- 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.
- The following four main steps were taken under the Fiscal Policy, 1991:
  - To control public expenditure strictly.
  - To expand Tax Net.
  - To observe discipline in management of funds of Central and State Governments.
  - To curtail grants (subsidy).
- Measures implemented under the Industrial Reforms Policy, 1991 were:
  - Delicensing of industries except the list of 18 industries.
  - M.R.T.P. norms were relaxed for disinvestment.
  - The areas reserved for public sector were opened to private sector.
- The objectives fixed for reforms in the Foreign Investment Policy, 1991 were:
  - Direct foreign investment up to 50% was given automatic approval, in many industries.
  - Foreign companies, involved in export activities were allowed to invest up to 51% capital.
  - The government gave automatic approval for Technology Agreement in the industries of high priorities.
- The measures implemented to bring efficiency and market discipline under the Public Sector Policy, 1991 were as under:

- Number of reserved industries decreased to eight. Presently, these are only four.
- The work of rehabilitation of sick industries handed over to Board of Industrial Financial Reconstruction.
- Industries were made powerful with the help of Memorandum of Understandings (MoU).
- Voluntary Retirement Schemes started to cut down the size of work force.

## ECONOMIC REFORMS

- Macroeconomic crisis of the early 1990s necessitated economic reforms in India. The crisis had three aspects:
  - Fiscal imbalance or increasing fiscal deficit.
  - Fragile Balance of Payment (BoP) situation.
  - Inflationary pressures in the economy.
- Two distinct stands of reform measures were prescribed by the World Bank and the IMF.
- These were:
  - Macroeconomic Stabilisation Demand Management.
  - Structural Adjustments' Supply-side Management.
- Economic Reforms were introduced in 1991 in India. First Generation Reforms were aimed at stabilisation of India economy and were of macro level in nature. Second Generation Reforms aimed at structural changes and are micro level in nature.
- Since economic reform, poverty has been declining from 36% in 1993 to 26% by the end of 10th Plan.
- 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 Renewal Fund** was constituted for rehabilitation of displaced labourers of sick industrial units affected due to industrial modernization, technological development, etc.

- Inclusive development in India first emphasised in the Eleventh Plan Period (2007-12).
- The essential elements of inclusive development are:
  - i. poverty reduction and increase in quantity and quality of employment;
  - ii. agricultural development;
  - iii. reduction in regional disparities;
  - iv. social sector development; and
  - v. protecting the environment.

## HUMAN DEVELOPMENT

- The Human Development Report (HDR) was published by the UNDP since 1990 captures the essence of human development.
- The HDR was started by Pakistani economist Mahbub-ul-Haq and Amartya Sen.

## POVERTY

- Planning Commission is the authority, which publishes the poverty estimates based on various rounds of National Sample Survey Organisation (NSSO) on monthly per capita consumption expenditure.
- In India, the poverty line is defined on the basis of calorie intake. According to this, 2100 calories a day has been fixed for urban areas and 2400 calories in rural areas.
- Since, NSSO 55th Round (1999), Planning Commission gives two poverty estimates based on Mixed Recall Period (MRP) and Universal Recall Period (URP).
- **Mixed Recall Period**, gives consumer expenditure data for five non-food items, namely clothing, footwear, durable goods, education and institutional medical expenses for 365 days and consumption data for remaining items are collected for 30 days' period.
- **In Universal Recall Period**, consumption data for all items are collected for a 30 days' recall period.

## INDIAN FINANCIAL SYSTEM

- There are two parts of Indian Financial System—first demand side and second supply side.

- 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 financial system is, commonly, classified into:
  - (a) Industrial finance,
  - (b) Agricultural finance,
  - (c) Development finance and
  - (d) Government finance.
- **Devaluation:** It means lowering the official value of the local money in terms of foreign currency or gold.
- **Balance of Payments** (BoP) is the difference between the value of goods exported and the value of goods imported per annum. Services not included in BoP.
- BoP is divided in current account and capital account.
- 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 highest financial institution in organized sector is Reserve Bank of India and in addition to this bank of public sector banks of private sector, foreign banks and other financial institutions are also part of organized sector.
- 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 1 July to 30 June.

## THE INDIAN CAPITAL MARKET

- The capital market in India includes:
  - (i) Government Securities (Gilt-edged market); (ii) Industrial Securities Market; (iii) Development financial institutions like IFCI, IDBI, ICICI, SFCs, IIBI, UTI,

- etc.; and (iv) financial intermediaries like merchant banks.
- 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 gilt-edged securities markets are 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.
- If shares or debentures of private corporations, primary sureties of government companies or new sureties and issue of bonds of public sector are sold or purchased in the capital market, then the market is called **Primary Capital Market**.
- Secondary Market** includes transactions in the stock exchange and gilt-edged market.
- Merchant bank, mutual fund, leasing companies, risk capital companies etc. Collect and invest public money into the capital market.
- Unit Trust of India (UTI) is the biggest Mutual Fund Institution of India.

## STOCK EXCHANGE

- The stock exchanges is the market for buying and selling of stocks, shares, securities, bonds and debentures, etc.
- The first organised stock exchange in India was started in Bombay (now Mumbai) when the “Native share Brokers’ Association” known as the Bombay Stock Exchange (BSE) was formed by the brokers in Bombay. BSE was Asia’s oldest stock exchange.
- Under the Securities Contract (Regulation) Act of 1956, the Government of India has so far recognised 23 stock exchanges. Bombay is the premier exchange in the country.
- With the setting up to National Stock Exchange, all regional stock exchanges have lost relevance.

- The BSE transformed itself into a corporate entity from being a brokers association, from the middle of August 2005.
- To prevent excessive speculation and volatility in the stock market SEBI has introduced rolling settlements from July 2, 2001, under which settlement has to be made every day.

## SOME IMPORTANT SHARE PRICE INDEX OF INDIA

- BSE SENSEX:** 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:** 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 28 July 1998, its name **S and P CNX Nifty**.
- CRISIL, set up in 1988, is a credit rating agency. It undertakes the rating fixed deposit programmers, convertible and non-convertible and debentures and also credit assessment of companies.
- CRISIL 500:** It is the new share price index introduced by Credit Rating Agency the “Credit Rating Information Services of India Limited” (CRISIL) on January 18, 1996.
- Apart from CRISIL, there is another credit rating agency called “Investment Information and Credit Rating Agency of India Limited (ICRA)”. It rates debt instrument of both financial and manufacturing companies.
- The **National Stock Exchange (NSE)** has launched a new version of its online trading software called Exchange for Automatic Trading (NEAT).
- India’s fiscal system includes 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 (i) Tax revenue and (ii) Non-tax revenue. Tax revenue comes broadly from three sources—(a) taxes on income and expenditure;

(b) taxes on property and capital transaction; and (c) taxes on commodities and services. Non-tax revenue, consists of-(a) currency, coinage and mint and (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; and (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.

## EXPENDITURE OF THE CENTRE

The Central Government makes expenditures broadly under two heads: (i) Plan expenditure and (ii) Non-plan expenditure.

- Under plan expenditure comes the outlay for agriculture, rural development, irrigation and flood control, energy, industry and minerals, transport, communications, science and technology, environment and economic service, etc.
- The major non-plan expenditures are interest payments, defence, subsidies and general services.
- 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** is a fiscal tool in the hands of the government to bridge the gap between revenue receipt and revenue expenditure.

## DEFICITS

**(a) Revenue Deficit** refers to the excess of revenue expenditure over revenue receipts.

**(b) Budget Deficit** refers to the excess of total expenditure over total receipts. Here, total receipts include current revenue and net internal and external capital receipts of the governments.

**(c) Fiscal Deficit** refers to the difference between total expenditure (revenue, capital, and loans net a repayment) on one hand; and on the other hand, revenue receipts plus and those capital receipts which are not in the form of borrowings but which in the end accrue to the government.

**(d) Primary Deficit** refers to fiscal deficit minus interest payments.

**Monetised Deficit** = Increment in Net RBI Credit to the Central Government.

## INDIAN FISCAL SYSTEM

### FISCAL SYSTEM

- It refers to the management of revenue and capital expenditure finances of the state.

### SOURCES OF REVENUE

- Main sources of revenue are customs duties, excise duties, service tax, taxes on property, corporate tax and income tax.

### SOURCES OF EXPENDITURE

- **Plan Expenditure** includes agriculture, rural development, irrigation and flood control, energy, industry, minerals, transport and communication, etc.

### PUBLIC DEBT

- Internal Debt
- External Debt
- Revenue Expenditure includes
- Capital Receipts includes
- Recovery of Loans
- Other Receipts (mainly PSU) (Disinvestment)
- Borrowings and other Liabilities
- Capital expenditure is huge expenditure, e.g., repayment of past loan including PPF (Private Provident Fund) and small saving.
- **Revenue Deficit** is the difference between Revenue Receipts and Revenue Expenditure.

### BUDGET

- The core of the budget is called the annual financial statement. This is the main budget document. Under Article 112 of the Constitution, a statement of estimated receipts and expenditure of the Govt. of

India has to be laid before the Parliament in respect of every financial year running from April 1 to March 31 while under article 202 of the Constitution a statements of estimated receipts and expenditures of the State Governments has to be laid before the House of the State Legislature concerned.

- The **Annual Budget** of the Central Government provides estimates of receipts and expenditures of the government. The Budget consists of two parts viz. (i) Revenue Budget and (ii) Capital Budget.
- **Revenue Budget:** All "Current" receipts such as taxation, surplus of public enterprises, and 'expenditures' of the government.
- **Capital Budget:** All "Capital" receipts and expenditure such as domestic and foreign loans 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.

## ■ PREPARATION OF BUDGET

- The budget is prepared by the budget division in the Ministry of Finance (MoF) after consulting with other ministries and the Planning Commission.

## ■ BUDGET TIMELINE

- Budget draft prepared and finalised– 28/29 February.
- Budget tabled before Parliament – March.
- General discussion on Budget proposal– March-April.
- House adjourns individual ministries Demands for Grants studies by Standing Committees – April.
- Detailed discussion and voting on ministries Demand for Grants – 1 April.
- New financial year begins–April.

## ■ STAGES IN BUDGET ENACTMENT

The budget goes through the following six stages in the Parliament.

- Presentation of the budget on the floor of the House before the Lok Sabha.
- General discussion on the budget.

## ■ VOTE ON ACCOUNT

- If budget is not passed before the beginning of financial year, then government use the concept of vote on account. Usually, the Appropriation Bill (expenditure part of budget) is passed by end of April, but government needs money from beginning of financial year, so government use vote-on-account to remove money from consolidated fund of India.
- Scrutiny by departmentally related standing committees.
- Voting on demands for grants.
- Passing of appropriation bill (Article 114 of the Constitution of India).
- Passing of finance bill (under rule 219 of the Lok Sabha).

## ■ TYPES OF BUDGETING

- **Line Item Budgeting:** It emphasises on the items (Objects) of expenditure without highlighting its purpose.
- **Output Budgeting:** It concentrates only on the quantitative aspect of expenditure.
- **Performance-based Budgeting:** Its attempt to solve decision-making problem based on a programmes ability to convert inputs to outputs and use inputs to affect certain outcomes.
- **Outcome Budgeting:** This type of budgeting tries to ensure that budget outlays translate into concrete outcomes.
- **Zero-based Budgeting:** It is a method of budgeting, in which all budgetary allocations are set to nil at the beginning of a financial year.
- **Gender Budgeting:** It came into being in 2004-05. To contribute towards the women empowerment and removal of inequality based on gender, role of budgeting has been accepted through this step.
- **Programme Budgeting:** It emphasis the planning aspect of budgeting for selecting the best out of a number of available programmes and for optimising the choice.

## ■ SMART FACTS 'BUDGET'

- **John Mathai** proposed the first budget of Republic of India in 1950.

- Finance Minister **Morarji Desai** has given budget for the maximum number of times.
- Indira Gandhi** is the only woman to hold the post of the Finance Minister and to have presented the budget in her capacity as the Prime Minister of India in 1978.

## BANKING IN INDIA

- 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 1884.
- The Banking Companies Act was passed in February 1949, which was subsequently amended to read as Banking Regulation Act, 1949.
- The Indian banking system consists of commercial banks, both in public and private sectors, Regional Rural Banks (RRBs) and cooperative 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 seven 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 Gorewala Committee and rechristened as State Bank of India.
- On July 19, 1969, 14 big commercial banks with deposits worth ₹ 50 crores or more and on April 15, 1980, six other scheduled banks were nationalised, bringing total number of nationalised banks to 27 (19 + SBI 7 SBI Associates).

- 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.

### Establishment of Various Financial Institutions

1. Reserve Bank of India	1934
2. Industrial Finance Corporation of India	1948. Sick financial institution
3. ICICI	1955
4. SBI	1955. Nationalised
5. Life Insurance Corporation (LIC)	1956
6. Industrial Development Bank of India (IDBI)	1964
7. Unit Trust of India (UTI)	1964
8. HUDCO	1970
9. General Insurance Corporation (GIC)	1972
10. NABARD	1982
11. SEBI (Replaced Controller of Capital Issue)	1988. Functional in 1992
12. Small Industries Development Bank of India (SIDBI)	1990. Subsidiary of IDBI
13. IRDA	1999

### 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.

### SCHEDULED AND NON-SCHEDULED BANKS

- The scheduled banks are those which are entered in the second schedule of the RBI Act, 1934.
- The commercial banks (India and foreign), regional rural banks and state co-operative banks or scheduled banks. Non-scheduled banks are those which are not included in the second schedule of the RBI Act, 1934.

## ■ RESERVE BANK OF INDIA (RBI)

- RBI was set up on the basis of Hilton Young Commission recommendation in April 1935, with the enactment of RBI Act, 1934. Its first Governor was C.D. Deshmukh.

## ■ ADMINISTRATION

- The headquarters of RBI are in **Mumbai**.

## ■ QUANTITATIVE/GENERAL CREDIT CONTROL

- Quantitative credit controls are used to control the volume of credit and indirectly to control the inflationary and deflationary pressures caused by expansion and contraction of credit.

The quantitative credit control consists of:

- Bank Rate:** It is also called the rediscount rate. It is the rate, at which the RBI gives finance to commercial banks.
- Cash Reserve Ratio (CRR):** The RBI (Amendment) Bill, 2006, empowers RBI to prescribe CRR—Cash that banks deposits with the RBI without any floor rate or ceiling rate.
- Statutory Liquidity Ratio (SLR):** It is the ratio of liquid asset, which all commercial Banks have to keep in the form of cash, gold and **unencumbered** approved securities equal to not more than 40% of their total demand and time deposit liabilities (ranges is 25-40%).
- Repo Rate:** It is the rate, at which RBI lends short-term money to the bank against securities.
- Reverse Repo Rate:** It is the rate, at which banks park short-term excess liquidity with the RBI.
- Open Market Operations (OMOs):** Under OMOs, the RBI sells G-securities in the market.

## ■ QUALITATIVE/SELECTIVE/DIRECT CREDIT CONTROL

Qualitative measures are used to make sure that purpose, for which loan is given is not misused. It is done through:

- Credit rationing.
- Regulating loan to consumption, etc.

## ■ INDIAN BANKS OPERATIONS ABROAD

- SBI has the largest network of foreign offices followed by Bank of Baroda.

- Among private sector banks, ICICI Bank has the largest foreign.

## ■ BANKING OMBUDSMAN

- The scheme is in operation since 1995 and work under the control and supervision of the RBI.

## ■ CRITERIA

- The 2001 revised guidelines have set certain criteria for the establishment of the new private sector banks. Some of these are:

- The bank should have minimum net worth of ₹ 100 crores.
- The promoters holding should be a minimum of 25% of the paid-up capital.
- Within three years of the starting of the operations, the bank should offer shares of public.

## ■ HOUSING DEVELOPMENT FINANCE CORPORATION (HDFC)

HDFC was the first private bank to receive license after 1993 economic reforms.

## ■ PRIORITY SECTOR LENDING

- The broad categories of advances under priority sector lending now include agriculture MSME sector, microcredit, education and housing.
- The priority sector lending targets of 40%, 32% and 60% have been fixed with respect to domestic, foreign and regional rural banks respectively.

## ■ DIFFERENTIAL INTEREST RATE SCHEME

- The scheme was introduced in 1972, under which public sector banks are required to fulfill the target of at least 1% of the advances at the end of the previous year to the weakest of the weaker sections of the society at an interest rate of 4% per annum.

- Lead Bank Scheme** under which each public sector bank is allocated certain districts and these banks have to bring development of those districts.

## ■ 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 crediting and depositing facilities for agriculture and other productive activities of all kinds in rural areas.

- First Regional Rural Bank was established on 2 October 1975.

## 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 1904.
- In the year 1991, Narasimhan Committee was constituted to advice or the issue of reconstruction of banking system.

## DEVELOPMENT BANKS

- Industrial Development Bank of India (IDBI)**, established in 1964.
- Industrial Finance Corporation of India (IFCI)**, established in 1948.
- Industrial Credit and Investment Corporation of India Limited (ICICI)** established in 1991.
- Small Industries Development Bank of India (SIDBI)**, established in 1988.
- Export-Import Bank of India (Exim Bank)** was established in 1982.
- National Housing Bank (NHB) started operations in 1988.
- NABARD** (National Bank for Agriculture and Rural Development) was established in 1982.

## INSURANCE

- Insurance industry includes two sectors—Life Insurance and General Insurance. Life Insurance in India was introduced by Britishers. A British firm in 1818 established the Oriental Life Insurance Company at Calcutta now Kolkata.
- Life Insurance Corporation (LIC) of India was established in September 1956. General Insurance Corporation (GIC) was established in November 1972.

- On 3 November 2000, GIC was renamed as GIC Re and approved as **Indian Reinsurer** and the four subsidiaries of GIC were separated from GIC and are functioning independently under Public Sector General Insurance companies (GIPSA).
- Indian insurance sector has low penetration, particularly in the rural areas. **The committee on Insurance Sector Reforms was set-up in 1993 under the chairmanship of R.N. Malhotra** which submitted its report in 1994.
- At present LIC is operating internationally through Branch Offices in Fiji, Mauritius, and UK and through Joint Venture Companies in Bahrain, Nepal, Sri Lanka, Kenya and Saudi Arabia.

## INSURANCE REGULATORY AND DEVELOPMENT AUTHORITY (IRDA)

- IRDA was set up on April 19, 2000 under the IRDA Act, 1999.
- IRDA comprises of a chairman, three whole-time members and four part-time members.

### Pension Sector

- New Pension System launched on 1 January 2004.
- With effect from 1 November 2009, the NPS was opened to all citizens.

- Swavalamban Scheme** was announced in the Budget of 2010. It is an incentive scheme for the NPS.
- The revised guidelines for NPS have raised the age from 55 years to 60 years.
- The Pension Fund Regulatory Development Authority was established on 23 August, 2003.

## BASE RATE SYSTEM

- Base rate system asks the banks to set a level of minimum interest rates charged while giving out the loans.
- Introduced on the recommendation of **Deepak Mohanty Committee**.

## BASEL NORMS

- Basel Norms are set by Bank of International Settlement (BIS) headquartered in Basel,

- Switzerland. It prescribes for a set of minimum capital requirement for banks.
- In India, Basel norms were introduced in 1988 by the RBI.

### INSTRUMENTS OF MONEY MARKET

- 91 days Treasury Bills (T-bills)
- 182 days T-bills
- 364 days T-bills
- 14 days T-bills
- Dated Government Securities
- Certificate of Deposits
- Commercial Papers
- Money Market Index
- Bankers Acceptance Rate
- LIBOR/MIBOR

### TAX SYSTEM

- A compulsory contribution given by a citizen or organisation to the government is called Tax.
- 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 and 2. Indirect Taxes.
- Direct Taxes:** The taxes levied by the Central Government on income 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:** 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) where sales tax is the exclusive jurisdiction of the State Governments.
- 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 and direct tax.

- R. Chelliah Committee** was constituted in August 1991 for suggesting reforms in Tax Structure.
- K.L. Rekhi Committee** was constituted in 1992 for suggesting uniform regulations for indirect taxation (Customs Duty and Excise Duty).

### Direct and Indirect Tax

Direct Tax	Indirect Tax
Corporation Tax	Excise Duties
Income Tax Service Tax	Interest Tax
Central Value-added Tax (Vat)	Expenditure Tax
Sales Tax	Wealth Tax
Property Tax	Gift Tax
Octroi	Estate Duty
Customs Duties	Land Revenue
Stamp Duties	

GST would be applicable on “supply” of goods or services as against the present concept of tax on the manufacture of goods or on sale of goods or on provision of services. GST would be based on the principle of destination based consumption taxation as against the present principle of origin-based taxation. It would be a dual GST with the Centre and the States simultaneously levying it on a common base. The GST to be levied by the Centre would be called Central GST (central tax-CGST) and that to be levied by the States [including Union territories with legislature] would be called State GST (state tax-SGST). Union territories without legislature would levy Union territory GST (union territory tax-UTGST).

### GST REPLACED THE FOLLOWING TAXES CURRENTLY LEVIED AND COLLECTED BY THE CENTRE:

- (a) Central Excise Duty; (b) Duties of Excise (Medicinal and Toilet Preparations); (c) Additional Duties of Excise (Goods of Special Importance); (d) Additional Duties of Excise (Textiles and Textile Products); (e) Additional Duties of Customs (commonly known as CVD);

- (f) Special Additional Duty of Customs (SAD);
- (g) Service Tax; (h) Cesses and surcharges insofar as they relate to supply of goods or services.

### STATE TAXES THAT WOULD BE SUBSUMED WITHIN THE GST ARE

- (a) State VAT; (b) Central Sales Tax; (c) Purchase Tax; (d) Luxury Tax; (e) Entry Tax (All forms); (f) Entertainment Tax (except those levied by the local bodies); (g) Taxes on advertisements; (h) Taxes on lotteries, betting and gambling; (i) State cesses and surcharges insofar as they relate to supply of goods or services.

GST would apply to all goods and services except Alcohol for human consumption. GST on five specified petroleum products (Crude, Petrol, Diesel, ATF & Natural gas) would be applicable from a date to be recommended by the GSTC. Tobacco and tobacco products would be subjected to GST. In addition, the Centre would continue to levy Central Excise Duty. A common threshold exemption would apply to both CGST and SGST. Taxpayers with an annual turnover of ₹20 lakh (₹10 lakh for special category States (except J & K) as specified in article 279A of the Constitution would be exempted from GST. A compounding option (i.e. to pay tax at a flat rate without credits) would be available to small taxpayers (including to manufacturers other than specified category of manufacturers and service providers) having an annual turnover of up to ₹75 lakh [₹50 lakh for special category States (except J & K and Uttarakhand) enumerated in article 279A of the Constitution]. The threshold exemption and compounding scheme would be optional.

### 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.

- 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 imports duty and export duty both.
- **Imports Duties:** Generally, imports duties are ad-valorem in India.
- **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.
- 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 the much-awaited symbol.
- The new symbol is an amalgamation of Devanagari 'Ra' and the Roman 'R' without the stem.
- 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.
- One Coin and One Rupee note belong to 'Legal Tender Money category'.
- M1 is known as Narrow Money.
- M3 is known as Broad Money.

### INDUSTRY

- Industry sector comprises mining, manufacturing, electricity and gas and construction.
- The Industrial Policy Resolution of 1948 marked the beginning of the evolution of the Indian Industrial Policy.
- In the Industrial Policy of 1948, the importance of both public sector and private sector was accepted. However, the responsibility of development of basic industries was handed over to public sector.
- The Industrial Policy Resolution of 1956 gave the public sector strategic role in the economy.

- The IPR, 1956, called the **Economic Constitution** of India, gave the public sector a strategic role in the economy.
- 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.

### ■ NEW INDUSTRIAL POLICY, 1991

- Abolition of industrial licensing:** The new industrial policy abolished all industrial licensing irrespective of the level of investment, except for certain industries.
- Entry of foreign investment and technology made easier:** Approval would be given for direct foreign investment up to 15% foreign equity in high priority industries.
- Public sector's role diluted:** Industries that continue to be reserved for the public sector are: (i) arms and ammunition and allied items of defence equipment, defence aircraft and warships; (ii) atomic energy; (iii) mineral oils and minerals specified in the schedule to the Atomic Energy (Control of Production and Use) Order, 1953; and (iv) railways.
- MRTP Act:** Under the MRTP Act, all firms with assets above a certain size (₹ 100 crores since 1985) were classified as MRTP firms. Such firms were permitted to enter selected industries only and this also a case by case approval basis.
- 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 subjects to compulsory licensing. In cities with a population of more than one million, industries other than those of

non-polluting type will be located outside several kms of the periphery.

- Abolition of Phased Manufacturing Programmes for new projects.**
- Mandatory Convertibility clause removed:** A large part of industrial investment in India is financed by loans from banks and finance institutions. These institutions have followed a mandatory practice including a convertibility clause in their lending operations for new projects. This mandatory convertibility clause 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.
- Navratna:** Public sector enterprises have been given enhanced autonomy and delegation of powers to incur capital expenditure (without any monetary ceiling), to enter intertechnology joint ventures, to raise capital from domestic and international market, to establish financial joint ventures and to wholly own subsidiary.

### ■ PUBLIC SECTOR

- In terms of ownership, public sector enterprise (PSE) comprises all undertakings that are owned by the government, or the public, whereas private sector comprises enterprises that are owned by private persons.

### ■ PUBLIC SECTOR ENTERPRISES

- The concept of **Memorandum of Understanding** (MoU), on the recommendation of Arjun Sengupta Committee (1988), was started in 1991.
- The concept of **Maharatnas, Navratnas** and **Miniratnas** was started in 1997.

### ■ MAHARATNA

- In 2009, the government established the **Maharatna** status, which raised the PSEs investment ceiling from ₹ 1,000 crores to ₹ 5,000 crores.

### ■ CRITERIA FOR MAHARATNA

The six criteria for the eligibility of Maharatna are:

- Having Navratna status;
- Listed on India stock exchange
- Have an average annual turnover of more than ₹ 25,000 crores during the last three years;
- An average annual net worth of more than ₹ 15,000 crores during the last three years;
- An average annual net profit after tax of more than ₹ 5,000 crores during the last three years;
- Should have significant global presence.

#### List of Maharatnas

There are **Eight Maharatnas** in India:

- Oil and Natural Gas Corporation (ONGC)
- Bharat Heavy Electricals Limited (BHEL)
- Gas Authority of India Limited (GAIL)
- Steel Authority India Limited (SAIL)
- Indian Oil Corporation (IOC)
- National Thermal Power Corporation (NTPC)
- Coal India Limited (CIL)
- Bharat Petroleum Corporation Limited

- Oil India Limited
- Power Finance Corporation Limited
- Power Grid Corporation of India Limited
- Rashtriya Ispat Nigam Limited
- Rural Electrification Corporation Limited
- Shipping Corporation of India Limited
- Container Corporation of India Ltd.
- Engineers India Ltd.
- National Building Construction Corporation Ltd.

#### DISINVESTMENT AND PRIVATISATION

- Disinvestment is a process through which privatisation could take place.
- First Disinvestment Commission was set up in 1996, under the Chairmanship of E.V. Ramakrishna, which was later constituted in July 2001, under Dr. R.H. Patil.
- There is a difference between privatisation and disinvestment. Privatisation implies a change in ownership resulting in a change in management. 'Disinvestment' is a wider term extending from dilution for the stake of the government to the transfer of ownership (when govt. stake reduced beyond 51%).
- To minimize the financial burden on the Public Sector Enterprises the government has started Voluntary Retirement Scheme (VRS) for the employees by giving full compensation to employees. This is called "**Golden Hand Shake Scheme**".

#### SMALL SCALE INDUSTRIES

Their importance can be explained as:

- Employment Generation.
- Equitable Distribution.
- Mobilisation of Small Savings.
- Exports contribution.
- Environment-friendly.

However, small scale industries are suffering from a number of problems like: (i) Lack of timely, adequate and easy finance; (ii) Lack of availability of raw material; (iii) Lack of sound marketing system; and (iv) Competition with large scale sector.

#### SICK INDUSTRIES

- A sick unit is one which is in existence for at least five years and it is found at the end of

#### List of Navratnas

- Bharat Electronics Limited
- Hindustan Aeronautics Limited
- Hindustan Petroleum Corporation Limited
- Mahanagar Telephone Nigam Limited
- National Aluminium Company Limited
- National Mineral Development Corporation
- Neyveli Lignite Corporation Limited

- the accounting year that it had fully eroded its net worth 30,000 units fall every year. A weak unit is the one which erodes 15% more of its net worth.
- Textile industry is the largest industry in the country. The share of textile and clothing industry in total industrial production is about 14% also contributes 13.14% in total merchandise exports of the country. This industry provides employment to about 350 lakh people in a country.
  - Ahmedabad is known as Boston of East. Kanpur is called Manchester of North India.
  - The first cycle making factory of India was established in Calcutta in 1932. India holds second place in the field of cycle production in the world.
  - Abid Husain Committee** is related to reforms in small industries.
  - The industries in which maximum ₹ 1 crore is invested are called Small industries.
  - Industrial Finance Corporation of India (IFCI)* was established on 1 July 1948 by a special Act of Parliament.
  - Industrial Development Bank of India (IDBI)** is an apex institution in the field of industrial finance.
  - Industrial Reconstruction Board of India (IRBI)* was established in 1971.
  - Unit Trust of India** was established in 1964.
  - The head office of Life Insurance Corporation of India is in Mumbai.
  - General Insurance Company of India (GIC) was established in 1972.
  - Indian Industrial Investment Bank Limited was established on 17 March 1977 by the government, under Companies Act, 1956. Presently, its authorized capital is 1000 crore rupees and its head office is in Kolkata.

## LARGE SCALE INDUSTRIES

### IRON AND STEEL INDUSTRY

- First steel industry at Kulti, West Bengal-Bengal Iron Works Company was established in 1870.
- First large scale steel plant-TISCO at Jamshedpur (1907) was followed at by IISCO at Burnpur (1919).

- The first public-owned steel plant was Rourkela Integrated Steel Plant set up in 1954 with the help of a German company, Demag.
- India is the fourth largest producer of crude steel in the world.
- India is the largest producer of sponge iron since 2002.
- Steel Authority of India Limited (SAIL) was established in 1974.

### COTTON AND SYNTHETIC TEXTILE INDUSTRY

- It is the largest industry in India. The first Indian modernised cotton cloth mill was established in 1818 at fort Gloster near Kolkata but this was unsuccessful.
- The second mill was established in 1854 at Bombay by K.G.N. Daber.

### JUTE INDUSTRY

- Jute industry was started in 1855 at Resra and India is the largest producer and second largest exporter of jute in the world.

### GEMS AND JEWELLERY

- According to the data released by the World Gold Council (WGC), India is the largest consumer of gold.
- India (especially, Seurat and Mumbai) ranks among the 'big four' diamond cutting centres of the world, the other three being, Belgium (Antwerp), the USA (New York) and Israel (Ramat Gan).

### PAPER INDUSTRY

- The first paper mill in India was set up at Sreerampur, West Bengal, in the year of 1862.

### SILK INDUSTRY

- India is the second largest (after China) silk manufacturer.
- The majority of silk is produced mainly in Bhoojan Pochampally (also known as silk city), Kanchipuram, Dharamvaram and Mysore.

### SUGAR INDUSTRY

- India is the largest producer of sugar in the world with a 22% share.
- It is the second largest agro-based industry in the country.
- B.B. Mahajan Committee** was set up to study the sugar industry.

- Dual price mechanism with partial control is applied to sugar industry.

### CEMENT INDUSTRY

- India is the second largest producer of cement in the world.

### PETROCHEMICAL INDUSTRY

- The real thrust to this industry came with the establishment of Indian Petrochemical Corporation Limited at Baroda.
- Kanpur Committee was set up to identify and support the growth of basic petrochemical and their end.

### FERTILIZER INDUSTRY

- The first fertiliser industry was set up in 1906, in **Ranipet** near Chennai.
- India is the third largest producer of fertilizer after China and USA and second largest consumer after China.
- Urea is the only fertilizer under statutory price control.

### AUTOMOTIVE INDUSTRY

- India is the **second** largest manufacturer of motorcycle and fifth largest manufacturer of commercial vehicles in the world.
- India is the largest manufacturer of tractors in the world.

## FOREIGN DIRECT INVESTMENT

- FDI occurs when a company invests in a business that is located in another country and it is investing not less than 10% of shares belonging to the foreign company. It is a non-debt capital flow.
- If the investment is less than 10% shares then it is called FII (Foreign Institutional Investment).
- Foreign portfolio investment occurs, when foreign investment in the form of shares, equities and bonds, is made by a foreign company.

### FDI IN RETAIL

- Since, May 20, 2011, FDI in **Limited Liability Partnership (LLP)** has been allowed.

## UNORGANISED SECTOR AND INFORMAL ECONOMY

- Unorganised Informal workers refer to workers, who are not covered under any social security benefits irrespective of whether they work in organised or unorganised sector. 86% of the total workforce was in the unorganised sector in 2004-05.
- To look into the problems of unorganised sector, **National Commission** for Enterprises in the Unorganised Sector was set up under the Chairmanship of **Dr. Arjun Sengupta**.
- In accordance with the recommendation of the NCEUS, the Government of India enacted the **Unorganised Worker Social Security Act, 2008**. The act came into effect from 16 May 2009.

## NATIONAL MANUFACTURING POLICY (NMP)

- The NMP was released by the government on 4 November 2011 with following objectives:
  - Increase manufacturing growth to 12-14% over the medium-term.
  - Enable manufacturing to contribute at least 25% of GDP by 2022.
  - Create 100 million additional jobs in the manufacturing sector by 2025.
  - Provides for National Investment and Manufacturing Zone (NIMZ) on lands, which are degraded and uncultivable.

## NATIONAL GOVERNANCE PLAN

It was launched in May 2006. It comprises Mission Mode Projects, covers e-infrastructure and MCA 21.

## NATIONAL POLICY ON ELECTRONICS (NPE), 2011

- NPE was released on 3 October 2011. The main objectives are:
  - To achieve a turnover of about US\$ 400 billion by 2020.
  - To create employment opportunities of around 28 million.
  - To increase export from US\$ 5.5 billion to US\$ 80 billion 2020.

## AUTOMOBILE INDUSTRY

- Automobile Industry was delicensed in July 1991 with the announcement of the New Industrial Policy.
- 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.

## 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.

## MICRO, SMALL AND MEDIUM ENTERPRISE DEVELOPMENT ACT, 2006

- This new Act, named as '**Small and Medium Enterprise Development Act, 2006**' has become effective from October 2, 2006.
- The Act provides the first-ever legal framework for recognition of the concept of '**enterprise**' (comprising both manufacturing and service and integrating the three tiers of these enterprises, viz., micro, small and medium).

## FOREIGN TRADE

- After independence, inward looking foreign trade policies were accepted and the policy of import replacement was its base.

## VOLUME OF INDIA'S FOREIGN TRADE

- After independence, Indian foreign trade has 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 cannot be said satisfactory

because Indian share in total foreign trade of the world has remained remarkable low.

- 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 good 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 Indian are broadly classified into four categories:** (i) Agriculture and allied products. Ores and minerals manufactured goods and (ii) Mineral fuels and lubricants.
- Exports of India over the years show a clear decline in the importance of agriculture and allied products and a substantial increase in the importance of manufactured goods. This has been due to change production structure of the economy and the overall growth of the economy.

## DIRECTION OF FOREIGN TRADE

- India is having maximum trade with OECD countries (mainly they US, EU and Japan).
- Indian trade has been partially shifted from West Europe of East Asia and OECD countries.
- The high growth rate in Japan and ASEAN countries gave a high demand and favourable market to India exports. This has been one of the reasons responsible for increasing Indian exports to East-Asian region of the world.

## NEW FOREIGN TRADE POLICY (2009-14)

- In the Foreign Trade Policy for the year 2009-14 announced on August 2009, the government spelt out a bold vision to double India exports of goods and services by 2014 and to double India's percentage share of global trade by 2020 and to focus on the generation of addition employment.

## BALANCE OF PAYMENTS

- BoP comprises current account, capital account and omissions and changes in foreign exchange reserves.

- Under current account transactions are classified into merchandise (exports and imports) and invisibles.

**Balance of Payment Crisis:** It means that exports exceed imports in value.

- The main component of capital account includes foreign investment, loans and banking capital.

**Non-debt Liabilities** includes FDI and portfolio investment comprising FIIs, ADRs/ GDRs.

- Debt Liabilities** included External assistance, External Commercial Borrowings (ECBs), trade credit and banking capital (NRIs deposits).

**Balance of Payment:** The balance of Payments may be classified into current account, capital account, unilateral transfer account and gold account.

**Invisibles:** A term used to describe those items such as financial series, included in the current Balance of Payments accounts, as distinct from physically visible Imports and Exports of goods.

### SPECIAL ECONOMIC ZONE (SEZ)

- Asia's first Export Processing Zone (EPZ) was set up in Kandla, India in 1965.
- The first SEZ policy was announced in April 2000.
- SEZ Act, 2005, was enacted with from 10 February 2005.

### SEZ ACT, 2005

- Duty-free import/domestic procurement of goods for development, operation and maintenance of SEZ units.
- 100% Income Tax exemption on export income of SEZ units; exemption from Central Tax, Sales Tax and Service Tax; and single-window clearance mechanism for the establishment of units.

### SEZs in India

S. No.	SEZ	Location	Type
1.	Kandla SEZ	Gujarat	Multi-product
2.	SEEPZ	Mumbai	Electronics, gems and jewellery

3.	Noida SEZ	Uttar Pradesh	Multi-product
4.	MEPZ	Chennai	Multi-product
5.	Cochin SEZ	Kerala	Multi-product
6.	Falta SEZ	West Bengal	Multi-product
7.	Visakhapatnam SEZ	Andhra Pradesh	Multi-product

### FOREIGN EXCHANGE RESERVES IN INDIA

- The foreign exchange reserves of the country include three important components: (i) Foreign Exchange Assets of RBI, (ii) Gold Stock of RBI and (iii) SDR holdings of the governments.
- After 1991, Indian foreign exchange reserves have rapidly increased due to various reasons which are as follows:
  - Devaluation of Rupee.
  - Availability of loans from international institutions.
  - Availability of foreign exchange from NRIs under various schemes.
  - Increase in foreign investment (both direct and indirect).
  - Full convertibility or rupee on current account.

- FEMA (Foreign Exchange Management Act) came into force in July 2000. This FEMA has replaced Foreign Exchange Regulation Act, 1943 (FERA, 1973).
- India's total external trade (exports plus imports including re-exports) in the year 1950-51 stood at ₹ 1214 crore. Since then, this has witnessed continuous increase with occasional downturns.

### THE INDIAN CURRENCY SYSTEM

The present currency system is based on **minimum reserve system** of note issue. It was adopted in 1957, under the minimum reserve system, minimum of gold and foreign securities to the extent of ₹ 200 crore (of which gold should be of value ₹ 115 crore) and the balance in rupee securities is maintained.

- The revised monetary measures are:  
**M1**= Coins and Notes + Demand Deposits + Other deposits with RBI.

**M2** = M1 + Time liabilities portion of saving deposits with banks + Certificates of deposits issued by banks + Term deposit maturing within a year.

**M3** = M2 + terms deposit with banks with maturity over one year + call/term borrowing of the banking system.

## DEVALUATION OF CURRENCY

- In India, devaluation has been resorted to four times.
  - (a) **First Devaluation** in June 1949.
  - (b) **Second Devaluation** in June.
  - (c) **Third Devaluation** on July 1, 1991.
  - (d) **Fourth Devaluation** on July 3, 1991.

## INFLATION

Inflation means a persistent rise in the price levels of goods and services leading to a fall in the currency's purchasing power.

## CAUSES OF INFLATION

- Printing too much money.
- Increase in production cost.
- Tax rises.
- Decline in exchange rates.
- War or other events causing instability.
- Increase in money supply in the economy.

## MEASURES TO CONTROL INFLATION

- Increasing the bank interest rates.
- Regulating fixed exchange rates of the domestic currency.
- **Deflation:** A general decline in prices often caused by a reduction in the supply of money or credit. Deflation can be also caused by a decrease in government, personal or investment spending.
- **Stagflation:** When you have a slow economy with high inflation rates and unemployment, stagflation is usually the result.
- Controlling prices and wages.
- Providing cost of living allowances to citizens.
- Regulating black and speculative market.
- Supply side inflation can be controlled by increasing production of economy, especially food grains and by improving infrastructure.

## WHOLESALE PRICE INDEX (WPI)

It measures the change in wholesale prices on weekly basis. The base year for WPI is 2004-05.

## CONSUMER PRICE INDEX (CPI)

It measures the change in retail prices on monthly basis.

## FINANCIAL RELATIONS BETWEEN CENTRE AND STATES

• Our Constitution provides residual powers to the Centre. Article 264 and Article 293 explain the financial relations between the Union and State Governments.

## FINANCE COMMISSION

- Under the provision of Article 280 of the Constitution, the President appoints a Finance Commission for the specific purpose of devolution of non-plan revenue resources. The Functions of the Commission are to make recommendations to the President in respect of:
  - The distribution of net proceeds of taxes to be shared between the Union and the States and the allocation of share of such proceeds among the States.
  - The principles, which should govern the payment of grants-in-aid by the Centre to the States.
  - Any other matter concerning financial relations between the Centre and the States.

• **Composition of Finance Commission:** The Finance Commission consists of Chairman and four other members to be appointed by President. They are eligible for re-appointment.

## FOURTEENTH FINANCE COMMISSION

The government constituted the Fourteenth Commission under former Reserve Bank of India Governor Yaga Venugopal Reddy. The five member panel is to submit its report by 31 October 2014.

## DEMOGRAPHY

### POPULATION TREND IN INDIA

- 1891-1921 Period of stagnant population.
- 1921-51 Period of steady growth.
- 1951-81 Period of high growth.
- 1981-2011 Period of declining rate.
- The year 1921 is known as the year of **Great Divide**.

### NATIONAL POPULATION POLICY 2000

This policy outlined the following objective to be achieved.

- To lower down the Total Fertility Rate (TFR) to achieve replacement level by 2010.
- Population stabilisation by 2045.
- Reduce MMR (Maternal Mortality Rate) to below 100 per 100000 births.
- Reduce IMR (Infant Mortality Rate) to below 30 per thousand live births.
- Making school education compulsory.
- Promote delayed marriage of girls.
- Promote and control communicable diseases.

### DEMOGRAPHICS

- First synchronised census in India took place in 1881. Since 1901, it has been taking place after every decade.
- Census 2011, is the 15th census and 7th after independence.
- The slogan of Census 2011 is “Our Census, Our Future”.
- India was the first country to adopt family planning in world.

## MISCELLANEOUS FACTS

- According to the World Bank, on the basis of the purchasing power parity, the economy of **India is the fourth largest economy in the world**.
- In the production of vegetables, India is on the second position (after China).
- **India is on the first position in the production of milk.**
- The highest producer of milk in India is Uttar Pradesh.
- India is the third largest producer of tobacco. The largest producer and consumer of tobacco is China.

- Four industries which have been reserved for public sector are: Arms and Ammunition, Atomic Energy, Rail Transportation, and Minerals mentioned in the scheduled list of Atomic Energy.
- The position of **India is first as a producer of pulses**.
- First Hydel Power Plant in India was started in Darjeeling.
- The Money-Order system in India was launched in 1880.
- First postal stamp was launched in India in 1852.
- Maharashtra is the first state which accorded the status of industry to agriculture in 1997.
- Central Agmark Laboratory is in Nagpur.
- First Cotton Industry of the country was established in Kolkata in 1818 and the second by Kovesjee Nana Bhai in Mumbai in 1853.
- The largest number of co-operative institutions is in India.
- Unorganised sectors are creating more employment than organised sector in India.
- Three cities of India have more than one 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.
- Prime Minister Narendra Modi announced demonetisation of ₹ 1000 and ₹ 500 notes with effect from midnight on 8 November 2016
- The Indian 2000 Rupee bank note is a denomination of the Indian Rupee. It was released by the RBI on 8 November 2016 after demonetisation of ₹ 500 and 1000 bank notes and has been in circulation since 10 November 2016.
- **TRIFED:** Tribal co-operative Marketing Development Federation of India Ltd. established by government in 1987 to benefit small tribal farmers.
- **NAFED:** National Agricultural Co-operative Marketing Federation of India Ltd. was established for marketing the agricultural products.
- 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.
- Agriculture Income Insurance Scheme was announced in 2004 to provide insurance safeguards and economic security to farmers.
- Seed Crop Insurance is operational since 1999-2000.
- Seed Bank is in operation since 1999-2000.
- Types of loans provided to Indian Farmers.
  - Short Term Loans:** Less than 15 months.
  - Medium Term Loans:** 15 months to 5 years.
  - Long Term Loans:** More than 5 years.

## 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.

**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.

**Ad-valorem Tax:** Ad-valorem tax is a kind of indirect tax in which goods are taxed by their values. Value Added Tax (VAT) is an ad-valorem tax.

**American Depository Receipt (ADR):** A security issued by a US bank in place of the foreign shares held in trust by that bank, thereby facilitating the trading of foreign shares in US markets.

**Amortization:** Accounting for expenses of chargers as applicable rather than as paid.

**Appreciation:** Appreciation means an increase in the value of something, e.g., stock of raw materials or manufactured goods.

**Arbitrage:** A technique employed to take advantage of differences in price.

**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.

**Assets:** Everything a corporation or an organisation owns 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. Whosoever makes the highest bid gets the commodity which is being sold.

**Auction market:** The system of trading securities through brokers or agents on an exchange such as the Bombay Stock Exchange.

**Auditor's report:** Often called the accountant's opinion, it is the statement of the accounting firm's work, 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.

**Balance Sheet:** Balance sheet is a statement showing the assets and liabilities of a business at certain date.

**Balance of Trade:** The part of a nation's balance of payments accounts that deals only with its imports and exports of goods and services.

**Bank:** Bank is a financial institution. It accepts funds on current account and savings accounts. It also lends money.

**Bank Draft:** Banker's draft (Demand Draft) is a negotiable claim drawn upon a bank. Bank Draft is safer than a cheque.

**Bank Rate:** It is official rate interest charged by Reserve Bank of India on loans to other banks. It is the rate at which RBI discounts first class securities including bills of exchange. Thus, it is known as discount.

**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 Frank and German Deutsche Mark. India opted for this system in 1975.

**Bear and Bull:** 'Bear' is an individual who sells shares in a hope that stock's price would fall. 'Bull' is an individual who buys shares in a 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.

**Bill of Exchange:** It is an unconditional order in writing addressed by one person to another requiring the addressee it pay on demand or at a fixed future time a certain sum of money to the order of the specified person to the bearer.

**Black Money:** It is unaccounted money which is concealed from tax authorities. Black money creates parallel economy.

**Blue Chip Stocks:** Stocks in large, nationally known companies that have been profitable for a long time and are well-known and trusted.

**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.

**Blue Sky Laws:** A popular name for laws various states have enacted to protect the public against securities frauds.

**Bond:** A bond is evidence of a debt on which the issuing company usually promises to pay the bondholders a specified amount of interest for a specified length of time, and to repay the loan on the expiration date.

**Boom:** Point at which price and employment are the maximum.

**Bounty:** It is a subsidy paid by the government to exporters.

**Brain-Drain:** It means the drift of intellectuals of a country to another country.

**Bride Loan:** A loan made by a bank for a short period to make up to a temporary shortage of cash.

**Broad Banding:** It means providing more flexibility to manufacturers to produce wider variety of products with same 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.

**Brokers' Loans:** Money borrowed by brokers from banks or other brokers for a variety of uses.

**Buffer stocks:** These are the stocks (generally of primary goods) accumulated by a government agency when supply is plentiful.

**Bullion:** It is gold or silver having a specific degree of purity.

**Bull Market:** It is a market where the speculators buy shares of commodities in anticipation of rising prices. The opposite is Bear Market.

**Buoyancy:** In the inflationary period, the increase in tax revenue is known as buoyancy.

**Buyer's Market:** When the markets is favourable to buyer's market. This situation occurs when there is a change from boom to recession.

**Callable:** A bond issue, all or part of which may be redeemed by the issuing firm, institution or organisation under specified conditions before maturity.

**Call Money:** It is a loan that is made for a very short period of a few days only or for a week.

**Capital:** The stock of goods which are used in production and which themselves have been produced.

**Capitalism:** The economic system based on free enterprise and private profit. Capitalism is an economic system in which all means of production are owned by private individuals.

**Capital Market:** It is a market for long-term loans.

**Capital Market:** It is a market for long loans.

**Capital stock:** All shares representing ownership of a business, including preferred and common.

**Capitalisation:** Total amount of the various securities issued by an organisation or a company. Capitalisation may include bonds, debentures, preferred and common stocks, and surplus.

**Cash Reserve Ratio (CRR):** It refers to that portion of banker's total cash reserves which they are statutorily to hold with the RBI.

**Cash Sale:** A transaction on the floor of the stock exchange that calls for delivery of the securities the same day.

**Ceiling Prices:** This is the maximum limit fixed generally by the government or its agency.

**Certificate:** The actual piece of paper that is an evidence of the ownership of stock in a company or an organisation.

**Certificate of Deposit (CD):** A money market instrument characterised by its set date of maturity and interest rate. There are two basic types of CDs: traditonal and negotiable.

**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.

**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).

**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.

**Common Stock:** Securities that represent an ownership interest in a company. The terms common stock and capital stock are 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. He is also known as a registered trader.

**Conglomerate:** A company or an organisation that has diversified its operations usually by acquiring enterprises in widely varied industries.

**Consolidated Balance Sheet:** It is 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.

**Corporate Tax:** It is a direct tax levied on company's profit.

**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.

**Cost Price Index (CPI):** It is used for measuring cost of living and it covers large number of commodities than Wholesale Price Index (WPI) which is used for measuring rate of inflation.

**Coupon Bond:** Bond with interest coupons attached.

**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 Squeeze:** Monetary authorities restrict credit as and when required. This credit restriction is called credit squeeze.

**Current Assets:** Those assets of a company are reasonably expected to be realized in cash, sold or consumed during one year.

**Currency Devaluation:** A government adjusts the value of the nation's currency so that it buys less of foreign currencies than before.

**Current Liabilities:** Money owed and payable by a company, usually within one year.

**Custom Duty:** It implies tax on imports. Custom duty is a duty that is imposed on the products received from exporting nations of the world. It is also called protective duty as it protects the home industries.

**Cyclical Unemployment:** It is that phase of unemployment which appears due the

occurrence of the downward phase of the trade cycle.

**Dealer:** An individual or firm in the securities business who buys and sells stocks and bonds as a principal rather than as an agent.

**Death Rate:** Death rate signifies the number of deaths in a year per thousand of the population. It is mostly known as crude death rate. Life expectancy is important determinant of death rate.

**Debentures:** It is a document which enlists the terms or conditions of a loan.

**Debit Balance:** In a customer's margin account, that portion of the purchase price of stock, bonds or commodities that is covered by credit extended by the broker to the margin customer.

**Decentration:** Decentration means the establishment of various units of the same industry at different places.

**Deed:** It is a written contract signed under legal seal.

**Deflation:** Deflation is a fall in the general price level over a particular period of time. It is opposite to inflation.

**Demand Draft:** It is a bill of exchange payable at sight.

**Depository Trust Company (DTC):** A central securities certificate depository through which members effect security deliveries between each other via computerised book-keeping entries, thereby reducing the physical moment of stock certificates.

**Depreciation:** A reduction in the value of capital goods over time due to their use in production.

**Depreciation of Currency:** A decline in the price of one currency relative to another.

**Depression:** It implies a state of economy when lack of demand result in heavy unemployment and stagnation in economy.

**Devaluation:** It is the reduction in the official rate of a currency in terms of a foreign currency. India rupee has been devalued thrice in 1949, 1966, and 1991.

**Director:** Person elected by shareholders to serve on the Board of directors.

**Discount:** The amount by which a preferred stock or bond may sell below its 'at par' value.

**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.

**Divided:** 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 a confirmation of a downward trend.

**Dumping:** It means selling goods in international market at a price which is lower than 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.

**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.

**Eagle's Law:** 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.

**Exchange Rate:** The rate at which central bank 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 of 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 stock selling ex-rights is not entitled to the right.

**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.

**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), and Entrepreneurship (profit).

**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.

**Fiscal Year:** A firm's or company's or a corporation accounting year.

**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.

**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.

**Free and Open Market:** A market in which supply and demand are freely expressed in terms of price.

**Free Trade:** It implies absence of any protective tariffs or trade barriers by any economy with respect to export and import.

**Fundamental Research:** Analysis of industries and companies based on such factors

as sales, assets, earnings, products or services, markets, and management.

**Funded Debt:** Usually, interest-bearing bonds or debentures of a company. These could include long-term bank loans.

**General Mortgage Bond:** A bond that is secured by a blanket mortgage on the company's property but may be outranked by one or more other mortgages.

**Gilt-edged:** High-grade bond issued by a company that has demonstrated its ability to earn a comfortable profit over a period of years and pay its bondholders their interest without interruption.

**Good 'til Canceled (GTC) or Open Order:** An order to buy or sell that remains in effect until it is either executed or canceled.

**Gresham's Law:** "If not limited in quantity; bad money drives good money out of circulation."

**Gross Domestic Product (GDP):** It is the aggregate of total flow of goods and services produced by an economy in year.

**Gross National Product (GNP):** Gross Domestic Product plus net factor income from abroad is equal to Gross National Product.

**Holding Company:** A corporation that owns the securities of another, in most cases with voting control.

**Hot Money:** It is volatile money which comes easily but can also go out easily, e.g., portfolio investment.

**Hypothecation:** The pledging of securities as collateral, for example, to secure the debit balance in a margin account.

**Income Bond:** Generally, income bonds promise to repay principal but to pay interest only when earned.

**Indenture:** A written agreement under which bonds and debentures are issued, setting forth maturity date, interest rate and other terms.

**Index:** A statistical yardstick expressed in terms of percentages of a base year of years.

**Inflation:** It is a sustained increase in general price level over a particular period of time. It reduces the purchasing power of money.

**Institutional Investor:** An organization whose primary purpose is to invest in own assets of those held in trust by it for others.

**Interest:** Payments borrowers pay lenders for the use of their money.

**Interim Budget:** It is an addition on the general budget and is presented as a part of it through the financial year.

**Interrogation Device:** A computer terminal that provides market information—last sale price, quotes, volume, etc.—on a screen or paper tape.

**Investment:** The use of money for the purpose of making more money, to gain income, increase capital, or both.

**Investment Banker:** Also known as an underwriter. The middleman between the corporation issuing new securities and the public.

**Investment Counsel:** One whose principal business consists of acting as an investment advisor and rendering investment supervisory services.

**I.O.U.:** It means 'I owe you'. It is non-negotiable promissory note indicating the debt owed by one party to another.

**Initial Public offering (IPO):** A company's first sale of stock to the public.

**IRA:** Individual retirement account. A pension plan with tax advantages. IRAs permit 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 of '**shares**' in the company.

**Keogh plan:** Tax-advantaged personal retirement programme 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 'free' markets over state's interference in economic affairs.

**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.

**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.

**Liquidity:** The ability of the market in a particular security to absorb in reasonable amount of buying or selling at reasonable price changes.

**Listed Stock:** The stock of a company that is traded in a stock exchange.

**Load:** The portion of the offering price of shares of open-end investment companies in excess of the value of the underlying assets.

**Locked in:** Investors are said to be locked in when they have profit on securities they own but do not sell because their profit would immediately come down subject to the capital gains tax.

**Margin:** The amount paid by the customer when using a broker's debt to buy or sell a security.

**Margin Call:** A demand upon a customer to put up money or securities—the broker.

**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.

**Merchant Banking:** In Merchant Banking, banks act as 'underwriter' and do business on behalf of corporate sector.

**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 input that go into production.

**Money Market Fund:** A mutual fund whose investments are in high-yield money market instruments such as federal securities, CDs and commercial paper.

**Monopoly:** It is a type of market structure having one seller and many buyers.

**Monopsony:** A market situation, in which there is only one buyer of a resource.

**Mortgage Bond:** A bond secured by a mortgage on a property.

**MoU:** The concept of **Memorandum of Understanding** introduced in 1988. The main objective of MoU is to reduce the quantity.

**Mutual Fund:** It is a form of collective investment that is useful 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 less capital consumption.

**Negotiable:** Refers to a security, the title of which is transferable by delivery.

**Net Asset Value:** Usually used in connection with investment companies to mean net asset value per share.

**Net Change:** The change in the price of security from the closing price on one day to the closing price the next day on which the stock is traded.

**Net Domestic Product (NDP):** The money value of a nation's annual output of goods and service, 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.

**Noncumulative:** A type of preferred stock on which unpaid dividends do not accrue.

**NYSE Composite Index:** The composite index covering price movements of all common stocks listed on the New York Stock Exchange.

**Octroi:** It is an internal tariff system among different region 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 listed 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.

**Oligopoly:** A market structure, in which a few, relatively large firms account for all or most of the production or sales of a good or service in a particular market, and where barriers to new firms entering the market are very high.

**Overbought:** An opinion as to price levels. May refer to a security 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'.

**Oversold:** 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 exchange.

**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.

**Participating preferred:** A preferred stock that is entitled to its state 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 less than \$1 a share.

**Per Capita Income:** It implies income per person. It is obtained in dividing national income of country by its population.

**Plastic Money:** It refers to use of instruments like '**Credit cards**' instead of cash in business transactions.

**Point:** In the case of shares of stock, a point means \$1.

**Portfolio:** Holdings of securities by an individual or institution.

**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 ₹ 76 per month in rural and ₹ 88 in urban areas in terms of 1979-80 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 common stock if the company liquidates.

**Premium:** The amount by which a bond or preferred stock may sell above its par 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.

**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.

**Progressive Tax:** A tax that take a larger percentage of income from people in higher-income groups than from people in lower-income ones.

**Profit-taking:** Selling stock that has appreciated in value since purchase, in order to realize the profit.

**Prospectus:** The official selling circular that must be given to purchasers of new securities registered with the Securities and Exchange 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.

**Reflation:** It is an increase in the level of **National Income and Output**. Reflation 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.

**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 on company affairs.

**Redemption price:** The price at which a bond may be redeemed before maturity, at the option of the issuing company.

**Refinancing:** Same as **refunding**. New securities are sold by a company and the money is used to retire existing securities.

**Registered Bond:** A bond that is registered on the books of the issuing company in the name of the owner.

**Registrar:** Usually, a trust company or bank charged with the responsibility of keeping record of the owners of corporation's securities and preventing the issuance of more than the authorized amount.

**Regressive Tax:** A tax that takes a larger percentage of income from people in groups than from higher-income ones. Sales taxes and excise taxes are example.

**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 others, to buy the new securities in proportion to the number of shares each one 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 has a minimum cash reserve of ₹ 5 lakh'.

**Scale Order:** An order to buy (or sell) a security, that specifies the total amount to be bought (or sold) at specified price variations.

**Scripophily:** A term coined in the mid-1970s to describe the hobby collecting antique bonds, stocks, and other financial instruments.

**SDRs (Special Drawing Rights):** The SDR is a reverse asset created with the framework of the International Monetary Fund in an attempt to increase international liquidity and forming a part of country's official reserves also with gold, reserve positions in the IMF and convertible foreign currency. It is also known as 'Paper Gold'.

**Self-Reliance:** Self-Reliance, in short, can mean attainment of economic independence which, in turn, implies capability to sustain a higher 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.

**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.

**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 share included in the index of 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. 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 they are liable for losses, although this liability is limited dividends and they are liable for losses, although this liability is limited to the value of the shares and to the limit of guarantee given by them. **Preference shares** are such shares of a company on which interest is 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.

**Sinking Fund:** Money regularly set aside by a company to redeem its bonds, debentures or preferred stock from 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 terms good 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.

**Split:** The division of the outstanding shares of a corporation into larger number of shares.

**Stock Exchange:** An organised marketplace for securities featured in the centralisation 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.

**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 price above or sell at a price below the current market.

*Stop buy orders* are generally used to limit loss or protect unrealized profits on a short sale. Stop sell orders are generally used to profits on a short sale. Stop sell orders are generally used to protect unrealized profits on limit loss on a holding.

**Street Name:** Securities held in the name of a broker instead of customer's name are said to be carried in 'street name'.

**Swapping:** Selling one security and buying a similar one almost at the same time to take a loss, usually for tax purposes.

**Syndicate:** A group of investment bankers who together underwrite and distribute a new issue of securities or a large block of an outstanding issue.

**Technical Research:** Analysis of the market and stocks based on support and demand.

**Tender Offer:** A public offer to buy shares from an existing stockholder of one public corporation by another public corporation under specific terms, good for a certain period of time.

**Third Market:** Trading of stock exchange-listed securities in the over the counter market by non-exchange member brokers.

**Ticker:** A telegraphic system that continuously provides the last sale prices and volume of securities transactions of exchanges.

**Trader:** Individuals who buy and sell for their own accounts for short term profit.

**Transfer Agent:** A transfer agent keeps a record of the name of each registered shareowner, his or her address, the number of shares owned, and sees that certificates presented for transfer are properly canceled and new certificates issued in the name of the new owner.

**Treasury Stock:** Stock issued by a company but later reacquired. It may be held in the

company's treasury indefinitely, reissued to the public or retired.

**Turnover Rate:** The volume of shares traded in a year as a percentage of total shares listed on an exchange, outstanding for an individual issue or held in an institutional portfolio.

**Unlisted Stock:** A security not listed on a stock exchange.

**Up Tick:** A term used to designate a transaction made at a price higher than the preceding transaction. Also called a 'plus' tick. A 'zero-plus' tick is a term used for a transaction at the same price as the preceding trade but higher than the preceding different price. Conversely a down tick, or 'minus' tick, is a term used to designate a transaction made at a price lower than the preceding trade.

**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.

**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 stage to avoid double taxation.

**Volume:** The number of shares or contracts traded in a security or area entire market during a given period.

**Voting Right:** A common stockholder has right to vote his/her stock in affairs of a company. The right to vote may be delegated by the stockholder to another person.

**Warrants:** Certificates giving the holder the rights to purchase security at a stipulated price within a specified time limit or perpetually.

**Working Control:** Theoretically, ownership of 51% of a company's voting stock is necessary to exercise control. In practice and this is particular true in the case of a large corporation, effective control sometimes can be exerted through ownership, individually or by a group acting in control of less than 50%.

**Yield:** Also known as return. The dividends or interest paid by a company expressed as a price.

**Yield to Maturity:** The yield of a bond to maturity takes into account the price discount from or premium over the face value.

**Zero Coupon Bond:** A bond that pays no interest but is priced, at a discount from its redemption price.

The existence of a large parallel economy fluctuates in agricultural and industrial output and indirect taxation are the reasons for:

### COST PUSH INFLATION

- Among the supply side, measure to contain inflation is **to increase the supply of products or commodities.**
- Population experts refer to the possible 'demographic bonus' that may accrue to India around 2016 AD. 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:

### Various Acts and their Enactment Years

1.	Banking Regulation Act	1949
2.	Industries (Development and Regulation) Act	1951
3.	MRTP Act	1969
4.	FERA	1973
5.	Negotiable Instruments Act	1981
6.	FEMA	2000
7.	Competition Act	2002

### Commissions/Committees and Their Purpose

Arjun Sen Gupta Committee	Public Sector Enterprise Autonomy
Rangarajan Committee	Disinvestment of PSUs and Balance of Payments
Malhotra Committee	Insurance Sector and its regulation. Follow-up led to setting up of IRDA.

Madhukar Committee	Gold exchange-traded fund implementation.
L.C. Gupta Committee	Derivatives in India Model
Naresh Chandra Committee	Corporate Audit and Governance
J.J. Irani Committee	Company Law Reforms
B. Bhattacharya Committee	Committee on pension reforms
Rakesh Mohan Committee	Small savings and Administered interest rates
Vijay Kelkar Committee	FRBM (Fiscal Responsibility and Budget Management) Act implementation
S.P. Gupta Committee	Generation of employment opportunities in the 10th plan
Raghvan Committee	Replacement of MRTP Act by Competition Act.
Eradi Panel	Industrial Insolvency
M.S. Verma	Restructuring weak banks.
Lakdawala Committee	Estimating poverty line in India
Montek Singh Ahluwalia	Power Sector reforms
Rakesh Mohan Committee	Development of Infrastructure in India
Abid Hussain Committee	Small Scale Sector
Jha Committee	MODVAT
Vasudev Committee	NBFC
Omkar Goswami Committe	Industrial Sickness
G.V. Ramakrishna	Disinvestment Commission
Arvind Virmani	Import Tariff Reform
Vaghul Committee	Money Markets India reforms

## FERA and FEMA

FERA	FEMA		
Violation of FERA was a criminal offence.	Violation of FEMA is a civil wrong.	Citizenship was a criteria to determine residential status of a person under FERA.	Stay in India for more than 182 days is the criteria to decide residential status.
Offences under FERA were not compoundable.	Offences under FEMA are compoundable.	There was only one Appellate Authority namely Foreign Exchange Regulation Appellate Board.	There are two appellate authorities, namely: 1. Special Director (Appeals) 2. Appellate Tribunal for Foreign Exchange.
Penalty was 5 times the amount involved.	Penalty is 3 times the sum involved.		





# SCIENCE

# PHYSICS

## UNIT

The chosen standard used for measuring a physical quantity is called 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 (i) CGS system; (ii) EPS System; (iii) FPS System; and (iv) SI Units.

### SI Base Units

Base quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Amount of substance	mole	mol
Luminous intensity	candela	cd
Supplementary Physical Quantity	Supplementary Unit	Symbol
Plane angle	radian	rad.
Solid angle	steradian	Sr

### Standard Units

viscosity	pascal second
Power	dioptre
Inductance	henry
Loudness	phon
Magnetic inductance	tesla
Magnetic flux	weber
Electric charge	farad, coulomb

## SCALAR QUANTITIES

Physical quantities which have magnitude only and no direction are called scalar quantities.

**Example:** Mass, Speed, Volume, etc.

## VECTOR QUANTITIES

Physical quantities which have magnitude and direction both and which obey triangle law are called vector quantities.

**Example:** Displacement, Velocity, etc.

## KINEMATICS

### DISTANCE

Distance is the length of actual path covered by a moving object in a given time interval.

- Distance is a scalar quantity whereas displacement is a vector quantity both having the same unit.

### DISPLACEMENT

- The difference between the final and the initial position of an object is called displacement.
- It is a vector quantity. Its unit is metre.
- The magnitude of displacement may or may not be equal to the path length traversed by an object.
- Displacement may be positive, negative or zero whereas distance is always positive.

### SPEED

- The **average speed** of a particle for a given interval of time is defined as the ratio of total distance travelled to the total time taken.

$$\text{Average speed} = \frac{\text{Total distance travelled}}{\text{Total time taken}}$$

- Distance travelled by the moving object in unit time interval is called speed. It is scalar quantity and its SI unit is metre/second (m/s). Velocity of a moving object is defined as the displacement of the object in the unit time interval. It is a vector quantity and its SI unit is metre/second.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Velocity} = \frac{\text{Displacement}}{\text{Time}}$$

## UNIFORM VELOCITY

- An object is said to be moving with uniform velocity if it undergoes equal displacements in equal intervals of time.

## RELATIVE VELOCITY

- When two bodies are moving in the straight line, the speed (or velocity) of one with respect to another is known as its relative speed (or velocity).

### Important Prefixes to Units

tera (T)	$10^{12}$	giga (G)	$10^9$	Mega (M)	$10^6$
kilo (K)	$10^3$	hecto (h)	$10^2$	deka (da)	$10^1$
deci (d)	$10^{-1}$	centi (C)	$10^{-2}$	milli (m)	$10^{-3}$
Micro ( $\mu$ )	$10^{-6}$	nano (n)	$10^{-9}$	Pico (P)	$10^{-12}$
Femto (f)	$10^{-15}$	atto (a)	$10^{-18}$		

## ACCELERATION

- Acceleration of an object is defined as the rate of change of velocity of the object. It is a vector quantity and its SI unit is metre/second<sup>2</sup> (m/s<sup>2</sup>). If velocity decreases with time then acceleration is negative and is called retardation.
- Acceleration (a) =  $\frac{v - u}{t}$
- When the velocity of a body increases with time then its acceleration is negative and is called retardation or deceleration.

## MOTION

If the position of an object changes with time, it is said to be in motion. A particle at rest does not have the speed and acceleration, while a particle in motion has its speed and also may have some acceleration.

### PROJECTILE MOTION

- When a particle is so projected that it makes certain angle with horizontal and moves under gravity alone then the motion of the particle is said to be projectile.
- Path of projectile is a parabola.
- To achieve maximum range the body should be projected at an angle of 45°.
- When a body is dropped freely from the top of the tower and another body is projected horizontally from the same point, both will reach the ground at the same time.
- If we throw two balls of different masses in horizontal direction then they will again reach on earth at the same time because both the balls will have zero velocity in vertical direction.

### CIRCULAR MOTION

- When an object moves along a circular path, then its motion is called circular motion e.g., motion of a top etc.
- If an object moves along a circular path with uniform speed, its motion is called uniform circular motion.
- It is accelerated even if speed of the body is constant. The motion of satellite is an accelerated motion.

### ANGULAR VELOCITY

The time rate of change of the angular displacement of a particle relative to its origin is angular velocity.  $\omega = \frac{\theta}{t}$

### NEWTON'S FIRST LAW OF MOTION

- Everybody 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.
- It gives the definition of force.

## 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.

### Some Examples of Inertia

- When a car or train starts suddenly, the passengers bend backward.
- When a running horse stops suddenly, the rider bends forward.
- When a coat/blanket is beaten by a stick, the dust particles are removed.
- 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 the body.

- Force = mass × acceleration

$$\Rightarrow m\left(\frac{v-u}{t}\right) = ma$$

- Its S.I. unit is Newton ( $\text{kg} \cdot \text{m s}^{-2}$ )

## NEWTON'S SECOND LAW OF MOTION

- The rate of change of momentum of a body is directly proportional to the applied force on the body and takes place in the direction of force.
- Newton's second law gives the magnitude of force, i.e. Force = mass × acceleration.
- 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.

- Forces act on two different bodies in opposite directions.

### Examples of third law

- Recoil of a gun;
- Motion of a rocket;
- Swimming;
- While drawing water from the well, if the string breaks up, the man drawing water falls back.

## MOMENTUM

Momentum is the property of a moving body and is defined as the product of mass and velocity of the body. It is a vector quantity. Its SI unit is  $\text{kg m/s}$ .

## 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, i.e.,

$$m_1 u_2 + m_1 u_2 = m_1 v_1 + m_2 v_2$$

## 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.
- It is a vector quantity and its direction is the direction of force. Its SI unit is Newton second (Ns).

## CENTRIPETAL FORCE

A body performing circular motion is acted upon by a force which is always directed towards the centre of the circle. This force is called centripetal force.

$$F = \frac{mv^2}{r}$$

**Cyclist** bends his body towards the centre on a turn while turning to obtain the required centripetal force.

## 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 also called a Pseudo force. It is always equal and opposite to centripetal force.

Cream separator, centrifugal driver, etc. work on the principle of centrifugal force.

## 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.

- The centre of gravity of a body is that point, through which the entire weight of body acts.
- The weight of a body acts through centre of gravity in the downward direction.

## EQUILIBRIUM

- If the resultant of all the forces acting on a body is zero then the body is said to be in equilibrium.

i. **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.

ii. **Unstable equilibrium:** If on a 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.

## 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.

- The centre of gravity of a body is that point through which the entire weight of the body acts.

## CONDITIONS FOR STABLE EQUILIBRIUM

- For stable equilibrium of a body, the following two conditions should be fulfilled.
  - The centre of gravity of the body should be at the minimum height.
  - The vertical line passing through the centre of gravity of the body should pass through the base of the body.

## FRICITION

- If we slide or try to slide a body over a surface, the motion is resisted by a bonding between the body and the surface. This resistance is called frictional force.
- The opposite force that comes into play when one body tends to move over the surface of another body but actually motion has yet not started is called **static friction**.

- Friction that exists during the relative sliding or rolling of one surface over the other is called **dynamic or kinetic friction**.
- Frictional force does not depend on the area of contact.
- Kinetic friction is less than static friction.

## ADVANTAGES AND DISADVANTAGES OF FRICTION

- Walking is possible due to friction.
- The transfer of motion from one part of a machine to other part through belts is possible by friction.
- Brake works on the basis of friction.
- Friction causes wear and tear of the parts of machinery in contact. Thus their lifetime gets reduced.

## METHODS OF REDUCING FRICTION

- By polishing, by lubrication, by proper selection of material, by using ball bearing, the friction can be reduced to some extent.

## WORK, ENERGY AND POWER

### WORK

- When a body is displaced by applying a force on it, then work is said to be done.
- $\text{Work} = \text{Force} \times \text{displacement}$ .
- Its SI unit is joule ( $\text{kg m}^2 \text{ s}^{-2}$ ).

### POSITIVE WORK DONE

- Positive work means that force is parallel to displacement, i.e. in the direction of displacement.

### NEGATIVE WORK DONE

- Negative work means that force is opposite to displacement.

### ZERO WORK DONE

- If the force is perpendicular to the displacement and if either the force or the displacement is zero, work done is zero.

### ENERGY

- Capacity of doing work by a body is called its energy.
- Energy is a scalar quantity and its SI unit is joule and CGS unit is erg.
- Energy developed in a body due to work done is called mechanical energy.

## KINETIC ENERGY

- If a body of mass  $m$  is moving with velocity  $v$ , then kinetic energy

$$KE = \frac{1}{2}mv^2 = \frac{P^2}{2m}$$

where  $p$  is the linear momentum.

- When momentum is doubled, kinetic energy becomes four times.
- If a body is moving in horizontal circle then its kinetic energy is same at all points, but if it is moving in vertical circle, then the kinetic energy is different at different points.

## POTENTIAL ENERGY

- It is the energy possessed by a body by virtue of its position.
- 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.
- When a body is falling downwards, then its potential energy goes on changing to kinetic energy.

## PRINCIPLE OF CONSERVATION OF ENERGY

- Energy can neither be created nor destroyed. Energy can only be transformed from one form to another form. The sum of all kinds of energies in an isolated system remains constant at all times.

## TRANSFORMATION OF ENERGY

- In a heat engine, heat energy changes into mechanical energy.
- In the electric bulb, the electric energy is converted into light energy.
- In burning coal, oil, etc., the chemical energy changes to heat energy.
- In solar cell, solar energy changes into electrical energy.
- In playing sitar, mechanical energy changes into sound energy.
- In microphone, sound energy changes into electrical energy.
- In loud speaker, electrical energy changes into sound energy.

- In battery, chemical energy changes into mechanical energy.
- In electric motor, electrical energy changes into mechanical energy.

## POWER

- Rate of doing work is called power.
- SI unit of power is watt named as a respect to the scientist James Watt or Joule Per second and it is scalar quantity.

$$1\text{ W} = 1\text{ J/s}$$

$$1\text{ kW} = 10^3\text{ W}$$

$$1\text{ MW} = 10^6\text{ W}$$

$$1\text{ Watt/s (W-s)} = 1\text{ J}$$

- Horse power is a practical unit of power.  
1 H.P. = 746 watt.

Power is the rate at which work is done. It is the work/time ratio. Mathematically, it is computed using the following equation:

$$\text{Power} = \frac{\text{Work done}}{\text{Time taken}}$$

$$P = \frac{W}{T}$$

## GRAVITATION

### DEFINITION

Every body attracts another body by a force called force of gravitation.

### GRAVITATIONAL FORCE

- Mathematically, it is represented as:  $F = G \frac{Mm}{r^2}$

Where,  $F$  is gravitational force,  $G$  is gravitational constant,  $M$  is the mass of first particle,  $m$  is the mass of second particle and  $r$  is the distance between them.

- This is called Newton's Universal Law of Gravitation.
- The value of  $G$  is  $6.67 \times 10^{-11} \text{ N m}^2/\text{kg}^2$ .

### 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.

## GRAVITY

- The acceleration due to gravity is the rate of increase of velocity of a body falling freely towards the earth. It is represented by

$$g = \frac{GM_e}{R_e^2}$$

where  $M_e$  is the mass of the earth and  $R_e$  is the radius of the earth.

- The value of  $g$  at the surface of earth is  $9.8 \text{ m/s}^2$ .
- The value of  $g$  on the Moon is  $1/6$ th of that on the earth.

## VARIATION IN THE VALUE OF GRAVITY

- When we go above the surface of the earth, the acceleration due to gravity goes on decreasing.
- When we go below the surface of the earth, the acceleration due to gravity goes on decreasing and becomes zero at the centre of the earth.
- On increasing the rotational motion of earth, the value of  $g$  decreases.
- Decreasing the rotational motion of earth, the value of  $g$  increases.
- When we go from the equator towards the poles, the value of  $g$  goes on increasing.
- If earth stops its rotation about its own axis then at the equator the value of  $g$  increases and consequently the weight of body lying there increases.

## VARIATION IN $g$

- Value of  $g$  decreases with height or depth from earth's surface.
- $g$  is maximum at poles.
- $g$  is minimum at equator.
- $g$  decreases due to rotation of earth.
- $g$  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.

## CENTRE OF GRAVITY

- The centre of gravity of a body is that point at which the whole weight of the body appears to act.

- The gravitational force of earth (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.

## WEIGHT

- The weight of a body is the force with which it is attracted towards the centre of Earth.
- It is measured by a spring balance.
- It is not constant and it changes from place to place.

### Weight of a Body in a Lift

- If the lift is stationary or moving with uniform speed (either upward or downward), the apparent weight of a body is equal to its true weight.
- If the lift is going up with acceleration ( $a$ ), the apparent weight of a body is more than the true weight, i.e.  $R = m(g + a)$
- If the lift is going down with acceleration, the apparent weight of the body is less than the true weight. i.e.  $R = m(g - a)$
- If the cord of the lift is broken, it falls freely under gravity. In this situation, weight of a body in the lift becomes zero.
- 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.

## SATELLITE

- The heavenly body which revolves round the planets is called satellite. Moon is a natural satellite of earth, while INSAT-I1B is an artificial satellite of earth.
- The speed of a satellite does not depend upon the mass of the satellite.
- A satellite revolving very close to earth's surface has a period of revolution about 84 min and its speed is nearly  $8 \text{ km/s}$ .
- Artificial satellites are of two types: Geo-stationary and Polar satellites.

### Kepler's Laws of Planetary Motion

- All planets move around the sun in elliptical orbits, with the sun being at rest at one focus of the orbit.
- The position vector of the planet with sun at the origin sweeps out equal area in equal time.
- The square of the period of revolution of a planet around the sun is directly proportional to the cube of main distance of planet from the sun.

### GEOSTATIONARY SATELLITE

If a satellite revolves in equatorial plane in the direction of earth's rotation, i.e. from west to east with a period of revolution equal to time period of rotation of earth on its own axis, i.e. 24 hours, then the satellite will appear stationary relative to earth. Such a satellite is called a geostationary satellite. Such a satellite revolves around the earth at a height of 36,000 km. The orbit of geostationary satellite is called parking orbit. Polar satellites revolve around the earth in polar orbits at a height of approximately 800 km. The time period of these satellites is approximately 84 minutes. These satellites are used for weather forecasting.

### ESCAPE VELOCITY

- The minimum velocity of the body that should be given to the body to enable it to escape away from earth's gravitational field is called escape velocity. Its value on the earth's surface is 11.2 km/s.

$$V_{esp} = \sqrt{\frac{2Gm}{R}}$$

### ORBITAL SPEED OF A SATELLITE

- Orbital speed of a satellite is independent of its mass. Hence satellites of different masses revolving in the orbit of same radius have same orbital speed.
- Orbital speed of a satellite depends upon the radius of orbit (height of satellite from the surface of earth). Greater the radius of orbit, lesser will be the orbital speed.

- The orbital speed of a satellite revolving near the surface of earth is 7.9 km/sec.

### PERIOD OF REVOLUTION OF SATELLITE

Time taken by a satellite to complete one revolution in its orbit is called its period of revolution.

- Period of revolution of a satellite depends upon the height of satellite from the surface of earth. The greater the height, the more will be the period of revolution.
- Period of revolution of a satellite is independent of its mass.
- The period of revolution of satellite revolving near the surface of earth is 1 hour 24 minutes (84 minute).

## GENERAL PROPERTIES OF MATTER

### ELASTICITY

- It is that property of the material of a body by virtue of which the body opposes any change in its shape or size when deforming forces are applied to it, and recovers its original state as soon as the deforming forces are removed.

### PLASTICITY

- The property of a body, by virtue of which it does not regain its original configuration after the removal of deforming force, is called plasticity.

### STRESS

- The internal restoring force acting per unit area of cross-section of the deformed body is called stress.

### STRAIN

- The change in length, volume, shape of the body under the application of the deforming force is called strain.
- Hooke's law and Modulus of Elasticity: The ratio of stress to strain is a constant for the material and is called Modulus of Elasticity.

$$E = \frac{\text{Stress}}{\text{Strain}}$$

- It is also called Hooke's law, which states that within the limit of elasticity the strain produced in a body is directly proportional to the stress applied to it.

## PRESSURE

- Pressure is defined as force acting normally on unit area on the surface. SI unit of pressure is  $\text{N/m}^2$  also called Pascal (Pa). Pressure is a scalar quantity.

$$\text{Pressure} = \frac{\text{Normal force}}{\text{Area}}$$

- Atmospheric pressure of 1 atm =  $1.01 \times 10^{-5}$   $\text{N/m}^2$  = 760 torr

### ATMOSPHERIC PRESSURE

Atmospheric pressure is that pressure which is exerted by a mercury column of 76 cm length at  $0^\circ\text{C}$  at  $45^\circ$  latitude at sea-level.

- Atmospheric pressure decreases with altitude (height from earth surface). This is why (i) It is difficult to cook on the mountain. (ii) The fountain pen of a passenger leaks in an aeroplane at a height.
- Atmospheric pressure is measured by barometer.
- 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 weathers.

### 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.

- In a static liquid at same horizontal level, pressure is same at all points.
- Pressure at a point in a static liquid has same value in all directions.
- Pressure at a point in a liquid is proportional to the depth of the point from the free surface.
- Pressure at a point in a liquid is proportional to the density of the liquid.

### PASCAL'S LAW

- The pressure exerted anywhere at a point of confined fluid is transmitted equally and undiminished in all directions throughout the liquid.

- Hydraulic lift, hydraulic press, hydraulic brake work on the basis of Pascal's law.
- Cohesive force:** It is the intermolecular force of attraction acting between the molecules of same substance.
- Adhesive force:** It is intermolecular force of attraction acting between the molecules of different substances.

Effect of Pressure on Melting Point and Boiling Point:

- The M.P. of substances which expands on fusion increases with the increase in pressure.
- The M.P. of substances which contracts on fusion decreases with the increase in temperature.
- Boiling point of all the substances increases with the increase in pressure.

## 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.

### 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-

- Density of material of body is less than or equal to the density of liquid.
- If density of material of body is equal to density of liquid, the body floats fully submerged in liquid in neutral equilibrium.
- When body floats in neutral equilibrium, the weight of the body is equal to the weight of displaced liquid.
- 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 Floating body:

- Relative density is measured by Hydrometer.
- The density of sea water is more than that of normal water.
- When ice floats in water, its part remains 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.

## SURFACE TENSION

- It is the force ( $F$ ) acting normally to a unit length ( $l$ ) of an imaginary line drawn on the surface of liquid.

$$\text{i.e. } T = \frac{F}{l}$$

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.

- Surface tension of a liquid decreases with the increase of temperature and becomes zero at critical temperature.

**Cohesive Force:** The force of attraction between the molecules of same substance is called cohesive force. Cohesive force is maximum solids. Cohesive force is negligible in cases of gages.

**Adhesive Force:** Force of attraction between the molecules of different substances is called adhesive force.

- If a clean and dry needle is very slowly kept on the surface of water, it floats due to surface tension.
- The addition of detergent or soap decreases the surface tension of water and, thus, increases the cleaning ability.

- Bubbles of soap solution are big because addition of soap decreases the surface tension of water.
- Due to the surface tension, rain drops are spherical in shape.
- When kerosene oil is sprinkled on water, its surface tension decreases. As a result, the larvae of mosquitoes floating on the surface of water die due to sinking.
- Small drops of **mercury** are spherical while large are flat.
- Formation of **lead shots**.
- Warm soup is tasty because at high temperature its surface tension is low and consequently the soup spreads on all parts of the tongue.

## CAPILLARITY

### CAPILLARY TUBE

A tube having very narrow (fine) and uniform bore is called a capillary tube.

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.

### ILLUSTRATIONS OF CAPILLARITY

- i. A piece of blotting paper soaks ink because the pores of the blotting paper serve as capillary tubes.
- ii. The root hairs of plants draw water from the soil through capillary action.
- iii. To prevent loss of water due to capillary action, the soil is loosened and split into pieces by the farmers.
- iv. 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.

- v. Action of leaves in soaking up water from the body is due to capillary action of cotton in the towel.
- vi. Melted wax, in a candle rises up to wick by capillary action.
- The kerosene oil in a lantern and the melted wax in a candle, rise in the capillaries formed in the cotton wick and thus they burn.
- Writing nib is split in the middle so that a fine capillary is formed in it. When it is dipped in ink the ink rises in the capillary.
- The water given to the fields rises in the innumerable capillaries formed in the stems of plants and trees and reaches the branches and the leaves.
- The farmers plough their fields after rains so that the capillaries formed in the soil are broken and the water remains in the lower layers of the soil.

## DENSITY

- The density of a substance ( $\rho$ ) is defined as the ratio of its mass ( $M$ ) to its volume ( $V$ ).

$$\text{i.e. Density} = \frac{\text{Mass}}{\text{Volume}}$$

- Density of water is maximum at  $4^{\circ}\text{C}$ .
- The **relative density** is defined as the ratio of the density of the substance to the density of water at  $4^{\circ}\text{C}$ .
- Ice floats on water surface as its density ( $0.92 \text{ g/cm}^3$ ) is lesser than the density of water ( $1\text{g/cm}^3$ ).
- If ice floating in water in a vessel melts, the level of water in the vessel does not change.
- The density of sea water is more than that of normal water. This explains why it is easier to swim in sea water.

## VISCOSITY

### VISCOUS FORCE

The force which opposes the relative motion between different layers of liquid or gases is called viscous force.

Viscosity is the property of a liquid by virtue of 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 ( $\text{N sm}^{-2}$ ) or Pascal-second. It is generally denoted by  $n$ .

### 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.

### 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 streamlined flow.

### CRITICAL VELOCITY

The maximum velocity up to which fluid motion is streamlined is called critical velocity. Clearly, if the velocity of flow is below critical velocity, flow is streamlined and if the velocity is above the critical velocity, flow is turbulent.

### BERNOULLI'S THEOREM

- When an incompressible and non-viscous liquid (or gas) flows in streamlined motion from one place to another, then at every point of its path the total energy per unit volume (pressure energy + kinetic energy + potential energy) remains constant.
- Venturi Meter, Pitot tube, Bunsen's burner, atomizer, filter pump and magnus effect are based on the Bernoulli's theorem.

### SIMPLE HARMONIC MOTION (SHM)

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 the moment and is always directed towards 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:

- No force acts on the particle.
- Acceleration of the particle is zero.
- Velocity is maximum.
- Kinetic energy is maximum.
- Potential energy is zero.

When a particle executing SHM is at the extreme end, then:

- Acceleration of the particle is maximum.
- Restoring force acting on particle is maximum.
- Velocity of particle is zero.
- Kinetic energy of a particle is zero.
- Potential energy is maximum.

## PERIODIC MOTION

Any motion which repeats itself after regular interval of time is called periodic or harmonic 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.
- Motion of piston in an automobile engine and motion of balance wheel of a watch are the examples of oscillatory motion.

## TIME PERIOD

Time taken in one complete oscillation is called time period.

Frequency is the number of oscillations completed by oscillating body in unit time interval. Its SI unit is Hertz.

## SIMPLE PENDULUM

- It is a heavy point mass suspended from a rigid support by means of an elastic inextensible string.
- Time period of simple pendulum =  $T = 2\pi \sqrt{\frac{l}{g}}$
- Where  $l$  is the length of simple pendulum and  $g$  is the acceleration due to gravity.

- If a simple pendulum is suspended in a lift descending down with acceleration, then time period of pendulum will increase. If lift is ascending, then time period of pendulum will decrease.
- If a lift falling freely under gravity, then the time period of the Pendulum will be infinite.

## WAVE

- A wave is a disturbance which propagates energy from one place to the other without the transport of matter.
- These are of two types:
  - Mechanical waves
  - Electromagnetic waves

## MECHANICAL WAVES

- The waves which require material medium (solid, liquid or gas) for their propagation are called mechanical waves or elastic waves.

These are of two types:

- Longitudinal waves
- Transverse waves

**Longitudinal Waves:** 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.

**Transverse Waves:** 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.

## ELECTROMAGNETIC WAVES

- The waves which do not require medium for their propagation, i.e. which can propagate even though the vacuum are called non-mechanical waves. Light and heat are the examples of non-mechanical wave. In fact all the electromagnetic waves are non-mechanical.
- All the electromagnetic waves consist of photons.
- The wavelength range of electromagnetic waves is  $10^{-4}$  m to  $10^4$  m.

## PROPERTIES OF ELECTROMAGNETIC WAVES

Following waves are not electromagnetic:

- Cathode rays
- Canal rays
- Sound waves
- Ultrasonic waves

**Note:** Electromagnetic waves of wavelength range  $10^{-3}$  m to  $10^{-2}$  m are called microwaves.

## IMPORTANT TERMS

### 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 particles 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 refractions is equal to wavelength.

### FREQUENCY

- Frequency of vibration of a particle is defined as the number of vibrations completed by the particle in one second

$$\text{Frequency (f)} = \frac{1}{\text{Time period (T)}}$$

Velocity of wave (v) = frequency (f)  $\times$  wavelength  $\lambda$

## SOUND WAVE

- It is longitudinal mechanical.
- The longitudinal mechanical waves which lie in the range 20 Hz to 20,000 Hz are called **audible** or **sound waves**.
- The longitudinal mechanical waves having frequencies less than 20 Hz are called **infrasonic**. These are produced by earthquakes, volcanic, eruption, Ocean waves, elephants, and whales.

- The longitudinal mechanical waves having frequencies greater than 2000 Hz are called **ultrasonic waves**.

### Applications of Ultrasonic Waves

- For sending signals.
- For measuring the depth of sea.
- For cleaning clothes, aeroplanes and machinery parts of clocks.
- For removing lamp-shoot from the chimney of factories.
- In sterilising of a liquid.
- In ultrasonography.

### SPEED OF SOUND

- In a medium, the speed of sound basically depends upon elasticity and density of medium.
- 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.
- Speed of sound is maximum in solids and minimum in gases.
- 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.
- The unit of loudness is decibel (dB).

**Effect of pressure on speed of sound:** The speed of sound is independent of pressure.

**Effect of temperature on speed of sound:** The speed of sound increases with the increase of temperature of the medium.

### Intensity of Sound

Area Code	Kind of area	Intensity during the day (decibel)	Intensity at night (decibel)
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Peaceful area	50	40

**Effect of humidity on speed of sound:** The speed of sound is more in humid air than in dry because the density of humid air is less than the density of dry air.

## CHARACTERISTICS OF SOUND WAVES

1. **Intensity:** Intensity of sound at any point in space is defined as amount of energy passing normally per unit area head held around that point per unit time.

Due to intensity, a sound appears loud or faint to the ear. Actually, the sensation of a sound perceived by 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. 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.

- The pitch of female voice is higher than the pitch of male voice.
- The pitch of sound produced by roaring of lion is lower whereas the pitch of sound produced by mosquito whisper is high.

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.

## SHOCK WAVES

- A body moving with supersonic speed in air leaves behind it conical region of disturbance which spreads continuously. Such a disturbance is called shock wave.
- These waves carry huge energy and may even make cracks in window panes.
- The speed of supersonic wave is measured in mach number. One mach number is the ratio of speed of source to the speed of sound.

$$\text{Mach number} = \frac{\text{Velocity of source}}{\text{Velocity of sound}}$$

**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 17m (16.6m).
- Persistence of ear (effect of sound on ear) is 1/10 sec.
- Due to refraction, sound is heard at longer 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 very large amplitude. This phenomenon is called resonance.

- A group of soldiers **on a bridge** are advised not to walk in steps because **their movement** causes the bridge to vibrate. If they walk in step, the frequency of vibration may match the natural frequency of the bridge structure, and thus causing resonance. This resonance of frequency can cause the bridge to collapse.

**Interference of sound:** The modification redistribution of energy at a point due to superposition of two (or more) sound waves of same frequency is called interference of sound.

## 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 the edge of obstacle and propagates forward. This phenomenon is called diffraction of sound.

## DOPPLER'S EFFECT

If there is a relative motion between source 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.

## USES

- i. By police to check over speeding vehicles.
- ii. At airport to guide the aircraft.
- iii. To study heart beats and blood flow in different parts of the body.

## MACH NUMBER

It is defined as the ratio of speed of sound source 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 behind it a conical region of disturbance which spreads continuously. Such a disturbance is called shock waves.

## HEAT

Heat is that form of energy which flows from one body to other body due to difference of temperature between the bodies. The amount of heat contained in a body depends upon the mass of the body.

- It is due to the kinetic energy of the molecules constituting the body.
- Its units are calorie (cal), kilocalorie (kcal) or joule (J).
- 1 cal = 4.18 Joule, 1 kcal = 1000 cal

## 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.

- The normal temperature of a human body is 37°C or 98.4 °F.
- Triple point is the state at which all the three states of matter co-exist. The triple point of water is 273.16 K.

The device which measures the temperature of a body is called thermometer.

The inter-conversion relation for celsius, Fahrenheit and Reumer scale is :

$$\frac{C}{5} = \frac{F - 32}{9} = \frac{R}{4}$$

## Thermometers

Scale	Minimum Temperature	Maximum Temperature (Boiling Point)
Centigrade or celsius	0°C	100°C
Fahrenheit	32°F	212°F
Reumer	0°R	80°R

## RELATION BETWEEN TEMPERATURES ON DIFFERENT SCALES

### TOTAL RADIATION PYROMETER

When a body is at high temperature, it glows brightly and the radiation permitted 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.

### 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 J/kg C°. It is given

by  $S = \frac{\Delta Q}{m \Delta \theta}$  where  $m$  is the mass and  $\Delta Q$  is

amount of heat given and  $\Delta \theta$  is change in temperature.

- 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/gram°C.
- For most substances, the specific heat increases with rise in temperature and assumes a constant value at high temperature.
- The specific heat of water however decreases with rise in temperature from 0°C to about 4°C, after which it increases with temperature.
- Hot water burns are less severe than that of steam burns because steam has high latent heat.
- Ice at 0°C appears colder than that water at 0°C, because ice absorbs more heat.

## THERMAL EXPANSION

When a body is heated, its length, surface area and volume increases.

Almost every liquid expands with the increase in temperature. But when temperature of water is increased from  $0^{\circ}\text{C}$  to  $4^{\circ}\text{C}$ , its volume decreases. If the temperature is increased above  $4^{\circ}\text{C}$  its volume starts increasing. Clearly, density of water is maximum at  $4^{\circ}\text{C}$  as its volume is minimum at  $4^{\circ}\text{C}$ .

## SOME PRACTICAL APPLICATIONS OF THERMAL EXPANSION

- **Telephone wires** are given enough gaps to allow the wires for contraction in winter.
- An ordinary **pendulum clock** runs faster in winter but slower in summer, because in summer the length of pendulum increases, while in winter it decreases.
- In the **Construction of bridges**, ends of steel girders are not fixed but placed on rolls to allow free expansion and contraction in summer and winter respectively to avoid any damage to the bridge.
- A gap is provided between the **iron rails** of the railway track so that rails can easily expand during summer and do not bend.

## TRANSMISSION OF HEAT

### CONDUCTION

In this process, heat is transferred from one place to other 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 from one place to other place. Due to movement of particles, a current of particles sets up, which is called convection current.

In liquids and gases, heat transfer takes place by convection.

- Earth's atmosphere is heated 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.
- 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 spot shines brilliantly, because black spot absorbs radiation during heating and emit in dark.
- **Black body** absorbs all the radiations incident on its surface. It always appear black despite the colour of radiation incident on it.

### STEFAN'S LAW

The radiant energy emitted by a black body per unit area per unit time (i.e. emissive power) is directly proportional to the fourth power of its absolute temperature.

### 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 (MP).

### FREEZING

The process by which a substance is changed from liquid state to solid state is called freezing. Freezing takes at a fixed temperature called freezing point (FP). For a substance  $\text{MP} = \text{FP}$ .

- Melting point of substances which contract in the process of fusion (as ice) decreases with the increase in pressure. Melting point of substances which expand 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.

### VAPORISATION

The process by which a substance is changed from liquid state to vapour state is called vaporisation.

### 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 an earthen 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 substance at constant temperature is called latent heat.

S.I. unit of latent heat is Joule/kilogram.

- Latent heat of fusion :** It is the amount of heat energy required to convert unit mass a substance from solid state to liquid state at melting point. The latent heat of fusion of ice at 0°C is approximately 334 joules (79.7 calories) per gram.

- 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. For water at 100°C it is about 2230 joules (536 cal per gram).

### 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.
- The amount of water vapour in air is called as humidity.
- The amount of water vapour present in 1 m<sup>3</sup> air is called its absolute humidity.

### 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.

- Relative humidity is measured by Hygrometer.
- Relative humidity increase with the increase of temperature.

### AIR CONDITIONING

For healthy and favourable atmosphere of human being, the conditions are as follows:

- Temperature:** from 23°C to 25°C.
- Relative humidity:** from 60% to 65%.
- Speed of air:** from 0.75 metre/minute to 2.5 metre/minute.

## THERMODYNAMICS

### FIRST LAW OF THERMODYNAMICS

The amount of heat given to a system is used up in two ways, first to increase the internal energy and second to do the external work.

### SECOND LAW OF THERMODYNAMICS

The second law of thermodynamics is the outcome of human experience under which heat energy can be converted into mechanical energy.

### Isothermal Process

If the changes are taking place in a system in such a way that temperature of the system remains constant throughout the change, then the process is said to be an isothermal.

### Adiabatic Process

If the changes are taking place in a system in such a way that there is no exchange of heat energy between the system and the surrounding, then the process is said to be an adiabatic process.

- If carbon dioxide is suddenly expanded, it is changed into dry ice. This is an example of adiabatic process.

### Kelvin's Statement

Whole of the heat can never be converted into work.

### Claudius Statement

Heat by itself cannot flow from a colder body to a hotter body.

### Types of Combustion Engine

Combustion Engine is a device which converts heat energy into mechanical work continuously through a cyclic process.

- Internal Combustion Engine:** In this engine, heat is produced in the engine itself. **Example:** Otto engine or petrol engine (efficiency = 52%), Diesel engine (efficiency = 64%).
- External Combustion Engine:** In this engine heat is produced outside the

engine. Steam engine is an example of external combustion engine (efficiency = 20%).

**Refrigerator Heat Pump:** A refrigerator is an apparatus which transfer heat energy from cold to a hot body at the expance of energy supplied by an external agent. The working substance here is called refrigerant. In actual refrigerator, vapours of Freon ( $\text{CCl}_2\text{F}_2$ ) acts as refrigerant.

## LIGHT

Light is a form of energy which is propagated as electromagnetic waves. In the spectrum of electromagnetic waves it lies between ultra-violet and infra-red region and has wavelength between 3900 Å to 7800 Å.

- Electromagnetic waves are transverse, hence light is transverse wave.
- Wave nature of light explains rectilinear propagation, reflection, refraction, interference, diffraction and polarisation of light.
- Clearly light behaves as wave and particle both.
- Speed of light is maximum in vacuum and air ( $3 \times 10^8$  m/s).
- It is a transverse wave.
- It takes 8 min 19 s to reach on the earth from the sun.
- The light reflected from moon takes 1.28 s to reach earth.

### Refractive Index

Refractive Index of a medium is defined as the ratio of speed of light in vacuum to the speed of light in the medium.

- Velocity of light is larger in a medium which has small refractive index.
- Light takes 8 minute 19 second (499 second) to reach from sun to the earth.
- The light reflected from moon takes 1.28 second to reach earth.

### Luminous Bodies

Those objects which emit light by themselves are called luminous bodies.

### Non-Luminous Bodies

Those objects which do not emit light by themselves but are visible by the light falling

on them emitted by the luminous bodies are called non-luminous bodies.

A material can be classified as:

- Transparent:** The bodies which allow most of the incident light to pass through them are called transparent bodies, e.g., glass and water.
- Translucent:** The bodies which allow a part of incident light to pass through them are called translucent bodies, e.g., pied paper.
- Opaque:** The substances which do not allow the incident light to pass through them are called opaque bodies, e.g., mirror, metal, wood, etc.

### REFLECTION OF LIGHT

- The return of light into the same medium after striking a surface is called reflection.

There are two laws of reflection.

- The angle of incidence is always equal to angle of reflection.
- The incident ray, normal at the point of incidence and reflected ray, all lie in the same plane.

### REFLECTION FROM PLANE MIRROR

- The image is virtual and laterally inverted.
- The size of image is equal to that of object.
- The distance of image from the mirror is equal to distance of object from the mirror.
- If an object moves towards (or away from) a plane mirror with speed  $u$ , relative to the object, the image moves towards (or away) with a speed of  $2u$ .
- If a plane mirror is rotated by an angle  $\theta$ , keeping the incident ray fixed, the reflected ray is rotated by an angle  $2\theta$ .
- To see his full image in a plane mirror, a person requires a mirror of at least half of his height.
- The total number of images formed by two plane mirrors inclined an angle

$$\theta' = \frac{360}{\theta} - 1.$$

 **Note:** Image formed by a convex mirror is always virtual, erect and diminished.

### REFLECTION AT SPHERICAL SURFACE

- Spherical mirrors are the mirrors in which reflecting surface side is spherical.

There are two types of spherical mirrors:

- convex mirror
- concave mirror

Mirror formula is given by  $\frac{1}{v} + \frac{1}{u} = \frac{1}{f} = \frac{2}{r}$

$u$  = Object distance

$v$  = Image distance

$f$  = Focal length of the mirror.

$r$  = radius of curvature

### USES OF CONCAVE MIRROR

- As a shaving glass.
- As a reflector for the headlights of a vehicle, search light.
- In ophthalmoscope to examine eye, ear, nose by doctors.
- In solar cookers.

### USES OF CONVEX MIRROR

- As a rear view mirror in vehicles because it provides the maximum rear field of view and image formed is always erect.
- In sodium reflector lamp.

#### Image formation by concave mirror

Position of object	Position of image	Size of image	Nature of image
At infinity	At F	Highly diminished	Real and inverted
Between infinity and C	Between F and C	Diminished	"
At C	At C	Same size	"
Between F and C	Between infinity and C	Enlarged	"
At F	At infinity	Highly enlarged	"
Between F and P	Behind the mirror	Enlarged	Virtual and erect

Where (C) is centre of curvature

P is pole of the mirror

F is focus.

### Image formation by convex mirror

Position of object	Position of image	Size of image	Nature of image
At infinity	At F	Highly diminished	Erect and virtual
Between infinity and Pole	Between F and P	Diminished	Erect and virtual

## 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 other medium, is called refraction of light. When a ray of light enters from rarer medium to denser medium (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

- i. Incident ray, refracted ray and normal drawn at incident point always lie in the same plane.
- ii. **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.
- The refractive index of a medium decreases with the increase in wavelength of light.
- The refractive index of a medium decreases with an increase in temperature.
- When a ray of light enters from one medium to other medium, its frequency and phase do not change but wavelength and velocity changes.

## SOME ILLUSTRATIONS OF REFRACTION

- i. Bending of a linear object when it is partially dipped in a liquid inclined to the surface of the liquid.
- ii. Twinkling of stars.
- iii. Oval shape of sun in the morning and evening.

- iv. An object in a denser medium, when seen from a rarer medium, appears to be at a smaller distance.

- **Due to refraction,** rivers appear shallow, coin in a beaker filled with water appears raised, pencil in the beaker appears broken.
- At sunset and sunrise, due to refraction, **sun appears above horizon** while it is actually below horizon.
- The duration of day appears to be increased by nearly 4 minute to **atmospheric refraction**.
- Writing on a **paper appears lifted** when a glass slab is placed over the paper.
- The refractive index of a medium is maximum for violet colour of light and minimum for red colour of light.
- Refractive index decreases with rise in the temperature.

**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  $90^\circ$ .

## TOTAL INTERNAL REFLECTION OF LIGHT

- If the angle of incidence in denser medium is greater than critical angle ( $C$ ), then the ray is reflected back into the first rarer medium, this phenomenon is called **total internal reflection**.
- In a desert, the phenomenon of **mirage** occurs due to total internal reflection.

## ILLUSTRATIONS OF TOTAL INTERNAL REFLECTION

- i. Sparkling of diamond.
- ii. Mirage and looming.
- iii. Shining of air bubble in water.
- iv. Increase in duration of sun's visibility.
- v. Shining of a smoked ball or a metal ball on which lamp stool deposited when dipped in water.
- vi. Optical Fibre.

## APPLICATIONS

- i. For transmitting optical signals and the two dimensional picture.
- ii. For transmitting electrical signals by first converting them to light.
- iii. For visualising the internal sites of the body by doctors in endoscopy.

## REFRACTION OF LIGHT THROUGH LENS

- When a lens is thicker at the middle than at the edges, it is called convex lens or a converging lens. When the lens is thicker at edge than in the middle, it is called as concave lens or diverging lens.

## LENSES

- Lens is a transparent medium bounded by two curved surfaces. Lenses are of two types:
  - Concave or divergent lens.
  - Convex or convergent lens

$$\text{Magnification } (m) = \frac{\text{Length (height) of image}}{\text{Length (height) of object}} = \frac{v}{u}$$

### Image Formation by a Convex Lens.

Position of object	Position of image	Size of image	Nature of image
At infinity	At $F_2$	Highly diminished	Real and inverted
Beyond $2 F_1$	Between $F_2$ and $2 F_2$	Diminished	Real and inverted
At $2 F_1$	At $2 F_2$	Same size	Real and inverted
Between $2 F_1$ and $F_1$	Beyond $2 F_2$	Enlarged	Real and inverted
At $F_1$	At infinity	Highly enlarged	Real and inverted
Between $F_1$ and lens	Behind the object on the same side of the object	Enlarged	Virtual and erect

## 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 metres. 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.

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.

## RAINBOW

Rainbow is formed due to dispersion of sun light by the suspended water droplets.

- Primary rainbow is formed due to two refractions and one total internal reflection of light falling on the raindrops.
- Secondary rainbow is formed due to two refractions and two internal reflections of light falling on raindrops.

## THEORY OF COLOURS

Colour is the sensation perceived by the rods 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 colours in proper proportion.

### Secondary Colours

The colour produced by mixing any two primary colours is called a secondary colour.

## DISPERSION OF LIGHT

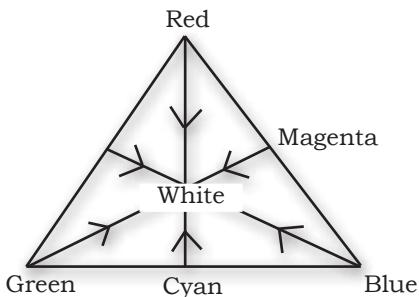
When a ray of white light (or a composite light) is passed through a prism, it gets splitted into its constituent colours. This phenomenon is called dispersion of light. The coloured pattern obtained on a screen after dispersion of light is called spectrum.

- 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 in 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

There are three secondary colours, yellow, magenta and cyan.

When the three secondary colours are mixed, white colour produced.

Colours produced by mixing lights of primary colours can be obtained from the colour triangle.



Thus,       $\text{Red} + \text{Green} = \text{Yellow}$

$\text{Red} + \text{Blue} = \text{Magenta}$

$\text{Green} + \text{Blue} = \text{Cyan}$

Also,       $\text{Green} + \text{Magenta} = \text{White}$

$\text{Red} + \text{Cyan} = \text{White}$

$\text{Blue} + \text{Yellow} = \text{White}$

## COMPLEMENTARY COLOURS

Any two colours when added produced white light, are said to be complementary.

- 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 the entire light incident over it.

## DISPERSION

- White light consists of seven colours-violet, indigo, blue, green, yellow, orange and red, in ascending order of their wavelength or from maximum frequency to minimum frequency.
- In glass, violet light travels the slowest while red light travels the fastest.
- When a narrow beam of white light passes through a glass prism, it is split up into its constituent colours. This separation of light into colours is called dispersion.
- The red light is deviated least and violet light the maximum.

- The most spectacular illustration of dispersion is the rainbow. The beautiful colours of the rainbow are due to the dispersion of sunlight by water droplets suspended in the air after rain. In each droplet there is dispersion as well as total internal reflection.

## SCATTERING OF LIGHT

- When light passes through a medium, in which particles are suspended, whose sizes are of the order of wavelength of light, then light on striking these particles, deviates in different directions. This phenomenon is called scattering of light.
- Red colour of light is scattered least and violet colour of light is scattered most. Blue colour of sky is due to scattering of light. The brilliant red colour of rising and setting sun is due to scattering of light.
- Clouds appear white due to scattering of light.
- The **air bubbles** in glass paper white appear silvery white due to total internal reflection.
- Sparkling of diamonds is due to multiple total internal reflections taking place inside the diamond.

## INTERFERENCE OF LIGHT

When two light waves of exactly the same frequency and a constant phase difference travel in same direction and superimpose, then the resultant intensity in the region of superposition is different from the sum of the intensities of individual waves. This modification in the intensity of light in the region of superposition is called interference of light. Interference is of two types:

- Constructive interference
- Destructive interference

**Diffraction of Light:** Diffraction is the process by which a beam of light or other systems of wave is 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. Polarisation is the phenomenon of restricting the vibrations of a light in a particular direction in a place

perpendicular to the direction of propagation of wave.

- The visible effect of light is only due to electric field vector.

## HUMAN EYE

- The human eye is more or less like a photographic camera.
- The **eye ball** is almost spherical in shape having a diameter of about 2.3 cm.
- The front transparent part of the eye is called **cornea** which serves as window of the eye for light.
- Behind the cornea, is a circular diaphragm called **iris** with a hole in its centre. The hole is called **pupil** of the eye.
- The function of iris is to control and regulate the amount of light entering the eye by adjusting the size of the pupil. When intensity of light is high, the pupil contracts and vice-versa.
- Behind the pupil, is a double convex lens, called the **eye lens**.
- Ciliary muscles adjust the focal length of eye lens. When the ciliary muscles are relaxed, eye lens becomes thin. Its focal length increases and converging power decreases. When the ciliary muscles are tense, converging power increases, as focal length decreases.
- Behind the eye lens, there is a screen called **retina** on which image of the object is formed.
- In retina there are light sensitive cells in the form of rods and cones.
- The rod type cells respond to intensity of light and cone type cells respond to the colour of light.
- An eye lid in front of human eye acts like a shutter in a camera.
- The image of any object seen persists on the retina for 1/16th of a second, even after the removal of object. It is called **persistence of vision**.
- Colour blindness** is said to occur when a person cannot distinguish between different colours (red-green). It is a genetic disorder which occurs by inheritance.

## DEFECTS OF HUMAN EYE AND THE REMEDIES

- Myopia or short sightedness:** A person suffering from myopia can see the near objects clearly while far objects are not clear.

It is caused due to :

- increase in the length of eye ball
- decrease in the focal length of the eye lens.

**Remedy:** Diverging or concave lens is used.

- Hyperopia or hypermetropia or long-sightedness:** A person suffering from hypermetropia can see the distant objects clearly but not the near objects.

It is caused due to :

- decrease in length of the eye ball
- increase in the focal length of eye lens.

**Remedy:** A converging or convex lens is used.

- Presbyopia:** This defect is generally found in elderly person. Due to stiffening of ciliary muscles, eye loses much of its accommodating power. As a result, the distant as well as the nearby objects cannot be seen.

**Remedy:** For its remedy, two separate lenses or a bifocal lens are/is used.

- Astigmatism:** This defect arises due to difference in the radius of curvature of cornea in the different planes. As a result rays from an object in one plane are brought to focus by eye in another plane. For its remedy cylindrical lens is used.

## CATARACT

- In this defect, an opaque, white membrane is developed on cornea due to which a person loses power of vision partially or completely. This defect can be removed by removing this membrane through surgery.
- There are two kinds of vision cells in the retina. They are called rods and cones on account of their peculiar shape. Rods decide the intensity of light whereas 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.

## ■ COMPOUND MICROSCOPE

It consists of two convex lenses coaxially fitted in a hollow tube. The lens facing the object is called objective and the lens towards the eye is called eyepiece.

## ■ TELESCOPE

- Astronomical telescope consists of two convex lenses placed coaxially in a hollow tube. The lens facing the object is called objective and the lens towards the eye is called eyepiece.
- The objective has large aperture so that the rays from the object can be easily collected.
- The focal length of objective is larger than that of eyepiece.

# ELECTRICITY

## ■ CHARGE

Charge is the basic property associated with matter due to which it produces and experiences electric and magnetic effects.

- It is something that a body attains when it loses or gains the electrons.
- Its S.I. unit is coulomb C.
- Electricity is associated with the charge.
- Similar charges repel each other and opposite charges attract each other.
- The proton possesses positive charge (+ e) and electron possesses an equal negative charge (- e).
- Charging of bodies takes place due to transfer of electrons from one body to other body.
- Human body and earth act like a conductor. Silver is the best 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 is maximum at the pointed parts of the conductor.

## ■ CONDUCTOR

Conductors are those materials which allow electricity (charge) to pass through them.

**Examples:** (a) Metals like silver, iron, copper, (b) Earth (especially the most part) acts like a huge conductor.

**Insulator or Dielectric:** Insulators are those materials which do not allow electricity to flow through them.

**Examples:** Wood, paper.

### Coulomb's Law

According to Coulomb's law, the 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.

## ■ ELECTRIC FIELD

- The region around an electric charge in which the electric effect can be experienced is called the electric field.
- Electric field intensity inside a charged hollow conductor is zero.

## ■ 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. For this reason 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.

**Potential Difference:** Work done in bringing a unit positive charge from one point to other point is the potential difference between the two points. Its SI unit is volt and it 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. Its SI unit is farad (F).

## ELECTROCHEMICAL CELL

Electrochemical cell is a device which converts chemical energy into electrical energy.

### PRIMARY CELL

In primary cell electrical energy is obtained from the irreversible chemical reaction taking place inside the cell.

**Examples:** Voltaic Cell, Leclanche 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.

- 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.
- In a dry cell, mixture of  $\text{MnO}_2$ ,  $\text{NH}_4\text{Cl}$  and carbon is kept in zinc vessel. A carbon rod is placed in the mixture which acts as anode. The zinc vessel itself acts as cathode.

### 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).

**Resistance:** The opposition offered by a conductor to the flow of current through it is called resistance. Its SI unit is ohm.

### OHM'S LAW

If physical conditions like temperature, intensity of light, etc. remains unchanged then electric current flowing through a conductor is directly proportional to the potential difference across its ends.

**Ohmic Resistance:** The resistances of such conductors which obey Ohm's law are called ohmic resistances. For example, resistance of melanin wire.

**Non-ohmic Resistance:** The resistances of such materials which do not obey ohm's law are called non-ohmic resistances.

**Example:** Resistance of diode valve, resistance of triode valve.

### CONDUCTANCE

Reciprocal of resistance of a conductor is called its conductance.

Its SI unit is  $\text{ohm}^{-1}$  (also called mho or siemen.)

- The resistance of a conductor is directly proportional to its length and inversely proportional to its cross sectional area.

**Specific conductance or conductivity:** The reciprocal of resistivity of a conductor is called its conductivity (s). Its SI unit is mho  $\text{m}^{-1}$  or siemen metre ( $\text{sm}^{-1}$ ).

- In series combination, the equivalent resistance is equal to the sum of the resistances of individual conductors. ( $R = R_1 + R_2 + \dots + R_n$ )
- In parallel combination, the reciprocal of equivalent resistance is equal to the sum of the reciprocal of individual resistances.
- **Specific resistance or Resistivity** depends only on the material of conductor and its temperature. Resistivity increases with temperature.
- If a wire is stretched or doubled on itself, its resistance will change, but its specific resistance will remain unaffected.

## ELECTRIC POWER

The rate at which electrical energy is consumed in a circuit is called electric power. Its SI unit is watt.

$$1 \text{ kilowatt hour} = 3.6 \times 10^6 \text{ joule}$$

## AMMETER

Ammeter is a device which is 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 electric current in a circuit.

## SHUNT

Shunt is a wire of very small resistance.

- A galvanometer can be converted into an ammeter by connecting shunt parallel to it.
- A galvanometer can be converted into a voltmeter by connecting a very high resistance in its series.

## 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 electromagnetic 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.

## MAGNETISM

- Magnet is a piece of iron or other material that can attract iron containing objects and that points north and south when suspended.

## DIRECTIVE PROPERTY

When a magnet is freely suspended, it aligns itself in the geographical north-south direction.

- Natural magnet is oxide of iron.
- 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.
- 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 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-metre Weber/metre or tesla (T).

## MAGNETIC LINES OF FORCE

The magnetic lines of force are imaginary current which represent a magnetic field graphically.

## MAGNETIC SUBSTANCE

- i. **Diamagnetic substance:** Diamagnetic substances are such substances which, when placed in a magnetic field, acquire feeble magnetism opposite to the direction of the magnetic field.

**Examples:** Bismuth, Zinc, Copper.

- ii. **Paramagnetic Substance:** Paramagnetic substances are such substances which when placed in a magnetic field acquire a feedback magnetised in the direction of field.

**Examples:** Iron, Cobalt.

## 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, alcomax or alnico.
- Electromagnets, cores of transformers, telephoediaphragms and motors are made of soft iron, mu-metal and stalloy.

## TERRESTRIAL MAGNETISM

Our earth behaves as a powerful magnet whose south pole is near the geographical North Pole and whose North Pole is near the geographical South Pole.

- i. **Declination:** The acute angle between magnetic meridian and geographical meridian at a place is called the angle of declination at that place.
- ii. **Dip or Inclination:** Dip is the angle which the resultant earth's magnetic field at a place makes with the horizontal. At poles and equator, dip is  $90^\circ$  and  $0^\circ$  respectively.

## ATOMIC AND NUCLEAR PHYSICS

### CATHODE RAYS

If the gas pressure in a discharge tube is  $10^{-2}$  to  $10^{-3}$  mm of Hg and a potential difference of  $10^4$  volt is applied between the electrodes,

then a beam of electrons emerges from the cathode, which is called cathode rays.

### PROPERTIES OF CATHODE RAYS

- i. Cathode rays are invisible and travel in straight line.
- ii. These rays carry negative charge and travel from cathode to anode.
- iii. These rays emerge perpendicular to the cathode surface and are not affected by the position of anode.
- iv. Cathode rays travel with very high velocity ( $1/10$ th the velocity of light).
- v. These rays are deflected by electric and magnetic fields.
- vi. These rays can ionise gases.
- vii. These rays heat the material on which they fall.
- viii. They can produce chemical change and thus affect a photographic plate.
- ix. These rays can penetrate through thin metal foils.
- x. The source of emf used in the production of cathode rays is induction coil.
- xi. When they strike a target of heavy metals such as tungsten, they produce X-rays.
- xii. The nature of cathode rays is independent of nature of cathode and the gas in the discharge tube.

### POSITIVE OR CANAL RAYS

If perforated cathode is used in a discharge tube, it is observed that a new type of rays are produced from anode moving towards the cathode and passed through the holes of cathode. These rays are positively charged and are called positive rays or canal rays or anode rays.

### PROPERTIES OF CANAL RAYS

- i. The positive rays consist of positively charged particles.
- ii. These rays travel in straight line.
- iii. These rays can exert pressure and thus possess kinetic energy.
- iv. These rays are deflected by electric and magnetic fields.

- v. These rays are capable of producing physical and chemical changes.
- vi. These rays can produce ionisation in gases.

## X-RAYS

- These rays are electromagnetic in nature.

## PROPERTIES OF X-RAYS

- X-rays travel in straight line.
- Speed of X-rays is equal to speed of light. These are not deflected by electric and magnetic fields.
- These produce illumination on falling on fluorescent substances.
- X-rays penetrate through different depth into different substances.
- X-rays shows photoelectric effect.
- X-rays are used in surgery, radio-therapy, engineering department and searching.

## PHOTOELECTRIC CELL

- It is a device based on phenomena of photoelectric effect which converts light energy directly into electric energy.

## APPLICATIONS OF PHOTOELECTRIC CELLS

- In reproduction of sound in cinema, television and photo-telegraphy.
- To control the temperature in furnace and in chemical processes.
- In automatic doors.
- In photoelectric counter.
- In automatic switches for street lights.
- In photoelectric sorters.

## RADIOACTIVITY

- Radioactivity was discovered by Henry Becquerel, Madame Curie and Pierre Curie for which they jointly won Nobel Prize.
- $\gamma$ -rays are emitted after the emission of  $\alpha$  and  $\beta$  rays.
- Alpha rays are positively charged helium nuclei ( $1/2$  He), beta rays are negatively charged electrons and gamma rays are chargeless photons.
- The end product of all natural radioactive elements after emission of radioactive rays is lead.

- With the emission of  $\alpha$  particle, atomic number is decreased by 2 and mass member is decreased by 4.
- With the emission of a  $\beta$  particle atomic number is increased by one and mass number does not change.
- The effect on the mass number and atomic number with the emission of  $\alpha$ ,  $\beta$  and  $\gamma$  rays is decided by **Group-displacement law or Soddy Fagan Law**.
- Radioactivity is detected by G.M. Counter.
- The time in which half nuclei of the element is decayed is called half life of the radioactive substance.
- Cloud chamber is used to detect the presence and kinetic energy of radioactive particles. It was discovered by CRT Wilson.
- **Transmutation:** The changing of one element into another is called transmutation. It is of two types-natural transmutation going on in the form of natural radioactivity and artificial transmutation by bombarding elements with highly energetic projectiles, electrons and protons etc. Artificial transmutation has been used to obtain elements with atomic number greater than 92 (called transuranic elements).

- **Radioactive Isotopes:** These are produced by irradiating substances with neutrons in a nuclear reactor.

- **Carbon Dating:** This is the technique of estimating the age of the remains of a once-living organism, by measuring the radioactivity of the carbon-14 content.

- **Uranium Dating:** The dating of older but non-living things such as rocks, is accomplished with radioactive minerals such as uranium.

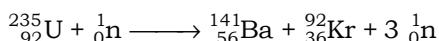
- **Application in Medicine:** Gamma rays from radioactive cobalt-60 are used for cancer therapy.

Radioisotopes are used to study the process of digestion. Radioisotopes are used to measure the volume of blood circulating in the body of a patient.

- **In Agriculture:** Radioisotopes are used to measure the fertilizer consumption of plants by using the tracer technique.

## NUCLEAR FISSION AND FUSION

**Nuclear Fission:** The nuclear reaction in which a heavy nucleus splits into two nuclei of nearly equal mass is called nuclear fission.



**Chain Reaction:** When uranium atom is bombarded with slow neutrons, fission takes place. With the fission of each uranium nucleus, on an average, three neutrons and large energy are 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.

**Atom bomb:** Atom bomb is based on nuclear fission. U-235 and Pu-239 are used as fissionable material. This bomb was first used by USA against Japan in Second World War (6 August 1945 at Hiroshima and 9 August 1945 at Nagasaki).

**Nuclear reactor:** 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.

These are several components of nuclear reactor which are as follows:

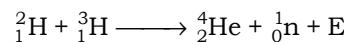
- Fissionable Fuel:** U-235 or U-239 is used.
- Moderator:** Moderator decreases the energy of neutrons so that they can be further used for fission reaction. Heavy water and graphite are used as moderator.
- Control Rod:** Rods of cadmium or boron are used to absorb the excess neutrons produced in fission of uranium nucleus so that the chain reaction continues to be controlled.
- 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, or gas like He or CO<sub>2</sub>.

**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.

A typical fusion reaction is:



- The energy released by sun and other stars is by nuclear fusion.

**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

- Albert Einstein established a relation between mass and energy on the basis of special theory of relativity in 1905. According to this mass can be converted into energy and *vice-versa*.

$$\text{i.e., } E = mc^2$$

Where, c is the velocity of light and E is the energy equivalent of mass m.

## FLUORESCENCE AND PHOSPHORESCENCE

- Zinc sulphide exhibits the phenomena of phosphorescence.

## ELECTRONICS

**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 cathode which is made up of tungsten on which this is a thin layer of barium oxide. When heated, cathode emits electrons. These electrons flow towards the other electrode called anode, a plate, which is a positive potential. As a result, an electric current is established in the circuit.

- Diode valve acts 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.

## SEMICONDUCTOR

- The substances, in which electric conduction is not possible at a low temperature but on increasing the temperature, electric conduction becomes possible, are called the semiconductors.
- Germanium and silicon are the two important semiconductors.
- A pure semiconductor is called **intrinsic semiconductor** and to increase its conductivity a chemical process is performed on it which is called Doping.
- An impure semiconductor is called **extrinsic semiconductor**.

### N-TYPE SEMICONDUCTOR

- If pentavalent impurity atom (such as antimony, arsenic, phosphorus, etc.) is added to the pure germanium or silicon crystal, the crystal so obtained is called the n-type semiconductor.
- Pentavalent impurities are called donor.

### P-TYPE SEMICONDUCTOR

- If trivalent impurity atom (such as aluminium, boron, gallium, etc.) is added to the pure germanium or silicon crystal, the crystal so obtained is called p-type semiconductor.
- Trivalent impurities are called accepter.
- LEDs are specially designed diode made of GaAsP, GaP and are used in electronic gadgets and indicator light.

**Doping:** Adding of chemical impurity to a pure semi-conductor is called doping.

- The electrical conductivity of a semiconductor increases with the increase in temperature.

## IMPORTANT POINTS

- When the energy of the **Satellite is negative**, it moves in either a circular or an elliptical orbit.
- When the energy of **satellite is zero**, it escapes away from its orbit and its path becomes parabolic.
- When the energy of a **satellite is positive**, it escapes from the orbit following a hyperbolic path.
- When the **height of the satellite is increased**, its potential energy increases and kinetic energy decreases.
- **Highly polished** surfaces are bad absorbers and bad emitter but they are good reflectors.
- Standing in double-decker buses, particularly on the upper floor, is not allowed because on tilting, the centre of gravity of the bus get changes and it is likely to overturn.
- **A rose appears red** when day light falls on it because it absorbs all the constituent colours of white light except red, which it reflects to us.

## NANOTECHNOLOGY

- **Nanotechnology:** Nanotechnology deals with structures sized developing materials or devices within that size.
- **Molecular nanotechnology**, sometimes called molecular manufacturing, describes engineered nanosystems (nanoscale machines) operating on the molecular scale.
- **Spintronics** is a technology that exploits the intrinsic spin of the electron and its associated magnetic moment, in addition to its fundamental electronic charge, in solid-state devices.
- **Diamondoids:** Non-scale molecules with characteristic diamond structure isolated from petroleum.
- **Grey Goo** is hypothetical end-of-the-world scenario involving molecular nanotechnology, in which out of control self-replicating robots consume all matter on earth, while building more of themselves.

### List of Scientific Instruments

Instrument	Use	Instrument	Use
Altimeter	It measures altitudes and is used in aircrafts.	Dynamo	It converts mechanical energy into electrical energy.
Ammeter	It measures strength of electric current (in amperes).	Endoscope	It examines internal parts of the body.
Anemometer	It measures force and velocity of wind.	Eudiometer	Glass tube for measuring volume changes in chemical reactions between gases.
AudioPhone	It is used for improving imperfect sense of hearing.	Electrometer	It measures electricity.
Audiometer	It measures intensity of sound.	Electroscope	It detects presence of an electric charge.
Barometer	It measures atmospheric pressure.	Fathometer	It measures the depth of the ocean.
Binocular	It is used to view distant objects.	Galvanometer	It measures the electric current of low magnitude.
Bolometer	It measures heat radiation.	Hydrometer	It measures the specific gravity of liquids.
Barograph	It is used for continuous recording of atmospheric pressure.	Hygrometer	It measures humidity in air.
Cinematography	It is an instrument used in cinema-making to throw on screen and enlarged image of photograph.	Hydrophone	It measures sound under water.
Crescograph	It measures the growth in plants.	Kymograph	It graphically records physiological movements (blood pressure and heartbeat).
Cyclotron	A charged particle accelerator which can accelerate charged particles to high energies.	Lactometer	It determines the purity of milk.
Calorimeter	It measures quantity of heat.	Manometer	It measures the pressure of gases.
Carburetor	It is used in an internal combustion engine for charging air with petrol vapour.	Mariner's Compass	It is an instrument used by the sailors to determine the direction.
Cardiogram	It traces movements of the heart, recorded on a cardiograph.	Microphone	It converts the sound waves into electrical vibrations and to magnify the sound.
Chronometer	It determines longitude of a place kept onboard ship.	Microscope	It is used to obtain magnified view of small objects.
Dynamometer	It measures electrical power.	Photometer	The instrument compares the luminous intensity of the source of light.
		Periscope	It is used to view objects above sea level (used in submarines).

<b>Instrument</b>	<b>Use</b>
Potentiometer	It is used for comparing electromotive force of cells.
Odometer	An instrument by which the distance covered by wheeled vehicles is measured.
Phonograph	An instrument for producing sound.
Pyrometer	It measures very high temperature.
Radar	It is used for detecting the direction and range of an approaching plane by means of radio microwaves.
Rain Gauge	An apparatus for recording rainfall at a particular place.
Radiometer	It measures the emission of radiant energy.
Refractometer	It measures refractive index.
Saccharimeter	It measures the amount of sugar in the solution.
Seismograph	It measures the intensity of earthquake shocks.
Salinometer	It determines salinity of solution.
Speedometer	It is an instrument placed in a vehicle to record its speed.
Sphygmomanometer	It measures blood pressure.
Spherometer	It measures the curvatures of surfaces.
Stereoscope	It is used to view two dimensional pictures.
Sextant	This is used by navigators to find the latitude of a place by measuring the elevation above the horizon of the sun or another star.
Spectrometer	It is an instrument for measuring the energy distribution of a particular type of radiation.

<b>Instrument</b>	<b>Use</b>
Stethoscope	An instrument which is used by the doctors to hear and analyze heart and lung sounds.
Stroboscope	It is used to view rapidly moving objects.
Tachometer	An instrument used in measuring speeds of aeroplanes and motorboats.
Teleprinter	This instrument receives and sends typed messages from one place to another.
Telescope	It views distant objects in space.
Theodolite	It measures horizontal and vertical angles.
Thermometer	This instrument is used for the measurement of temperatures.
Thermostat	It regulates the temperature at a particular point.
Viscometer	It measures the viscosity of liquids.
Voltmeter	It measures the electric potential difference between two points.

### Invention and Discovery

<b>Inventions/ Discoveries</b>	<b>Name of the Scientist/ Person</b>
Archimedean Screw	Archimedes
Atom	Neils Bohr
Atomic Number	Mosley
Atomic Physics	Enrico Fermi
Atomic Structure	Bohr and Rutherford
Atomic Theory	Dalton
Automatic Gearbox	Hermann Föttinger
Adding Machine	Pascal
Aeroplane	Wright brothers
Air Brake	George Westinghouse
Air Pump	Otto von Guericke

Inventions/ Discoveries	Name of the Scientist/ Person	Inventions/ Discoveries	Name of the Scientist/ Person
Airship (rigid)	G. Ferdinand von Zeppelin	Camera	George Eastman
Aniline Dyes	Hoffman	Carburettor	Gottlieb Daimler
Antiseptic Surgery	Lord Joseph Lister	Cell Doctrine	Rudolf Virchow
Arc Lamp	C. F. Brush	Celluloid	A. Parker
Automobile	Daimler	Cement	Joseph Aspdin
Automobiles using gasoline	Karl Benz	Chromosomal Theory of Heredity	Thomas Hunt Morgan
Avogadro's Hypothesis	Avogadro	Chronometer	John Harrison
Bacteriology	Robert Koch	Cine Camera	Friese-Greene
Bakelite	Leo H Baekeland	Cinematography	Thomas Alva Edison
Balloon	Jacques and Joseph Montgolfier	Classical Field Theory	Michael Faraday
Ball-Point Pen	John J. Loud	Clock (mechanical)	Hsing and Ling-Tsan
Barometer	Evangelista Torricelli	Clock (pendulum)	C. Huygens
Beri-Beri	Eijkman	Coloured Photography	Lippman
Bicycle	Kirkpatrick Macmillan	Computer	Charles Babbage
Bicycle Tyre	J.B. Dunlop	Cosmic Rays	R.A. Millikan
Bacteriophage	Max Delbruck	Crescograph	J.C. Bose
Bifocal Lens	Benjamin Franklin	Crystal Dynamics	C.V. Raman
Binomial Nomenclature	Carl Linnaeus	Cyclotron	Lawrence
Biogenetic Principle	Ernst Haeckel	Deuterium (Heavy Water)	H.C. Urey
Bismuth	Valentine	Diesel Engine	Rudolf Diesel
Bomb	Edward Teller	Diesel Oil Engine	Rudolf Diesel
Boson	S.N. Bose	Difference Engine	Charles Babbage
Boyle's law	Boyle	Electrons	J.J. Thomson
Braille	Louis Braille	Solar System	Copernicus (1540)
Breaking up the Nucleus of an atom	Rutherford	Specific Gravity	Archimedes
Cinema	A.L. and J.L. Lumiere	Dynamite	Alfred B. Nobel
Centigrade scale	A. Celsius	Dynamo	Michael Faraday
Chemical Structure	August Kekule	Effect of Pressure on Trough Bodies	Meghnad Saha
Chemotherapy	Paul Ehrlich	Eightfold Way	Murray Gell-Mann
Chloroform	James Harrison and James Young Simpson	Electric Battery	Alessandro Volta
Cholera Bacillus	Robert Koch	Electrical Waves	Heitz
Calculating Machine	Pascal	Electricity	Faraday
		Electromagnet	William Sturgeon
		Electromagnetic Field	James Clerk Maxwell

Inventions/ Discoveries	Name of the Scientist/ Person	Inventions/ Discoveries	Name of the Scientist/ Person
Electromagnetic Theory	Maxwell	Helium Gas	Lockyer
Electron	Joseph J. Thomson	Hovercraft	Christopher Cockerell
Electron Theory	Bohr	Hydrogen	Cavendish
Electronic Computer	Dr. Alan M. Turing	Hydrophobia	Louis Pasteur
Elevator	Elisha G. Otis	Intelligence Test	Binet
Energy of the Sun	Hans Bethe	Internal Combustion Engine	Otto
'Equal' sign (=)	Robert Recorde	Jeans	Levi Strauss
Ethology	Konrad Lorenz	Jet Engine	Sir Frank Whittle
Eugenics	Francis Galton	Jet Propulsion	Frank Whittle
Fahrenheit Scale	Fahrenheit	Kala-azar Fever	U.N. Brahmachari
Film and Goods Photographic	Kodak	Kaleidoscope	David Brewster
Electric Flat Iron	H.W. Seeley	Laboratory Gas Burner	Robert Wilhelm von Bunsen
Electric Furnace	William Siemens	I.Q. Test	Alfred Binet
Electric Generator	Michael Faraday	In Number Theory	Ramanujam
Electric Guitar	Adolph Rickenbacker	Incandescent Bulb	Edison
Electric iron	H.W. Seeley	Induction Coil	Rohm Korff
Electric Lamp	Thomas Alva Edison	Induction of Electric Current	Faraday
Electric Measurement	Gauss	Insulin	F. Banting
Electric Motor (AC)	Nikola Tesla	Laughing Gas	Priestley
Electric Razor	Jacob Schick	Law of Electrolysis	Faraday
Film (with sound)	Dr. Lee de Forest	Law of Gases	Gay Lussac
Fundamental Laws of Electric Attraction	Coulomb	Laws of Electrical Resistance	Ohm
Galvanometer	Andre-Marie Ampere	Laws of Gravitation	Newton
Gas Lighting	William Murdoch	Laws of Heredity	Gregory Mandel
Gasoline Engine	Karl Benz	Laws of Inheritance	Gregory Mendel
Genetic Code	Frederick Sanger	Laws of Motion	Newton
Glider	Sir George Caley	Laws of Multiple Proportion	Dalton
Gramophone	Thomas Alva Edison	Laws of Natural Selections	Darwin
Gun Powder	Rogeji Bacon	Logarithms	John Napier
Heavens	William Herschel	Machine Gun	Dr. Richard Gatling
Heavy Hydrogen	Urey	Malarial Parasite	Ronald Ross
Helicopter	Broquett	Match (safety)	J.E. Lurdstrom
Heliocentric Universe	Nicolaus Copernicus	Mathematical Astro-physics	Chandrasekhar

Inventions/ Discoveries	Name of the Scientist/ Person	Inventions/ Discoveries	Name of the Scientist/ Person
Mathematical Genius	Carl Gauss (Karl Friedrich Gauss)	New Astronomy	Tycho Brahe
Mauve Dye	Perkin	New Science	Galileo Galilei
Measurement of Electrical Energy	Joule, James Prescott	Newtonian Mechanics	Pierre Simon de Laplace
Mechanical Equivalent of Heat	Joules	Modern Computer	John von Neumann
Mercury Thermometer	Fahrenheit	Modern Geology	Charles Lyell
Meson	Hideki Yakawa	Modern Physiology	William Bayliss
Microphone	Johann Phillip Reis, Alexander Graham Bell, Elisha Gray, Amos E. Dolbear, and Thomas Edison	Modern Synthesis	Theodosius Dobzhansky
Microscopic Anatomy	Marcello Malpighi	Modern Telescope	Edwin Hubble
Life Boat	Henry Great Head	Molecular Biology	Francis Crick
Lift	E.g., Otis	Molecular Scattering of Light in Fluid	Ramanathan
Lift (Elevators)	Otis	Montessori Method	Maria Montessori
Lightning Conductor	Benjamin Franklin	Newtonian Revolution	Isaac Newton
Line of Demarcation (Ship)	Plimsoll	Nuclear Fission	Otto Hahn, Bohr and Fermi
Linotype	Mergenthaler	Nylon	Dr. Wallace H. Carothers
Liquid Oxygen	Dewar	Nylon Plastic	Carothers
Locomotive	Richard Trevithick	Organic Chemistry	Emil Fischer
Logarithmic Tables	John Napier	Origin of Species	Charles Darwin
Modern Anthropology	Franz Boas	Oxygen	Priestly
Modern Astronomy	Arthur Eddington	Paints	Shalimar
Motion of the Planets	Johannes Kepler	Paper Clip	Johann Vaaler
Motor Car (Petrol)	Karl Butler	Parking Meter	Carlton McGee
Movie Projector	Thomas Alva Edison	Penicillin	Alexander Fleming
Neon Gas	Ramsay, Travers	Periodic Law	Mendeleef
Neon Lamp	G. Claude	Periodic Table of Elements	Dmitri Mendeleev
Neurophysiology	Charles Sherrington	Pharmacology	Gertrude Belle Elion
Neutron	Chadwick	Phonograph	Edison
New Anatomy	Andreas Vesalius	Photograph	Dauguerre
		Photography (paper)	W.H. Fox Talbot
		Quantum Theory	Werner Heisenberg
		Quantum Theory	Max Plank
		Razor (safety)	K.G. Gillette
		Rabies Vaccine	Louis Pasteur

Inventions/ Discoveries	Name of the Scientist/ Person	Inventions/ Discoveries	Name of the Scientist/ Person
Radar	Dr. A.H. Taylor and L.C. Young	Razor (electric)	Col. J. Schick
Radio	G. Marconi	Refrigerator	James Harrison, Alexander Catlin
Phototherapy	N.R. Finsen	Replacing Human Heart	Christian Barnard
Pneumatic Tyres	John Boyd Dunlop	Revolution in Chemistry	Antoine Laurent Lavoisier
Positive Electrons	Anderson	Revolver	Samuel Colt
Power Loom	Edmund Cartwright	Rise of German Science	Hermann von Helmholtz
Powerloom	Cartwright	Rubber (vulcanized)	Charles Goodyear
Principle for lever (S.P. Gravity)	Archimedes	Rubber (waterproof)	Charles Macintosh
Printing for the Blind	Braille	Safety Lamp	Sir Humphrey Davy
Printing Press	Johannes Gutenberg	Safety Pin	William Hurst
Psycho-analysis	Dr. Sigmund Freud	Seismograph	Roberts Mallet
Psychology of the Unconscious	Sigmund Freud	Sewing Machine	Thomas Saint
Quanta	Max Planck	Sextant	Hadley
Quantum Cosmology	Stephen Hawking	Ship (steam)	J.C. Perier
Quantum Electrodynamics	Richard Feynman	Ship (turbine)	Sir Charles Parsons
Quantum Mechanics	Max Born	Soviet Genetics	Trofim Lysenko
Radio Transmitter	Alexanderson	Space Flying	Braun, Dr. Wernher von
Radioactive Dating	Willard Libby	Spectroscope	Bunsen
Radioactivity	Marie Curie	Spectroscopy	Gustav Kirchhoff
Radioactivity of Uranium	Henry Becquerel	Spinning Frame	Sir Richard Arkwright
Radium	Madame Curie	Spinning Jenny	James Hargreaves
Railway Engine	Stephenson	Stainless Steel	Harry Brearley
Raincoat	Charles Macintosh	Shorthand	Sir Isaac Pitman
Raman Effect	C.V. Raman	Sociobiology	Edward O. Wilson
Rare Gas	Cavendish	Steam Boat	Fulton
Safety Razor	King C. Gillette	Steam Engine	James Watt
Salk Vaccine	Salk	Steam Engine (condenser)	James Watt
Saxophone	Antoine Joseph Sax	Steam Engine (piston)	Thomas Newcome
Scooter	G. Bradshaw	Steam Turbine	Parsons
Rayon	American Viscose Co.	Stress Concept	Hans Selye
		Structural Anthropology	Claude Levi-Strauss
		Structure of DNA	James Watson

Inventions/ Discoveries	Name of the Scientist/ Person	Inventions/ Discoveries	Name of the Scientist/ Person
Structure of the Atom	Ernest Rutherford	Thermodynamics	Ludwig Boltzmann
Submarine	David Bushnell	Vaccination	Edward Jenner
Sulpha Drugs	Domagk	Valve of Radio	Sir J.A. Fleming
Steel Melting Process	Bessemer	Vitamins	Hopkins and Funk
Steel Production	Henry Bessemer	Vitamin A	Elmer V. McCollum and M. Davis
Stethoscope	Dr. William Stokes, Rene Laennec	Vitamin B	Elmer V. McCollum
Superconductivity	Heike Kamerlingh	Vitamin B1	Casimir Funk
Symbiosis Theory	Lynn Margulis	Vitamin B2	D. T. Smith, E. G. Hendrick
Telegraph	Samuel Morse	Vitamin Niacin	Conrad Elvehjem
Telegraphic Code	Samuel Morse	Vitamin Folic acid	Lucy Wills
Telephone	Sir Alexander Graham Bell	Vitamin B6	Paul Gyorgy
Telescope	Galileo	Vitamin C	James Lind
Television	Baird	Vitamin D	Edward Mellanby
Television (mechanical)	John Logie Baird	Vitamin E	Herbert Evans and Katherine Bishop
Tempo of Evolution	George Gaylord Simpson	Vulcanised Rubber	Charles Goodyear
Terylene	J. Whinfield and H. Dickson	Washing Soda	Lablanc
The Long Playing Microgroove Record	Peter Goldmark	Watch	A.L. Breguet
T.N.T.	Iilly Brandt	Waterproof Rubber	Charles Macintosh
Talkies	Lee-de-Frost	Wave Mechanics	Erwin Schrodinger
Tank	Sir Ernest Swington	Wave Theory of Light	Christiaan Huygens
Theory of Conditioned Reflex	Pavlov	Wave/Particle Duality	Louis Victor de Broglie
Theory of Evolution	Darwin	Wireless Communication	Oliver Lodge
Theory of Relativity	Einstein	Wireless Telegraphy	Marcony
Thermometer	Galileo Galiei	World Wide Web and Hypertext Markup Language	Tim Berners Lee
Thermos Flasks	Dewar	X-rays	Roentgen
Tractor	J. Froelich	X-ray	Wilhelm Reontgen
Transformer	Michael Faraday	X-ray Crystallography	Max von Laue
Transistor	Bardeen, Shockley, Brattain	Zerox Machine	Chester Carlson
Typewriter	C. Sholes	Zip Fastener	W.L. Judson
Uranium Fusion	Oho Hahn	Zipper	B.F. Goodrich
Theory of the Atom	John Dalton		

# CHEMISTRY

A French chemist, **Lavoisier (1743-93)** is regarded as father of modern chemistry.

## MATTER AND ITS STATES

- It exists in five states viz, solid, liquid, gas, plasma, Bose-Einstein condensate, out of which the former three are commonly seen.
- Anything that occupies space, possesses mass and can be felt by any one or more of our sense organs is called **matter**.

## STATES OF MATTER

### SOLID STATE

A solid possesses definite shape and definite volume which means that it cannot be compressed on applying pressure.

### LIQUID STATE

A liquid possesses definite volume but no definite shape.

### GASES

- These have neither definite volume nor definite shape.
- Solid, liquid and gases are inter-convertible by changing the conditions of temperature and pressure.
- Fluorescent tube** contains helium (He) gas and neon sign bulb contains neon (Ne) gas.

### BOSE-EINSTEIN CONDENSATE

- In 1924–25, Satyendra Nath Bose and Albert Einstein gave the information about Bose-Einstein condensate.
- It is a state of matter of a lower density gas of boson cooled up to temperature which is very close to absolute zero or  $-273.15^{\circ}\text{C}$ . Infact, it is a fifth state of matter.

- Pure substances:** A single substance (or matter) which cannot be separated into other kinds of matter by any physical process is called pure substance.

## ELEMENTS

- They contain only single type of atoms.
- Elements which are liquid at room temperature are mercury (Hg) and bromine ( $\text{Br}_2$ ).
- Examples (of elements) are diamond, graphite, sulphur ( $\text{S}_8$ ), phosphorus ( $\text{P}_4$ ), ozone ( $\text{O}_3$ ), oxygen ( $\text{O}_2$ ), etc.
- Elements have the following order of abundance in earth crust, Oxygen > silicon > aluminium (metal) > iron > calcium.
- Elements have the following order of abundance in human body: Oxygen > carbon > hydrogen > nitrogen.

### Extraction Process for Various Elements

Frasch process	Sulphur
Acheson process	Graphite
Hall Herault	Aluminium
Ostwald process	Nitric acid
Bayer process	Extraction of aluminium from ore
Bessemer process	Steel from molten pig iron
Patio process	Silver
Dow process	Bromine
Pidgeon process	Magnesium
Fischer Tropsch process	Gasoline
Azeotropic distillation	Absolute alcohol

## METALS

Metals are solids (exception mercury which is liquid at room temperature) are normally hard. They have lustre, high MP and BP and also with increase in temperature due to vibration of positive ions at their Lattice points.

## NON-METALS

Non-metals are the elements with properties opposite to those of the metals. They are found in all states of matter. They do not possess lustre (exception is iodine). They are poor conductors of electricity (exception is graphite) and they are not malleable and ductile.

## METALLOIDS

Metalloids are the elements which have common properties of both metals and non-metals.

## COMPOUNDS

Compounds are pure substances that are composed of two or more different elements in fixed proportion by mass.

- These contain more than one kind of atom.
- Their examples are silica ( $\text{SiO}_2$ ), water ( $\text{H}_2\text{O}$ ), sugar ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ), salt ( $\text{NaCl}$ ), etc.

## ORGANIC COMPOUNDS

The compounds obtained from living sources are called organic compounds. **Examples** are carbohydrates, proteins, oils, fats, etc.

## INORGANIC COMPOUNDS

The compounds obtained from non-living sources such as rocks and minerals are called inorganic compounds. **Examples** are common salt, marble, washing soda, etc.

## MIXTURES

A material obtained by mixing two or more substances in any indefinite proportion is called a mixture. **Examples** are milk, sea water, petrol, paint, glass, cement, wood, etc.

## (A) HOMOGENEOUS MIXTURE

A mixture is said to be homogeneous if it does have a uniform composition throughout.

**Example:** Salt-solution, sugar solution, etc.

## (B) HETEROGENEOUS MIXTURE

A mixture is said to be heterogeneous if it does not have a uniform composition throughout and has visible boundaries of separation between the various constituents.

**Example:** A mixture of sulphur and sand, a mixture of iron fillings and sand, etc.

## SEPARATION OF MIXTURES

### SUBLIMATION

In this process, a solid substance passes direct into its vapours on application of heat. The vapours when cooled, give back the original substance.

### 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.

### EVAPORATION

If a solution of solid substance in a liquid is heated, the liquid gets converted into its vapours and slowly goes off completely. This process is called evaporation.

### CRYSTALLISATION

This method is mostly used for separation and purification of solid substances. In this process, the impure solid or mixture is heated with suitable solvent to its boiling point and the hot solution is filtered. The clear filtrate is cooled slowly to room temperature. When pure solid crystallises out, this is separated by filtration and dried.

### 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.

**(A) Vacuum Distillation**

- It is also known as distillation under reduced pressures.

**(B) Steam Distillation**

- It is used to separate a steam volatile compound from non-volatile or non-steam volatile compounds.

**(C) 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.

**CHROMATOGRAPHY**

- 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.

**CENTRIFUGATION**

- It is based upon the principle that the denser particles are forced to the bottom and the lighter particles stay at the top when spun rapidly.

**SEDIMENTATION AND DECANТАTION**

- These methods are used when one component is a liquid and the other is an insoluble solid, heavier than liquid, i.e. mud and water.

If muddy water is allowed to stand undisturbed for some time 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.

**REVERSE OSMOSIS**

- It is a technique in which solvent molecules move from the solution of higher concentration to the solution of lower

concentration when these are separated by semipermeable membrane and excess pressure is applied to the solution of higher concentration.

- It is used for desalination of sea water.

**SOLUTIONS OR TRUE SOLUTIONS**

- These are homogeneous mixtures of two or more substances. The size of solute particles is less than  $10^{-7}$  cm.

**COLLOIDAL SOLUTIONS**

- These are heterogeneous mixtures. The size of solute particles is between  $10^{-7}$  cm and  $10^{-5}$  cm.
- These can scatter light because of the presence of large solute particles, i.e. they show **Tyndall effect** and **Brownian movement**.
- The scattering of light by colloidal particles is called Tyndall effect.

**STRENGTH OF SOLUTION**

- **Molarity:** It is defined as the number of moles of the solute per litre of solution.

$$M = \frac{\text{Number of moles of solute}}{\text{Volume of solution per litre}}$$

- **Normality:** It is defined as the number of gram equivalent of the solute per litre of solution.

$$\text{Normality (N)} = \text{Molarity} \times \frac{\text{Molecular mass}}{\text{Equivalent weight}}$$

- **Molality:** It is defined as the number of moles of solute dissolved in 1000 g of the solvent.

$$m = \frac{\text{Moles of solute}}{\text{Weight of solvent in Kg}}$$

**Types of Colloidal Systems**

S.No.	Dispersed Phase	Medium	Name	Example
1.	Solid	Solid	Solid Sol	Some coloured glasses
2.	Solid	Liquid	Sol	Muddy water
3.	Liquid	Solid	Gel	Cheese, butter, jellies
4.	Liquid	Liquid	Emulsion	Milk, Hair Cream
5.	Gas	Solid	Solid Foam	Pumice stone, foam, rubber
6.	Gas	Liquid	Foam	Froth, whipped cream

## PHYSICAL CHANGE

- It is the change which only affects the physical properties like colour, hardness, density, melting point, etc. of matter.

## CHEMICAL CHANGE

- These changes affect the composition as well as chemical properties of matter and result in the formation of a new substance.

## CONCEPT OF CHANGE IN STATE

- Melting Point:** The temperature at which solid and the liquid forms of the substance exist at equilibrium or both forms have same vapour pressure is called melting point.
- Boiling Point:** The temperature at which the vapour pressure of a liquid becomes equal to the atmospheric pressure is called boiling point.
- Freezing Point:** The temperature at which a substance is changed from liquid state to solid state is called freezing point.
- 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 on (i) its nature and (ii) temperature.

Higher the vapour pressure, lesser will be the magnitude of intermolecular forces present in molecules. Vapour pressure of a liquid increases with increase in temperature.

## ATOMIC STRUCTURE

### Atom

The smallest particle of an element is called an atom. The atom of the hydrogen is the smallest and lightest.

### Characteristics of Atoms

#### Atomic Number (Z)

- It is equal to the number of protons.
- It is equal to the number of electrons in natural atom.

### Mass Number (A)

- It is equal to the sum of number of protons and number of neutrons.
- It is written as a superscript to the right of the symbol of the atom e.g., C<sup>12</sup> here 12 is the mass number of carbon (C).

### Molecule

A molecule is the smallest particle of a compound that can have a stable and independent existence.

### Mole Concept

One mole is just a number whose value is equal to  $6.022 \times 10^{23}$  i.e. Avogadro's number. Thus, one mole in quantity implies that the matter contains exactly  $6.022 \times 10^{23}$  number of particles (atoms, molecules, ions, etc).

- Number of moles of molecules

$$= \frac{\text{Weight in gm}}{\text{Molecular mass}}$$

- Number of moles of atoms

$$= \frac{\text{Weight in gm}}{\text{Atomic mass}}$$

- Number of moles of gases

$$= \frac{\text{Volume at STP}}{\text{Standard molar volume}}$$

- Standard molar volume of gas at STP = 22.4 litres

### Atomic Mass

It is the ratio of mass of one atom of the element to the part of the mass of one atom of Carbon-12.

### Molecular Mass

It indicates how many times one molecule of a substance is heavier in comparison to the mass of the atom of Carbon-12.

## ELECTRON

- Electron was discovered by J.J. Thomson.
- The name of electron was given by Stoney.
- An electron is obtained from Cathode rays experiment.

- Its antiparticle is positron.
- It has mass equal to  $9.1 \times 10^{-31}$  kg or 0.00054 u.
- It has charge equal to  $-1.6 \times 10^{-19}$  C (by Millikan oil drop experiment).

## PROTON

- i. A proton was discovered by Goldstein.
- ii. A proton was named by Rutherford.
- iii. A proton is obtained from anode rays experiment.
- It is positively charged.
- It is present in the nucleus.
- It has charge  $+1.6 \times 10^{-19}$  C and mass equal to  $1.672 \times 10^{-27}$  kg or 1.00727 u.

## Proton, Neutron and Electron Data

Particle	Relative Charge	Relative/C	Charge/kgs	Mass
Protons	1	+1	$+1.6 \times 10^{-19}$	$1.67 \times 10^{-27}$
Neutrons	1	neutral	0	$1.67 \times 10^{-27}$
Electrons	0.0005	-1	$-1.6 \times 10^{-19}$	$9.11 \times 10^{-31}$

## NUCLEUS

- It contains protons and neutrons which are collectively called nucleons.
- **Mass number (A):** The sum of number of protons and neutrons in an atom of the elements is called mass number. It is denoted by **A**.
- **Isotopes:** These are atoms of the elements having the same atomic number but different mass number.
- Hydrogen (H-1) is the lightest isotope and lead-208 is the heaviest isotope (with mass 207.974).
- The isotopes of hydrogen are Protium ( ${}_1^1\text{H}^1$ ), Deuterium ( ${}_1^2\text{H}^2$ ) and Tritium ( ${}_1^3\text{H}^3$ ).  ${}_6^1\text{C}^{12}$  and  ${}_6^14\text{C}^{14}$  are isotopes of carbon.
- **Isobars:** These are atoms of the elements having the same mass number but different atomic numbers, e.g.:  ${}^{40}\text{S}$ ,  ${}^{40}\text{Cl}$ ,  ${}^{40}\text{Ar}$ ,  ${}^{40}\text{K}$  and  ${}^{40}\text{Ca}$ .
- **Isotones:** These are atoms of different elements having the same number of neutrons.
- **Isoelectronic:** These are atoms/molecules/ions containing the same number of electrons.
- **Thomson's model of an atom:** According to Thomson, an atom is treated as sphere of radius  $10^{-8}$  cm in which positively charged particles are uniformly distributed and negatively charged electrons are embedded

## NEUTRON

- i. A neutron was discovered by James Chadwick.
- ii. Charge on neutron is zero.
- iii. A neutron is obtained from radioactivity phenomenon.
- It has zero charge and mass equal to  $1.674 \times 10^{-27}$  kg or 1.00867 u.
- It is present inside the nucleus. Its antiparticle is antineutrino.

**Atomic number (Z):** The number of proton or electrons in an atom of the element is called atomic number. It is denoted by **Z**.

through them. This is also called Plum-Pudding model of an atom or watermelon model of an atom.

## CATHODE RAYS

- These rays were discovered by J.J. Thomson.
- These rays originate from cathode and travels in a straight line towards anode.

## ANODE RAYS

- These rays were discovered by Goldstein (also called positive rays).
- These rays do not originate from anode.
- These are positively charged and have velocity less than cathode rays.
- **Hydrogen** is the only atom in which neutrons are not present.
- According to **de-Broglie**, all particles have wave nature.

## RUTHERFORD'S ATOMIC MODEL

- This model was based upon  $\alpha$ -particle scattering experiment and it suggests that most of the part of an atom is empty. It also suggests that the entire mass of an atom is concentrated in its centre at the nucleus. The nucleus is surrounded by electrons that move around the nucleus with a very high speed in circular paths called orbits.

**Spectrum:** When a white light is allowed to pass through a prism, it splits into seven colours. These seven coloured bands are called spectrum.

### NIEL BOHR'S MODEL

- This model suggests that the electrons are confined into clearly defined, quantized orbits, and could jump between these, but could not freely spiral inward or outward in intermediate states.

### PLANCK'S QUANTUM THEORY

- According to this theory:
  - Atoms and molecules could emit or absorb energy only in the form of discrete packets of energy called quanta.
  - The energy of quantum ( $E$ ) is proportional to its frequency ( $\nu$ ).

### HEISENBERG'S UNCERTAINTY PRINCIPLE

- This principle states that it is impossible to determine simultaneously the exact position and exact momentum (velocity) of an electron.

### QUANTUM NUMBERS

- These show the position and energy of electrons in an atom. These are four in number
  - Principal quantum number,  $n$ .
  - Azimuthal quantum number,  $l$ .
  - Magnetic quantum number,  $m$ .
  - Spin quantum number,  $s$ .

### ELECTRONIC CONFIGURATION

- It is the arrangement of electrons in various shells, subshells and orbitals in an atom.

### PAULI EXCLUSION PRINCIPLE

- It is the quantum mechanical principle which states that no two identical fermions (particles with half-integer spin) may occupy the same quantum state simultaneously. Or
- Only two electrons may exist in the same orbital and these electrons must have opposite spin.

**Zeeman's effect:** When spectral lines obtained from atomic spectra are placed in a magnetic field, they are splitted into number of fine lines. This is called Zeeman's effect.

**Stark's effect:** When spectral lines obtained from atomic spectra is placed in electric field, they are splitted into number of fine lines this is called Stark's effect.

## RADIOACTIVITY

- It was discovered by **Henry Becquerel** but term radioactivity was given by **Madam Curie**. It is the process of spontaneous disintegration of nucleus and is measured by Geiger counter.
- It involves emission of  $\alpha$ ,  $\beta$  and  $\gamma$  rays/particles and has units Curie, Becquerel, Rutherford.

### ALPHA ( $\alpha$ ) PARTICLE

- These are positively charged helium nuclei  $(2\text{He}_4)^{2+}$ .
- An  $\alpha$ -emission reduces the atomic mass by 4 and atomic number by 2.

### BETA ( $\beta$ ) PARTICLE

- These are negatively charged electrons ( ${}^{-1}\text{e}_0$ ).
- A  $\beta$ -emission increases the atomic number by one with no change in atomic mass.

### GAMMA ( $\gamma$ ) RAYS

- These are electromagnetic radiations and have very high penetrating power.
- Their emission increases does not affect the position of nuclei in the Periodic Table.

### NUCLEAR REACTOR

- It is a device that is used to produce electricity and permits a controlled chain nuclear fission.
- It contains fuels e.g.,  ${}_{92}\text{U}^{235}$ , moderator (e.g., graphite and heavy water,  $\text{D}_2\text{O}$ ) to slow down neutrons and control rods (made up of boron steel or cadmium) to absorb neutrons.
- It may also contain liquid sodium as coolant.

### HALF-LIFE PERIOD

- It is the time in which a radioactive substance remains half of its original amount.

### Uses of RadioIsotopes

- Iodine-131** is employed to study the structure and activity of thyroid gland.
- Iodine-123** is used in external radiation therapy for the treatment of cancer.
- Cobalt-60** is used in external radiation therapy for the treatment of cancer.
- Sodium-24** is injected along with salt solution to trace the flow of blood.
- Phosphorus-32** is used for leukemia therapy.
- Carbon-14** is used to study the kinetics of photosynthesis.

### RADIOCARBON DATING

- It is used in determining the age of carbon bearing materials such as wood, animal fossils, etc.

### URANIUM DATING

- It is used to determine the age of earth, minerals and rocks.

## PERIODIC CLASSIFICATION OF ELEMENTS

Father of Periodic Table is **Mendeleev**.

### PERIODIC TABLE

- It is a tabular display of the chemical elements, organised on the basis of their properties.

### MENDELEEV'S PERIODIC TABLE (1869)

- It is based upon the Mendeleev's periodic law, which states, "Properties of the elements are the periodic function of their atomic masses."

**Modern Periodic Law:** Modern periodic law was given by Moseley.

**According to Moseley:** "The physical and chemical properties of the elements are the periodic function of their atomic numbers."

### MODERN PERIODIC TABLE

It is just graphical representation of Aufbau principle. It is based on the electronic

configuration of elements and contains 118 elements.

Modern periodic table is classified as:

- |              |               |
|--------------|---------------|
| i. s-block;  | iii. d-block; |
| ii. p-block; | iv. f-block.  |

### S-BLOCK

- It contains group 1 and 2, i.e., hydrogen and alkali metals (Li, Na, K, Rb, Cs, Fr) and alkaline earth metals (Be, Mg, Ca, Sr, Ba, Ra). General electronic configuration of these elements is  $ns^{0-2}$ .
- These elements are soft metals, electropositive.

### P-BLOCK

- It comprises the last six groups (13–18).
- General electronic configuration of this block elements is  $ns^2 np^{1-6}$ .
- It is only block which contain metals, non-metals and metalloids.

### D-BLOCK

- It comprises 10 groups (3 to 12). These elements are called transition elements.
- General electronic configuration of d-block elements is  $(n-1)d^{1-10} ns^{1-2}$ .
- Hg, Zn, Cu, Sc etc. are d-block elements but not the transition elements.

### F-BLOCK

- There are two series in this block 4 F and 5F series. 4F series elements are called lanthanides and 5F series elements are called actinides.
- General electronic configuration of this block elements is  $(n-2)F^{1-14} (n-1) d^{1-10} ns^{1-2}$ .

### PERIODIC PROPERTIES

- Atomic radii:** The distance from the centre of the nucleus to the outermost shell containing electrons is called atomic radius.
- Ionic radii:** The effective distance from the centre of nucleus of the ion upto which it exerts its influence on the electron cloud is called ionic radii.
- Atomic Size:** It generally increases on moving down the group because number of shells increases.

- iv. **Vалency:** It is the combining capacity of an element. It remains the same in a group.
- v. **Metallic Character:** It is the tendency of an element to form cation by **the loss of electrons**. It decreases along a period from left to right and increases in a group on moving downwards.
- vi. **Ionisation Energy:** It is the energy required to remove an electron from the outermost shell of an isolated gaseous atom. It generally increases along a period from left to right but ionisation energy of Be, Mg, Ca, Sr is larger than the ionisation energy of B, Al, In, Ti, respectively. It generally decreases along a group on moving downwards.
- vii. **Electron Affinity (EA):** It is defined as the energy liberated when an extra electron is added to an atom. It decreases on moving down a group. It is highest for chlorine.
- viii. **Electronegativity:** It is the tendency of an atom in a molecule to attract the shared electrons towards it. It increases regularly along a period from left to right and decreases on moving down a group. It is highest for fluorine.
- ix. **Lattice Energy:** The amount of energy released during formation of the mole of ionic compound from its constituent ions is called Lattice energy.
- x. **Hydration Energy:** The amount of energy released during dissolution of one mole of compound into water, is called hydration energy.

If hydration energy > Lattice energy, then compound is soluble in water and if hydration energy < Lattice energy, then compound is insoluble in water.

## CHEMICAL BONDING

The force that holds together the different atoms in a molecule is called chemical bond.

### IONS

- These are of two types: cations and anions. **Cations** are formed by the loss of electrons

and carry positive charge. **Anions** are formed by the gain of electrons and carry negative charge.

### IONIC BOND OR (ELECTROVALENT BOND)

A bond formed by the complete transfer of ions or more electrons from one atom to other atom is called ionic bond.

### COVALENT BOND

A bond formed between two same or different atoms by mutual contribution and sharing of electrons is called covalent bond.

**Co-ordinate bond (or Dative bond):** Co-ordinate bond is a special type of covalent bond in which one atom donates electrons of other atom. The bonding between donor to acceptor atom is called **co-ordinate bond**.

### VALENCY

- It is the number of electrons taking part in bonding (i.e., bond formation).

### 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 is large, hence,  $\sigma$ -bond is a strong bond.

### pi-BOND ( $\pi$ -BOND)

A bond formed by the sidewise (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.

### 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 greater the size of atoms, the lesser will be bond energy.

The greater the bond multiplicity, the more will be bond energy.

## BOND LENGTH

The average equilibrium distance between the centres of the two bonded atoms is called length.

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 by a covalent bond and to other by a weak force of attraction which is called hydrogen bond.

Intermolecular hydrogen bond arises when hydrogen bonding occurs between two or more molecules. In this case, m.p. and b.p. of the compounds increase due to molecular association.

When hydrogen bonding occurs within a molecule, then it is called intermolecular hydrogen bonding. Due to cyclisation, m.p. and b.p. of the compounds decrease in this case.

Due to intermolecular hydrogen bonding between alcohol and water, alcohol is soluble in water.

## VAN DER WAALS' INTERACTIONS/FORCE

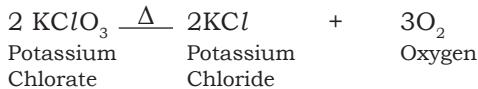
It is the attractive force among the non-polar molecules in solid or liquid states.

## CHEMICAL REACTION

- The process in which substances (reactants) react to form new compounds (products) is known as chemical reaction.

## TYPES OF REACTIONS

**Decomposition reactions:** In these reactions, compound either of its own or upon heating decomposes to give two or more components out of which at least one is in the elemental state.



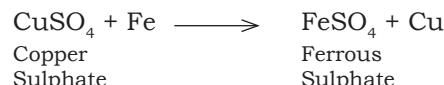
**Addition reactions:** In such reactions, two or more substances combine to give a single substance.

**Substitution reactions:** In such reactions, an atom or a group of atoms of a molecule is replaced by another atom or group of atoms.

**Combination reactions:** In combination reactions, compounds are formed as a result of the chemical combination of two or more elements.

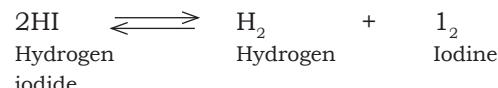


**Displacement reactions:** In these reactions, an atom/ion present in a compound gets replaced by an atom/ion of another element.



**Disproportionation reactions:** The chemical reaction in which only one substance is oxidised as well as reduced simultaneously is called disproportionation reaction.

**Dissociation reactions:** These are those reversible reactions in which a molecule dissociates into two or more simple molecules.



**Double decomposition reactions:** These involve exchange of ions between two compounds.

**Exothermic reactions:** These are those reactions in which energy is released.

**Endothermic reactions:** These are those in which energy is consumed.

**Redox reaction:** A reaction in which both oxidation and reduction takes place simultaneously is called redox reaction.

**Neutralisation reaction:** When an acid reacts with a base, salt and water is formed. This reaction is called neutralisation reaction.

**Reversible reaction:** A reaction in which reactants combine to form products and again products recombine to form reactants is called reversible reaction.

**Irreversible reaction:** A reaction which proceeds in only one direction is called irreversible reaction.

### OXIDATION (OLD CONCEPT)

Oxidation is a process which involves either of the following—

- Addition of oxygen.
- Removal of hydrogen.
- Addition of electronegative element or group.
- Removal of electropositive element or group.

### REDUCTION (OLD CONCEPT)

Reduction is a process which involves either of the following:

- Addition of hydrogen.
- Removal of oxygen.
- Addition of electropositive element or group.
- Removal of electronegative element or group.

### MODERN CONCEPT OF OXIDATION AND REDUCTION

According to modern concept, loss of electrons is called oxidation whereas gain of electrons is called reduction.

**Oxidising agent (OA):** A substance which undergoes reduction is called oxidising agent.

**Reducing agent (RA):** A substance which undergoes oxidation is called reducing agent.

**Oxidation number:** The charge present on atom in molecule or ion is called oxidation number. It may be zero, positive or negative.

### RULES FOR DETERMINATION OF OXIDATION NUMBER

- Oxidation number of an atom in free state is zero, positive or negative.
- Oxidation number of alkali metals (Li, Na, K, Rb, Cs) in molecule is always +2.

- Sum of oxidation numbers of atoms in a molecule is equal to zero.
- Sum of oxidation numbers of atoms in an ion is equal to magnitude of charge with sign.

### CATALYSIS

- It was discovered by Berzelius.
- It is a term used for the reactions/processes which occur in the presence of certain substances that increase the rate of the reaction without being consumed. Such substances are called **catalysts**.

Uses of Catalyst		
S. No.	Process	Catalyst
1.	Manufacture of Ghee from vegetable oils	Nickel
2.	Conversion of milk into curd	Lactase
3.	Decon's process for manufacture of chlorine	Cupric Chloride
4.	Conversion of sucrose into glucose and fructose	Invertase enzyme
5.	Contact process for manufacture of sulphuric acid	Pt Powder
6.	Conversion of proteins into peptide	Pepsin enzyme
7.	Conversion of glucose into ethyl alcohol	Zymase enzyme
8.	Formation of vinegar from cane sugar	Mesoderm acetate
9.	Conversion of starch into maltose	Diastase enzyme

### ACIDS, BASES AND SALTS

#### ACID

An acid is a substance which

- Is sour to taste.
- Turns blue litmus paper into red.
- Contains replaceable hydrogen.
- Gives hydrogen ion ( $H^+$ ) in aqueous solution.
- Can donate a proton.
- Can accept an electron.

### Uses of Acid

1. As food:
  - (a) Citric acid—Lemons or oranges.
  - (b) Lactic acid—Sour milk.
  - (c) Butyric acid—Rancid butter.
  - (d) Tartaric acid—Grapes.
  - (e) Acetic acid—Vinegar.
  - (f) Maleic acid—Apples.
  - (g) Carbonic acid—Soda water, carbonated drinks.
  - (h) Stearic acid—Fats.
  - (i) Oxalic acid—Tomato and wood sorrel.
2. Hydrochloric acid (HCl) is used in digestion.
3. Nitric acid ( $\text{HNO}_3$ ) is used in the purification of gold and silver.
4. Oxalic acid is used to remove rust spot.
5. Boric acid is a constituent of eyes wash.
6. Formic acid is present in red ants.
7. Uric acid is present in urine of mammals.

**Basicity of an acid:** The number of removable hydrogen ions from an acid is called basicity of that acid.

### Uses of HCl

- i. Used as bathroom cleaner.
- ii. As a pickling agent before galvanization.
- iii. In the tanning of leather.
- iv. In the dying and textile industry.
- v. In the manufacture of gelatin from bones.

### Uses of $\text{HNO}_3$

- i. In the manufacture of explosives like TNT (Trinitrotoluene), TNB (Trinitrobenzene), Picric acid (Trinitrophenol), etc.
- ii. Found in rain water (first shower).
- iii. In the manufacture of rayon.
- iv. In manufacturing fertilizers.

### Uses of Sulphuric acid ( $\text{H}_2\text{SO}_4$ )

- i. In lead storage battery.
- ii. In the manufacturing of HCl.
- iii. In the manufacturing of Alum.
- iv. In the manufacturing of fertilisers, drugs, detergents and explosives.

**Use of Boric Acid:** It is used as an antiseptic.

### Uses of Phosphoric Acid

- i. Its calcium salt makes our bones.
- ii. It forms phosphatic fertilisers.

**Use of Ascorbic Acid:** Source of vitamin C.

**Use of Citric Acid:** Flavouring agent and food preservative.

**Use of Acetic Acid:** Flavouring agent and food preservative.

### Uses of Tartaric acid

- i. Souring agent for pickles.
- ii. A component of baking powder (sodium bicarbonate + tartaric acid).

## BASES

A Base is a substance which:

- i. Is bitter in taste.
- ii. Turns red litmus paper into blue.
- iii. Gives hydroxyl ions ( $\text{OH}^-$ ) in aqueous solution.
- iv. Can accept proton.
- v. Can donate electrons.

- Oxides and hydroxides of metals are bases.
- Water soluble bases are called alkali.
- All alkalies are bases but all bases are not alkalies because all bases not soluble in water.

**Acidity of a base:** The number of removable hydroxyl ( $\text{OH}^-$ ) ions from a base is called acidity of a base.

**The pH scale:** pH of a solution is the negative logarithm of the concentration of hydrogen ions on mole per litre.

## INDICATORS

- These are the substances which give different colours in acid and base solution.

## pH VALUE

- It is a measure of acidity or basicity of a solution.
- It is defined as the negative logarithm of the concentration in (mol/L) of hydrogen ions which it contains.
- It is seven for neutral solution, greater than seven for basic solution and less than seven for acidic solution.

### pH Values of Common Substances

pH values	Acidic Solutions	pH Value	Alkine Solution
1	0.1 N HCl	7.3	Blood (Human)
2.3	Citric and Lemons	7.9	Albomin (egg)
3	Carbonic acid (soft drink)	8.5	Sea water
3.5	Tartaric acid (Grapes)	10.5	Milk of Magnesia
5.3	Boric acid (eyewash)	11.6	0.1 N $\text{Na}_2\text{CO}_3$ Solution
6.6	Lactic acid	13	0.1 N NaOH Solution

### SALTS

- These are the product of neutralisation reaction between an acid and a base.
- A salt can be acidic, basic or neutral. Strong acid + Weak base  $\rightarrow$  Acidic salt  
Weak acid + Strong base/alkali  $\rightarrow$  Basic salt.  
Strong acid + Strong base/alkali  $\rightarrow$  Normal/neutral salt.
- Mohr's salt  $[\text{FeSO}_4(\text{NH}_4)_2 \cdot \text{SO}_4 \cdot 6\text{H}_2\text{O}]$  and Alum  $[\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}]$  are double salts.
- Hydrolysis** is a reaction in which salt reacts with water to form a solution.
- Efflorescence** is the property of salts to lose their water of crystallisation.
- Deliquescence** is the property of salts to absorb moisture at ordinary temperature to form a solution.
- Hygroscopy** is the property of salts to absorb atmospheric moisture at ordinary temperature without dissolving in it.

### WASHING SODA

- Its chemical name is sodium carbonate decahydrate ( $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ ) and is used in glass, soap and paper industries and for removing permanent hardness of water.

### BAKING SODA

- It is sodium hydrogen carbonate ( $\text{NaHCO}_3$ ). It is a mild non-corrosive base.
- When mixed with a mild edible acid such as tartaric acid it is called baking powder and is used to make bread or cake soft and spongy.
- It is used as mild antiseptic for skin infections, in soda-acids and as fire extinguishers.

### BLEACHING POWDER

- It is chemically  $\text{Ca}(\text{OCl})\text{Cl}$  or  $\text{CaOCl}_2$ .
- It is used for disinfecting drinking water and in the manufacture of chloroform.

### PLASTER OF PARIS

- It is chemically calcium sulphate hemihydrate, i.e.  $(\text{CaSO}_4)_{0.5} \cdot \text{H}_2\text{O}$
- It is formed from gypsum, that is,  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ .
- It is used to plaster fractured bones, for making toys, materials for decoration and for making surfaces smooth.

### COPPER SULPHATE

- Copper sulphate when anhydrous, is white and when associated with water of crystallisation (i.e.  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ), is blue, so it is called **blue vitriol**. It is used to test the presence of water.

### LIME

- It is chemically calcium oxide and also called quicklime.
- It is used in the manufacture of glass, cement, etc. and for drying ammonia and alcohol.

### POTASSIUM NITRATE

- It is used as fertilizer in gun powder in matchsticks, etc.
- Ant or bee sting contains methanoic or **formic acid**.

### BEHAVIOUR OF GASES

#### Boyle's Law

At constant temperature, the volume of a definite mass of a gas is inversely proportional to pressure, i.e.  $P \propto \frac{1}{V}$ .

#### Charles' Law

- At constant pressure volume of a fixed mass of a gas is directly proportional to its absolute temperature, i.e.  $V \propto T$ .
- Applications of Charles' Law:** Bursting of hydrogen balloon, making of chapatti.

## **Gay-Lussac's Law**

At constant volume, the pressure of given mass of a gas is directly proportional to the temperature in Kelvin, i.e.  $P \propto \frac{1}{T}$ .

## **THE COMBINED GAS LAW OR IDEAL GAS EQUATION**

- It is a gas law which combines Charles law, Boyle's law and Gay-Lussac's law.

## **Avogadro's Gas Law**

At constant temperature and pressure the volume of a gas is directly proportional to the number of molecules.

## **Ideal Gas Equation**

$PV = nRT$  is called ideal gas equation, where

P = Pressure

V = Volume

n = Number of moles

T = Temperature in Kelvin.

**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.

## **GRAHAM'S LAW OF DIFFUSION**

- According to this law, "the rate of diffusion of a gas is inversely proportional to the square root of its density."

## **IDEAL AND REAL GASES**

- Ideal gases follow gas laws in all conditions of temperature and pressure.
- Critical temperature** is the temperature above which a gas cannot be liquefied.
- Dalton's law of partial pressure:** It states that, if two or more gases which do not react chemically are enclosed in a vessel, the total pressure, of all gases of the gaseous mixture is equal to the sum of the partial pressures of all gases which exert pressure when enclosed separately in the same vessel at constant temperature.

## **ELECTROLYSIS**

- Electrolytes:** These are the substances which allow the electricity to pass

through them in their molten state or in their aqueous solution and undergo chemical decomposition.

- Strong Electrolytes:** The electrolytes which are almost completely dissociated into ions in solution are called strong electrolytes, e.g., HCl,  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4$ , NaOH, KOH.
- Weak Electrolytes:** The electrolytes which do not ionise completely in solution are called weak electrolytes. e.g. Acetic acid, carbonic acid, Ammonium hydroxide, sodium carbonate.
- Electrolysis:** The process of chemical decomposition of an electrolyte by the passage of electric current through its molten state or its solution is called electrolysis.

## **FARADAY'S LAWS OF ELECTROLYSIS**

### **FIRST LAW OF ELECTROLYSIS**

- It states that, the quantity of elements separated by passing an electric current through a molten or dissolved salt is proportional to the quantity of electric charge passed through the circuit.

### **SECOND LAW OF ELECTROLYSIS**

It states that, the mass of the resulting separated elements is directly proportional to the atomic masses of the elements when an appropriate integral divisor is applied.

**Electrodes:** In order to pass the current through an electrolyte in molten state or in aqueous solution, two rods of 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.

**Cathode:** The electrode which is attached to negative terminal of batteries.

### **ELECTROCHEMICAL CELL**

- It is a device that produces an electric current from energy released by a spontaneous redox reaction. This kind of cell includes the galvanic cell or voltaic cell.

## BATTERY

- It is an arrangement of one or more cells connected in series.
- These are of two types:
  - i. Primary batteries (non-rechargeable), e.g., dry cell, mercury cell, etc.
  - ii. Secondary batteries (rechargeable) e.g., lead storage battery, nickel cadmium battery.

### Mercury Cell

- It is suitable for the low current devices like hearing aids and camera, etc.
- It consists of zinc-mercury amalgam as anode and a paste of  $\text{HgO}$  and Carbon as cathode. The electrolyte is a paste of  $\text{KOH}$  and  $\text{ZnO}$ .

### Lead Storage Battery

- It is a secondary battery.
- It acts as electrochemical cell during discharging (e.g., during use) and as electrolytic cell during charging.
- It is used in automobiles and invertors.
- A 38% solution of sulphuric acid is used as an electrolyte.

## CARBON AND ITS COMPOUNDS

### 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 are diamond, graphite and charcoal.

### Diamond

- i. It is the purest form of carbon.
- ii. It is hardest natural known substance.
- iii. It is transparent and its specific gravity is 3.52.
- iv. It is a bad conductor of electricity and heat.
- v. It has very high refractive index of 2.415.
- vi. It is chemically inert and on heating above  $15000^\circ\text{C}$ , it gets transformed into graphite.
- vii. It has high MP and density.
- viii. Black diamond called **Carbonado** contains traces of graphite.

### Graphite (Plumbago or Black Lead)

- i. It is soft, greasy, dark grayish colored crystalline solid.
- ii. It is good conductor of heat and electricity.
- iii. It is chemically more reactive than diamond.
- iv. Its layer structure is headed by weak van der Waal's forces.

### FULLERENES

- It ( $\text{C}_{60}$ ) looks like a soccer ball (or bucky-ball).

### GRAPHENE

- Graphene is an allotrope of carbon.

### CARBON MONOXIDE (CO)

- It is formed by incomplete combustion. It is a colourless, odourless gas.

### ORGANIC COMPOUNDS

- These are the compounds of mainly carbon and hydrogen or compounds of carbon and hydrogen with other elements like phosphorus, oxygen, nitrogen, sulphur, halogens, etc.
- Urea is the first synthesised organic compound (by Wöhler).
- **Acetic acid** was the first organic compound synthesised in the laboratory from its elements.

## HYDROCARBONS

Compounds made of carbon and hydrogen atoms only, are called hydrocarbons. The natural source of hydrocarbons is petroleum.

1. **Saturated hydrocarbons:** The hydrocarbons in which carbon atoms are singly bonded are called saturated hydrocarbons. Saturated hydrocarbons are also called alkanes or paraffins.  
General formula of alkane— $\text{C}_n\text{H}_{2n+2}$ \*

2. **Unsaturated hydrocarbons:** The hydrocarbons in which carbon atoms are either doubly or triply bonded are called unsaturated hydrocarbons. Doubly bonded (carbon atoms) hydrocarbons are called alkenes. The general formula of alkene is  $\text{C}_n\text{H}_{2n}$ .

**Triply-bonded carbon:** Hydrocarbons containing at least one carbon–carbon triple bond between two carbon atoms are called alkynes. The general formula of alkynes is  $C_nH_{2n-2}$ .

### 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.

**Isomerism:** Two or more compounds having same molecular formula but different physical and chemical properties are called isomers and this phenomenon is called isomerism.

**Polymerisation:** The simple molecules which combine to form a macro molecule called polymer. The process by which the simple molecules (monomers) are converted into polymer is called polymerisation.

Natural occurring polymers are protein, nucleic acid, cellulose, starch, etc.

## PLASTICS

These are cross-linked polymers.

- **lac** is a natural plastic (polymer).

i. **Thermoplastics:** These are the polymers which can be easily softened repeatedly when heated and hardened when cooled with little change in their properties.

**Examples:** Polyethylene and teflon.

ii. **Thermosetting plastics:** These are the polymers which when condensed have a 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.

**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 in making combs, fountain pens, photographs, records, electrical goods, etc.

**Rubber:** It is a polymer which is capable of returning to its original length, shape or size after being stretched or deformed. The rubber obtained from natural sources is called natural rubber, and polymer prepared in laboratory, which is similar to natural rubber, is known as synthesised rubber.

iii. **Thiokol:** Thiokol is made by polymerisation of ethylene chloride and sodium polysulphide.

Thiokol is chemically resistant polymer. It is used in the manufacture of houses and tank linings, engine gaskets and rocket fuel.

**Vulcanization** is a process of treating the natural rubber with sulphur or some compound of sulphur ( $SF_6$ ) under heat. Vulcanized rubber is used for manufacturing rubber bands, gloves, car tyres, etc.

### NATURAL RUBBER

- It is an elastomer. It is a polymer of *cis*-isoprene.
- It is heated with sulphur compounds at 373 K in the presence of  $ZnO$  to improve their properties. This process is called vulcanisation of rubber.
- If vulcanised with 5% sulphur, it is used for making tyres and if with 30% sulphur, it is used in making battery cases.

### EXPLOSIVES

- Some examples of explosives are trinitrotoluene (TNT), nitroglycerin or trinitroglycerin, cyclotrimethylenetrinitramine (RDX, also called cyclonite).

### FIBRES

- These have strong intermolecular forces like hydrogen bonding.

**Rayon:** Synthetic fibre obtained from cellulose is known as Rayon.

## USES OF SOME IMPORTANT ORGANIC COMPOUNDS

- **Methane ( $CH_4$ )** is used to manufacture printer ink, methyl alcohol and to obtain light and energy.

- **Ethylene ( $C_2H_4$ )** is used to prepare mustard gas (war gas) and for ripening of fruits.
- **Glycol ( $C_2H_6O_2$ )** is used as an antifreeze mixture in car radiator and to prevent the freezing of fuel in spacecrafts.
- **Acetylene ( $C_2H_2$ )** is used to generate light, weld metals as oxy-acetylene flame and to prepare synthetic rubber (neoprene).
- **Methyl Alcohol ( $CH_3OH$ )** is used as a fuel with petrol, used to synthesise varnish and polish, used to denature ethanol.
- **Chloroform ( $CHCl_3$ )** is used as an anesthetic and to preserve substances obtained from plants and animals. It converts into poisonous phosgene ( $COCl_2$ ), when exposed to sunlight. So, it is kept in dark bottles.
- **Glycerin ( $C_3H_8O_3$ )** is used as a preservative for fruits and juices, in leather industry and in coagulation of rubber.
- **Acetic acid ( $CH_3COOH$ )** is used in vinegar, medicines, and as a solvent.
- **Oxalic acid ( $C_2H_2O_4$ )** is used in printing of clothes, in photography and in the synthesis of coal tar.
- **Glucose ( $C_6H_{12}O_6$ )** is used for the synthesis of alcohol and as a preservative for fruit juice.
- **Benzene ( $C_6H_6$ )** is used as a solvent for oil fat and in drycleaning. Sodium benzoate is a food preservative.
- **Toluene ( $C_6H_5CH_3$ )** is used to synthesis explosive TNT, for drycleaning and for the synthesis of medicines like chloramine.
- **Phenol ( $C_6H_5OH$ )** is used to synthesis explosive, 2,4,6-trinitrophenol (picric acid) and bakelite.
- **Ethyl Alcohol ( $C_2H_5OH$ )** is used for drinking, in medicine to prepare tincture and as insecticide, and as a fuel with petrol.

## FUELS

A substance that can supply energy either alone or by reacting with another substance is known as fuel. Heat produced by fuel is measured in Calories. An ideal fuel should:

- i. Have high calorific value.
- ii. Be cheap and easily available.
- iii. Be easily stored and transport.
- iv. Be regulated and controlled.

- v. Have low ignition temperature.
- The quantity of fuel is expressed in the form of calorific value.

## CALORIFIC VALUE

- It is defined as the heat obtained when 1 g of a fuel is burned in excess of oxygen and is expressed in kcal/g.
- **Hydrogen** is the fuel of future.
- Alcohol, when mixed with petrol, is called power alcohol. It is an alternative source of energy.
- For the **combustion of substance**, its ignition temperature should be low.

## FLAME

- It is the hot part of fire and has three parts:
  1. **Innermost region**
    - It is black because of the presence of unburned carbon particles.
    - It has the lowest temperature.
  2. **Middle region**
    - It is yellow luminous due to partial combustion of fuel.
  3. **Outermost Region**
    - It is blue (non-luminous) due to complete combustion of fuel.
    - It is the hottest part of flame.

## SAFETY MATCH

- Safety matchstick contains a mixture of antimony trisulphide and potassium chlorate at its one end. Its box side contains a mixture of powdered glass and red phosphorus. Gaseous fuels are considered to be the best fuels.

**Producer gas:** It is mixture of CO and  $H_2$ . It is the cheapest gaseous fuel; however, its calorific value is not very high because it has a large proportion of nitrogen.

**Coal gas:** It is a mixture of  $H_2$ ,  $CH_4$ , CO and gases like  $N_2$ ,  $C_2$ ,  $H_4$ ,  $O_2$ , etc.

**Oil gas:** It is a mixture of  $H_2$ ,  $CH_4$ ,  $C_2H_4$ , CO and other gases like  $CO_2$ .

**Gobar gas:** It contains  $CH_4$ , CO and  $H_2$ .

**Natural gas:** It is a mixture of gaseous hydrocarbons, viz. methane 85%, ethane, propane, butane, etc.

## COAL

- It is believed to have been formed by the slow carbonisation of vegetable matter buried underneath the earth centuries ago, in limited supply of air under high temperature and pressure prevailing there.
- Bituminous** is the most common variety of coal.
- On the basis of carbon % and calorific value there are four types of coal.

Nature	% of carbon
Peat	50–60%
Lignite	60–70%
Bituminous	75–80%
Anthracite	90–95%

## CHARCOAL

- It can be wood charcoal, animal charcoal, and activated charcoal depending upon the source from which it is obtained.

## LAMP BLACK OR CARBON BLACK

- It is the most pure amorphous form of carbon (contain about 98-99% carbon).
- It is used for making printer ink, black paint, varnishes and carbon papers.

## PETROLEUM

- It is a dark coloured oily liquid with offensive odour. It is also called rock oil, mineral oil, crude oil or black gold.

## LIQUEFIED PETROLEUM GAS (LPG)

- It is a mixture of n-butane, iso-butane and some propane.
- A strong foul smelling substance called ethyl mercaptan is added to LPG to detect the gas leakage.

## COMPRESSED NATURAL GAS (CNG)

- It consists mainly of methane (95%) which is a relatively unreactive hydrocarbon and makes its nearly complete combustion possible.

## OCTANE NUMBER

- It is a measure of quality of petrol (gasoline).
- The higher the octane number, the better is the fuel.

## ANTIKNOCK COMPOUNDS

- These are used to reduce the knocking property, e.g., tetraethyl lead (TEL).

## CETANE NUMBER

- It is a measure of quality of diesel.

## METALLURGY

The process of extracting metal in pure form from its ore is known as metallurgy.

**Metals:** These are the elements which are hard, lustrous, ductile, malleable, sonorous and conductor of heat and electricity in their solid as well as molten state. These evolve hydrogen gas when react with water and acids. Mercury (metal) is liquid at room temperature. Ti is called strategic metal.

**Minerals:** The compound of a metal found in nature is called a mineral.

**Ores:** Those minerals from which metal can be economically and easily extracted are called ores.

**All ores are minerals 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-(i) acidic flux, (ii) basic flux.

**Slag:** Combination of gangue with flux in ores forms a fusible material which is called slag.

**Concentration:** The process of removal of gangue from the ore is known as concentration of ore.

**Calcination:** It is the process of heating the concentrated ore in absence or in limited supply of air, below its melting point.

**Roasting:** Roasting is a process in which ore is heated usually in the presence of air, at temperatures below its melting point.

**Smelting:** The reduction of oxide ore with carbon at high temperature is known as smelting.

## SOME COMMON ORES

**Aluminium:** Bauxite ( $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ ), Kryolite ( $\text{Na}_3\text{AlF}_6$ ), Corrundum ( $\text{Al}_2\text{O}_3$ )

**Iron:** Magnetite ( $\text{Fe}_3\text{O}_4$ ), Haematite ( $\text{Fe}_2\text{O}_3$ ), Siderite ( $\text{FeCO}_3$ )

**Copper:** Copper pyrite ( $\text{CuFeS}_2$ ), Copper glance ( $\text{Cu}_2\text{S}$ )

**Zinc:** Zinc blende ( $\text{ZnS}$ ), Calamine ( $\text{ZnCO}_3$ )

**Lead:** Galena ( $\text{PbS}$ ), Angelsite ( $\text{PbCl}_2$ )

**Mercury:** Cinnabar ( $\text{HgS}$ ), Calomel ( $\text{Hg}_2\text{Cl}_2$ )

**Magnesium:** Magnesite ( $\text{MgCO}_3$ ), Dolomite ( $\text{MgCO}_3 \cdot \text{CaCO}_3$ ), Epsom salt ( $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ ), Kieserite ( $\text{MgSO}_4 \cdot \text{H}_2\text{O}$ ).

**Potassium:** Karnalite ( $\text{KCl MgCl}_2 \cdot 6\text{H}_2\text{O}$ ), Salt Petre ( $\text{KNO}_3$ ).

## CORROSION

- It is the process of oxidative deterioration of a metal surface by the action of environment to form unwanted corrosion.
- Corrosion of iron is called rusting.
- It is prevented by the following methods:
  - By electroplating
  - By surface coating
  - By alloying
  - By galvanisation of iron

## ALLOYS

- These are mixtures of two metals or a metal and a non-metal.

S. No.	Alloys	Constituents
1.	Brass	Copper (80%) & Zinc (20%)
2.	Bronze	Copper (90%) & Tin (1%)
3.	German Silver	Copper (60%), Zinc (20%) & Nickel (20%)
4.	Duralumin	Aluminium, Copper, Magnesium and Manganese
5.	Alnico	Aluminium, Nickel, Cobalt & Iron
6.	Magnalium	Aluminium (95%) & Magnesium (5%)
7.	Babbitt Metal	Tin, Antimony, Copper & Lead. Used in ball bearings to reduce friction.

8.	Invar	Iron & Nickel. Used in precision instruments
9.	Bell metal	Copper & tin
10.	Gun Metal	Copper, Tin & Zinc
11.	Monel Metal	Nickel (67%), Copper & Iron
12.	Pewter	Tin (80-90%), Copper & Lead
13.	Solder	Tin, Lead & Antimony

## AQUA-REGIA

- It is a mixture of concentrated hydrochloric acid ( $\text{HCl}$ ) and concentrated nitric acid ( $\text{HNO}_3$ ) in the ratio of 3:1. It is used to dissolve noble metals like gold and platinum.

**Amalgam:** An alloy in which one of the component metals is mercury is called amalgam.

## COMPOUNDS OF METALS AND NON-METALS AND THEIR USES

- Ferrous sulphate** ( $\text{FeSO}_4 \cdot 4\text{H}_2\text{O}$ ): In dye industry, and Mohr's salt.
- Iodine** ( $\text{I}_2$ ): (i) As antiseptic, (ii) In making tincture of iodine.
- Bromine** ( $\text{Br}_2$ ): (i) In dye industry (ii) As a laboratory reagent.
- Chlorine** ( $\text{Cl}_2$ ): In the formation of (i) Mustard gas (ii) Bleaching.
- Sulphuric acid** ( $\text{H}_2\text{SO}_4$ ): (i) As a reagent (ii) In purification of petroleum (iii) In lead storage battery.
- Sulphur** (S): Antiseptics, vulcanization of rubber, gun powder, medicine.
- Phosphorus (P)**: (i) Red Phosphorus refrigerant, in match industry, etc. (ii) White Phosphorus-Rat killing Medicine.
- Carbon dioxide** ( $\text{CO}_2$ ): Soda water, Fire extinguisher.
- Graphite:** As electrodes.
- Alum** [ $\text{K}_2\text{SO}_4 \text{Al}_2 (\text{SO}_4)_3 \cdot \text{H}_2\text{O}$ ]: (i) Purification of water (ii) Leather industry.
- Mercuric Chloride** ( $\text{HgCl}_2$ ): Calomel, Insecticides (Corrosive sublimate).
- Mercuric oxide (HgO)**: Ointment, poison.

13. **Zinc Sulphide (ZnS):** White pigment.
14. **Zinc Sulphate (White vitriol)** ( $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ ): Lithopone, Eye ointment.
15. **Zinc Chloride ( $\text{ZnCl}_2$ ):** Textile industry.
16. **Zinc oxide ( $\text{ZnO}$ ):** Ointment.
17. **Plaster of Paris** [ $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ .  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ ]: Statue, Surgery.
18. **Calcium sulphate ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ):** Cement industry.
19. **Calcium carbonate ( $\text{CaCO}_3$ ):** Lime and toothpaste.
20. **Cupric oxide ( $\text{CuO}$ ):** Blue and green glass, purification of petroleum.
21. **Cuprous Oxide ( $\text{Cu}_2\text{O}$ ):** Red Glass, pesticides.
22. **Copper (Cu):** Electrical wire.
23. **Sodium nitrate ( $\text{NaNO}_3$ ):** Fertilizer.
24. **Sodium Sulphate (Glauber's salt) ( $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ ):** Medicine, cheap glass.
25. **Sodium bicarbonate (Baking soda) ( $\text{NaHCO}_3$ ):** Fire extinguisher, bakery, reagent.
26. **Sodium Carbonate (Washing soda):**  
(i) Glass industry, (ii) Paper industry,  
(iii) Removal of permanent hardness of water, (iv) Washing.
27. **Heavy Water ( $\text{H}_2\text{O}$ ):** Nuclear reactor.
28. **Liquid Hydrogen:** Rocket fuel.

#### Elements/Compounds and Their Uses

Xenon	High-speed photographic tubes. Electric valves and T.V. tubes
Krypton	Incandescent bulb. Airfield lights because of characteristic red colour.
Lithium	Deoxidizer and to remove unwanted gases during the manufacture of metals.
Beryllium X-ray	(Transparent) window. Moderator in nuclear reactions around the core.
Neon	Neon lights. Cryogenics
Hopsalite	Mixture of oxides of manganese, cobalt, copper and silver-Antipollution
Ammonia	Refrigerant, fertilisers
Yttrium	Used in TVs to produce red colour

Bismuth	Mixed with iron to make it malleable
Sodium	Street lamp
Gadolinium	CDs. Aluminium is sometimes used to coat the disc
Cesium	Atomic clocks
Tellurium	Tint glass (one-way visibility used in cars)
Technetium	Superconductor at -262 degree Celsius
Paraformaldehyde	Common disinfectant and contraceptives
Potassium Dichromate	Used in breath analyser for detecting alcohol. Safe limit is 0.1%.

#### IMPORTANT FACTS ABOUT SOME METALS

- Zinc Phosphide is used for killing rats.
- Wood furnitures are coated with zinc chloride to prevent termites.
- Galvanised iron is coated with zinc.
- Rusting of iron is a chemical change which increases the weight of iron.
- In flash-bulb, magnesium wire is kept in atmosphere of nitrogen gas.
- Titanium is called strategic metal because it is lighter than iron.
- Gun powder contains 75% potassium nitrate, 10% sulphur and 15% charcoal.
- Nichrome wire is used in electrical heaters (Ni, Cr, Fe).
- Zeolite is used to remove hardness of water.
- In cytochrome, iron (Fe) is present.
- Selenium metal is used in photoelectric cell.
- Gallium metal is liquid at room temperature.
- Palladium metal is used in aeroplane.
- Radium is extracted from pitchblende.
- World famous Eiffel Tower has steel and cement base.
- Cadmium rod is used in nuclear reactor to slow down the speed of neutron.
- Co-60 is used in cancer treatment.
- Onion and garlic odour due to potassium.
- Silver and copper are the best conductors of electricity.

- Gold and silver are the most malleable metals.
- Mercury and iron produces more resistance in comparison to the other during the flow of electricity.
- Lithium is the lightest and the most reductant element.
- In fireworks, crimson red colour is due to presence of strontium (Sr).
- Green colour is due to the presence of Barium in fireworks.
- Osmium is the heaviest metal and the platinum is the hardest.
- Silver chloride is used in photochromatic glass.
- Silver iodide is used in artificial rain.
- Silver iodine is used as marker during election.
- Silver spoon is not used in egg food because it forms black silver sulphide.
- To harden the gold, copper is mixed. Pure gold is 24 carat.
- Iron Pyrites ( $\text{FeS}_2$ ) is known as fool's gold.
- Mercury is kept in iron pot because it does not form amalgam with iron.
- In a tubelight, there is the vapour of mercury and argon.
- Tetraethyl Lead is used as an anti-knocking compound.
- Fuse wire is made up of lead and tin.

## NON-METAL

- In Modern Periodic Table, there are 24 non-metals.
- Electronegative elements are non-metals.
- Non-metals are bad conductors of heat and electricity except graphite, Bi and Ge are semi-conductors.
- Protium is the only one isotope in Periodic Table having zero neutrons.
- Deuterium oxide is known as heavy water and used in nuclear reactor as moderator.
- Liquid hydrogen is used as rocket fuel.
- Hydrogen is known as range element because it may kept in group I and group VIIA.
- These may be solid, liquid or gas (bromine is the only liquid non-metal).
- These are soft, non-lustrous, brittle, non-sonorous and non-conductor of heat and electricity.

- These form oxides with oxygen which are generally acidic.

### HELIUM

- It is noble gas.
- It is used for filling balloons and other lighter aircraft.
- Helium (He), when mixed with  $\text{O}_2$ , is used by deep-sea divers for breathing and for respiratory patients.

### NEON

- It is used in neon signs.

### ARGON

- It is used to generate inert atmosphere for welding and to fill incandescent light bulbs.

### XENON

- It is called stranger gas.

### WATER ( $\text{H}_2\text{O}$ )

Hard water—Less froth with soap.  
Soft water—More froth with soap.

### OXYGEN

Ozone ( $\text{O}_3$ ) is the allotrope of Oxygen.

### NITROGEN

78% by volume in atmosphere, liquid nitrogen is used for refrigeration. Ammonia is an important compound of  $\text{N}_2$  which is prepared by Haber's process.

### AMMONIA

- As refrigerant, in the manufacture of  $\text{HNO}_3$ .
- In fertilizer like urea, ammonium sulphate, etc.
- In the manufacture of  $\text{Na}_2\text{CO}_3$  and  $\text{NaHCO}_3$ .
- 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 and DNA.

### HALOGENS

- **Fluorine** is used in the preparation of  $\text{UF}_6$  and  $\text{SF}_6$  for energy production and as dielectric constant, respectively.

- By using HF, chlorofluorocarbon compound and polytetrafluoroethylene can be synthesised.
- Chlorofluorocarbon is known as Freon and is used as refrigerant and aerosol.
- Non-stick utensils are made up of teflon.
- **Chlorine** is used to prepare PVC, insecticides herbicides, etc.
- **Bromine** is used in ethylene bromide synthesis which is mixed with leaded petrol.

### ■ INERT GASES

- They belong to 18th group of Periodic Table. For example, He, Ne, Ar, Kr, Xe, Rn.
- Except Rn, all inert gases are present in atmosphere.
- Argon is used in Arc. welding and electric bulbs.
- Helium is light and non-inflammable so, used in balloon, weather indicator, etc.
- Neon is used in discharge tube glow light.

## COMMON FACTS

### ■ SOME IMPORTANT EXPLOSIVES

- **Dynamite:** It was discovered by Alfred Nobel in 1863. It is prepared by absorption of raw dust with nitro-glycerin. In modern dynamite, Sodium Nitrate is used in place of Nitro-glycerin.
- **Tri Nitro Phenol (TNP):** It is also known as picric acid.
- **R.D.X.** is highly explosive known as plasticiser 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 ( $C_{14}$ ).
- Diamond has maximum refractive index and due to total internal reflection, it has lustre.
- Cream is a type of milk in which amount of fat is increased while amount of water is decreased.
- $N_2O$  is known as laughing gas.
- Red phosphorus is used in match industry.
- Urea contains 46% nitrogen.

- A candle blows off when covered because it does not get oxygen which helps in burning.
- **Phosphorus catches fire** if kept in air but is unreactive with water, so it is kept in water.
- Urea was the first organic compound synthesised in laboratory.
- Ferric chloride is used to stop bleeding.
- Sea weeds contain iodine.
- During cooking maximum vitamin is lost.
- For the preparation of silver mirror, glucose is used.
- **Silver nitrate** ( $AgNO_3$ ) is used to prepare the ink used during noting.
- **Silver iodide** ( $AgI$ ) is used for artificial rain.
- **Hydrogen peroxide** ( $H_2O_2$ ) is used as an oxidising agent, bleaching agent, as an insecticide, and for washing old oil paintings.
- For artificial respiration mixture of oxygen and helium gas cylinder used.
- Sodium is kept in kerosene oil.
- The heaviest element is osmium (Os).
- The lightest element, least dense and most reductant element is lithium (Li).

## AIR, WATER AND THEIR POLLUTION

### ■ AIR

- It is homogeneous mixture of different gases.
- It has the following composition — 78% nitrogen; 21% oxygen, 0.03-0.05% carbon dioxide ( $CO_2$ ), argon etc.

#### Oxygen ( $O_2$ )

- It was discovered by K. Scheele.
- It is non-combustible but helps in combustion.

#### Ozone ( $O_3$ )

- It is an allotrope of oxygen.
- It is used as insecticide, in purification of water to preserve food, to synthesis artificial silk and camphor and as a bleaching agent.

#### Nitrogen ( $N_2$ )

- It was discovered by Rutherford. It is neutral and lighter than air.
- It is filled in sealed packets and bulbs to create inert atmosphere.
- **Living beings** die in an environment of nitrogen.

### Carbon Dioxide ( $\text{CO}_2$ )

- It is used by plants for photosynthesis.
- It turns the lime water milky.
- It is used to extinguish fire and for artificial respiration when mixed with oxygen (carbogen).
- It is dangerous to have **charcoal fire** burning in a closed room because it produces carbon monoxide gas, which is suffocating.
- ENO** produces effervescence if dissolved in water due to evolution of  $\text{CO}_2$  gas.

### WATER

- It contains two elements: hydrogen and oxygen ( $\text{H}_2\text{O}$ ).
- It has boiling point  $100^\circ\text{C}$  and freezing point  $0^\circ\text{C}$ . Its density is maximum at  $4^\circ\text{C}$ .

#### Soft Water

- Soft water easily lathers with soap.

#### Hard Water

- It does not lather with soap.

#### Heavy Water

- It is deuterium oxide,  $\text{D}_2\text{O}$ . (Molecular mass is 20).

### POLLUTANTS

- These are the substance that contaminate the environment and of two types.

1. **Primary Pollutants:** These persist in the environment in the form they are formed, for example, sulphur dioxide ( $\text{SO}_2$ ), nitrogen dioxide ( $\text{NO}_2$ ), etc.

2. **Secondary Pollutants:** These are the products of reaction of primary pollutants, e.g., PAN, ozone ( $\text{O}_3$ ), aldehyde, etc.

### GREENHOUSE EFFECT

- It is the heating of earth and its objects because of the trapping of IR radiations by carbon dioxide ( $\text{CO}_2$ ), methane ( $\text{CH}_4$ ),  $\text{NO}$ , ozone ( $\text{O}_3$ ), chlorofluorocarbons and water vapours.

### GLOBAL WARMING

- It is the result of increased concentration of greenhouse gases.

### ACID RAIN (BY ROBERT AUGUST)

- It is due to oxides of nitrogen and sulphur.

### PARTICULATES

- These are minute solid particles and liquid droplets dispersed in air, e.g., dust, smoke, fumes, etc.

### SMOG

- It is a consequence of particulate pollution and is of two types.

#### 1. Classical Smog

- It is also called London type smog.
- It is formed in cool humid climate when carbon soot particles combine with gaseous oxides of sulphur.

#### 2. Photochemical Smog

- It is also called Los Angeles smog.
- It occurs in warm, dry and sunny climate by the action of sunlight on unsaturated hydrocarbons and nitrogen oxide.

### TROPOSPHERIC POLLUTION

- Presence of undesirable solid or gaseous particles in the air.

### STRATOSPHERIC POLLUTION

- Stratospheric pollution means depletion of ozone layer (ozone hole) by certain compounds like chlorofluorocarbons (CFCs), oxides.

### WATER POLLUTION

- It is due to the presence of foreign substances like sewage, algae, soluble salts, etc. in water.

### SOIL POLLUTION

- It is caused by pesticides like insecticides (e.g., DDT, BHC, etc.) herbicides (e.g., sodium chlorate and sodium arsenate), fungicides (e.g., organomercury compounds).
- Barium sulphate** is used in X-rays of abdomen as barium meal.
- Silver and copper** are best conductors of electricity. Gold and silver are the most malleable metal.
- Zinc oxide** ( $\text{ZnO}$ ) is known as flower of zinc or Chinese white and is used as white paint.
- Mercury is stored in iron pot.
- Radium** is extracted from pitch blends.
- Artificial perfumes** are prepared from ethyl acetate.

- **Chlorine** is used for the purification of water, for synthesis of bleaching powder, etc.

## MAN-MADE SUBSTANCE

1. **Fertilisers:** The substances added to the soil to make up the deficiency of essential elements are known as fertilisers, these are either natural or synthetic (chemical). Among the chemical fertilisers, the two important categories are:

**Phosphate fertilisers:** The most abundant phosphate is rock phosphate [ $3\text{Ca}_3(\text{PO}_4)_2$ ], which is mostly consumed by the fertiliser industry in the manufacture of 'superphosphate of lime', 'triple superphosphate' and 'altrophs'-a combined phosphatic and nitrogenous fertiliser.

**Nitrogenous Fertilizers:** Plants need nitrogen for rapid growth and increase in their protein content. For this reason, nitrogenous fertilizers are of some more importance. The chief nitrogenous fertilizers are ammonium sulphate, calcium cyanamide, sodium nitrate, ammonium nitrate, urea, and ammonium phosphate.

2. **Dyes:** Coloured substances used for colouring textiles, foodstuffs, silk, wool, etc. are called dyes.
3. **Cement:** It is a complex material containing the silicates of calcium and aluminium. A paste of sand, cement and water is called mortar.

A mixture of stone chips (gravel), cement and water is known as concrete. Concrete with steel bars and wires is called reinforced concrete. It is used for constructing roads, bridges and pillars.

## GLASS

- It is an amorphous or transparent solid, also called **supercooled liquid**.
  - It contains mainly silica ( $\text{SiO}_2$ ).
1. **Soda or soft glass** is sodium calcium silicate used for making bottles, window panes, etc.

2. **Potash glass or hard glass** contains potassium. It is used for making chemical apparatus: beakers, flasks, funnel, etc.
3. **Crown glass** contains potassium oxide, barium oxide, boric oxide, and silica. It is used for optical apparatus.
4. **Flint glass** contains lead oxide and is used in optical instruments like lenses, prisms.
5. **Crook's glass** contains cesium oxide. It is used for spectacles as it absorbs UV rays.
6. **Jena glass** contains  $\text{B}_2\text{O}_3$  and alumina. It is used for making laboratory bottles, for keeping acids and alkalies.
7. **Milky glass** is prepared by adding tin oxide, calcium phosphate or cryolite to the melt glass.
8. Glass laminates is made by fixing polymer sheets between layers of glass. It is used to make window and screens of cars, trains and aircraft. Specially manufactured glass laminates are used as bulletproof material.
- It has the following composition: calcium oxide ( $\text{CaO}$ ) = 50–60%, silica ( $\text{SiO}_2$ ) = 20–25%, alumina ( $\text{Al}_2\text{O}_3$ ) = 5–10%; magnesium oxide ( $\text{MgO}$ ) = 2–3%.
- It is manufactured from limestone and clay.

**Paints:** Chemical contains a pigment as a vehicle and a thinner.

**White pigment:** Zinc oxide, white lead and titanium dioxide. The pigment mixed with a vehicle, which is an oil like **linseed or soyabean** oil or a **polymer**. A thinner is a solvent such as **turpentine oil or kerosene**.

**Luminous paints:** Glow when exposed to light.

## SOAPs

- These are sodium and potassium salts of higher fatty acids.

## DETERGENTS

- These are sodium or potassium salts of long chain alkyl or aryl sulphonates or sulphates.
- These are also called **soapless soap**.
- **Antibiotic:** Medicinal compounds produced by moulds and bacteria, capable of destroying or preventing the growth of bacteria in animal systems.

- **Antibody:** Kinds of substances formed in the blood, tending to inhibit or destroy harmful bacteria, etc.
- **Antidote:** Medicine used against a poison.
- **Antigen:** Substance capable of stimulating formation of antibodies.
- **Antipyretics** are used to reduce body temperature during high fever, e.g., paracetamol, aspirin, phenacetin, analgin, and novalgin.
- **Tranquilizers** are used to treat stress, mild, and severe mental disease.
- **Antiseptic:** Prevent the growth of micro-organisms or kill them but are not harmful to living tissues, e.g., dettol and savlon.
- **Analgesics:** Painkillers are called analgesics, e.g., aspirin, paracetamol and morphine.
- **Antimalarials** are used to treat malaria, e.g., chloroquin.
- **Sulphadrugs:** Alternatives of antibiotics, sulphanilamide, sulphadiazine sulphagunamidine.
- **Antacid:** Substances which remove the excess acid and raise the pH to appropriate level in scotch are called antacids.
- **Antacids** are used as a remedy for acidity.
- **Pesticides** are used to destroy the organisms that harm the crop.

These are of the following types.

1. **Insecticides**, e.g., DDT, aluminium phosphate, gammexane.
2. **Fungicide**, e.g., Bordeaux mixture.
3. **Herbicides**, e.g., benzepam, benzadox.

4. **Rodenticides**, e.g., aluminium phosphide. **Chloroform:** A sweetish, colourless liquid. It is used as a solvent and anaesthetic. **Saccharin:** A white crystalline solid which is 550 times sweeter than sugar, but does not have any food value. It is used by diabetic patients. **DDT:** Dichlorodiphenyltrichloro ethane is a white powder used as an insecticide.

### Propellants

Liquid propellants	Liquid hydrogen, liquid ammonia, hydrazine, nitromethane, methyl nitrate, hydrogen peroxide
Solid propellants	Polybutadiene, acrylic acid, nitroglycerine + nitrocellulose
Hybrid propellants	$N_2O_4$ + Acrylic rubber

### Dyes

Nitro dyes	Less important as the colours are not fast
Azo dyes	Azo (-N=N-) group is chromophore
Triphenylmethane dye	Malachite green
Direct dyes	Mautius yellow, Naphthol yellow, Congo red, etc.
Mordant dyes	Alizarin
Vat dyes	Indigo

# BIOLOGY

- The term 'Biology' was coined by **Lamarck** and **Treviranus**.
- Aristotle** is known as the Father of Biology. He is also known as the *Father of Zoology*.
- Theophrastus is known as **Father of Botany**.

## 1. Botany

Study of different aspects of plants.

## 2. Zoology

Study of various aspects of animals. Aristotle is called Father of Zoology as well as Biology.

## Biologists and their Contributions

1. Coined the term 'cell'	Robert Hooke
2. Binomial nomenclature	Carolus Linnaeus
3. One gene-one enzyme hypothesis	Beadle & Tatum
4. Operon concept	Jacob & Monod
5. Jumping genes concept	Dr. McClintock
6. Human blood groups	Karl Landsteiner
7. Fluid Mosaic Model	Singer & Nicholson

## CLASSIFICATION OF ORGANISMS

Classification means to categorise organisms into different groups.

### 1. Monera

This kingdom includes all prokaryotic organisms like bacteria, cyanobacteria and archiobacteria. It includes true-bacteria (Eubacteriales), fungus like bacteria (Actinomycetales) and the blue-green algae (cyanobacteria).

### 2. Protista

This kingdom includes unicellular form usually found in parasitic and saprophytic forms. It includes Euglenophyta, Pyrrophyta; Chrysophyta and Xanthophytes. Euglena

has both heterotrophic and autotrophic modes of nutrition.

### 3. Fungi

This kingdom includes non-green plants, generally multi-nucleate organisms with eukaryotic nuclei. It has saprophytic nutrition and growing on dead and decaying organic matter.

**Example:** Mushroom, Mucor, Albugo, etc.

### 4. Plantae

This kingdom includes all plants except some algae, diatoms, fungi and embryo of monera and protista.

### 5. Animalia

Multicellular eukaryotic organisms with cells lacking a rigid cell wall and photosynthetic apparatus. Almost all animals come under this kingdom except protozoa.

## STUDY OF CELL

- Cell:** The **Cell** is the basic structural and functional unit of all known living organisms. It is the smallest unit of life and is often called the building block of life.
- The largest known cells are unfertilized **ostrich egg** cells.
- The smallest cell is of **PPLO** (*Mycoplasma gallisepticum*).
- Human nerve cell is the **longest animal cell**.
- Largest unicellular plant is Acetabularia (10 cm) and animal is *Amoeba*, (1mm).
- The largest human cell is the **female ovum** and the smallest human cell is the **red blood cell**.
- Robert Hooke** coined the term *cell*.
- The first living cell was discovered by **Leeuwenhoek**.
- The longest cell is *Neuron*.
- The biggest cell is egg of *Ostrich*.

## TYPES OF CELLS

- i. **Prokaryotic Cells:** These are primitive cells, lacking a nucleus and most of the other cell organelles.
- ii. **Eukaryotic Cells:** These have nucleus and membrane bound cell organelles.

### Difference Between Eukaryotic Cells and Prokaryotic Cells

Cell organelle	Eukaryotic	Prokaryotic
Nucleus	Present	Absent
Number of chromosomes	More than one	One—but not true chromosome: Plasmids
Cell Type	Usually multicellular	Usually unicellular (some cyanobacteria may be multicellular)
True Membrane-bound Nucleus	Present	Absent
Example	Animals and plants	Bacteria and archaea
Genetic Recombination	Meiosis and fusion of gametes	Partial, undirectional transfers, DNA
Lysosomes and peroxisomes	Present	Absent
Microtubules	Present	Absent or rare
Endoplasmic reticulum	Present	Absent
Mitochondria	Present	Absent
Cytoskeleton	Present	May be absent
DNA wrapping on proteins	Eukaryotes wrap their DNA around proteins called histones	Multiple proteins act together to fold and condense prokaryotic DNA. Folded DNA is then organized into a variety of conformations that are supercoiled and wound around tetramers of the HU protein.
Ribosomes	Larger	Smaller
Vesicles	Present	Present
Golgi apparatus	Present	Absent
Chloroplasts	Present (in plants)	Absent; chlorophyll scattered in the cytoplasm
Flagella	Microscopic in size; membrane bound; usually arranged as nine doublets surrounding two singlets	Submicroscopic in size, composed of only one fiber
Permeability of nuclear membrane	Selective	Not present
Plasma membrane with steroid	Yes	Usually no
Cell wall	Only in plant cells and fungi (chemically simpler)	Usually chemically complexed
Vacuoles	Present	Present
Cell size	10-100 $\mu\text{m}$	1-10 $\mu\text{m}$

## MAIN FEATURES OF THE CELL THEORY

1. All organisms are composed of cell.
2. Each cell arises from pre-existing cell.
3. Every organism starts its life from single cell.

## PARTS OF CELL AND THEIR FUNCTIONS

1. **Cell wall:** In plant cell there is a rigid cell wall which is non-living and freely permeable. It is made up of cellulose and chitin. It provides shape and rigidity to the cell.
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.
3. **Protoplasm:** The whole fluid present inside plasma-membrane is protoplasm.  
 (A) **Cytoplasm:** The fluid found outside the nuclear membrane.  
 (B) **Nucleoplasm:** The fluid found inside the nuclear membrane.

## MITOCHONDRIA

- It is a semi-autonomous organelle and called **powerhouse of the cell** because in it stepwise oxidation of fuel occurs which results in release of chemical energy. This energy is stored in the form of ATP.

## ENDOPLASMIC RETICULUM

- These are hollow membranous system having ribosomes (thus called Rough ER) or no ribosomes (thus called Smooth ER). Rough Endoplasmic Reticulum is the site of protein synthesis, while Smooth Endoplasmic Reticulum is the site of synthesis of steroids and detoxification.

## GOLGI APPARATUS

- Plays important role in secretion, transportation and acrosome formation.

## PLASTID

Only found in plant cells.

- (a) **Chloroplasts:** These are green pigment found in green plants involved in photosynthesis. So, it is known as '*Kitchen of the cell*'.

**Function:** Chloroplast provides green colour to plant and take part in photosynthesis.

- (b) **Chromoplast** provides various colours to the plant.
- (c) **Leucoplast** is colourless. It stores the food in the form of starch, lipid or protein.

### Functions:

- i. It helps in osmoregulation. It stores toxic metabolic waste.
- ii. It controls all the activities of a cell. So, it is also known as the 'control room' of a cell. Chromatin transmits hereditary characters from parents to their offspring.

The red colour of tomatoes is due to the presence of lycopene pigment, i.e., chromophore.

The colour of **carrot** is due to carotene.

## RIBOSOMES

It is made up of ribonucleic acid (RNA).

### Functions

- i. Take part in protein synthesis.
- ii. Help in intracellular digestion. The enzyme found in lysosome may digest the entire cell. So it is also known as suicidal bag.
- iii. Help in the formation of spindle fibre during cell division.

## CHROMOSOME

- Chromosome is thread-like structure, found in the nucleus. Bead-like structure found on chromosome is called **genes**, which are made up of DNA and are the carrier of genetic information from generation-to-generation. In some viruses, RNA is the genetic material called **retrovirus**.
- Eukaryotic cells possess many chromosomes.

Organism	Number of pairs of chromosomes
Dog	39 = 78
Human	23 = 46
Monkey	21 = 42
Onion	8 = 16

### Difference between plant and animal cells

Plant cell	Animal cell
It has cell wall.	Cell wall is usually absent.
Plastids are found.	Plastids are usually absent.
A big vacuole is present.	Vacuole is absent or very small in size.
Lysosomes are not present.	Lysosomes are present.
Centrioles are absent.	Centrioles are present.

### LYSOSOMES

- These are sometimes called **suicidal bags of the cell**. These are bags of hydrolysing enzymes.

### CENTROSOMES

- Participate in the formation of spindle during cell division and cilia.

### VACUOLES

- These are non-living reservoirs, bounded by a membrane called **tonoplast**.
- It stores toxic metabolic waste and helps in osmoregulation.

### NUCLEUS

- It was discovered by **Robert Brown**.
- Nucleus is rich in protein and RNA. Chromatin is the **controlling centre of a cell**.

### NUCLEIC ACIDS

- These contain the genetic instructions used in the development and functioning of all known **living organisms**.

### Comparison between DNA and RNA

Comparison	DNA	RNA
Name	Deoxyribonucleic acid	Ribonucleic acid
Function	Long-term storage of genetic information; transmission of genetic information to make other cells and new organisms.	Used to transfer the genetic code from the nucleus to the ribosomes to make proteins. RNA is used to transmit genetic information in some organisms and may have been the molecule used to store genetic blueprints in primitive organisms.
Structural Features	B-form double helix. DNA is a double-stranded molecule consisting of a long chain of nucleotides.	A-form helix. RNA usually is a single-strand helix consisting of shorter chains of nucleotides.
Composition of Bases and Sugars	Deoxyribose sugar Phosphate backbone Adenine, guanine, cytosine, thymine bases	Ribose sugar Phosphate backbone Adenine, guanine, cytosine, uracil bases

- These are of two types DNA and RNA.

### DEOXYRIBONUCLEIC ACID (DNA)

- It is a long polymer made from repeating units called **nucleotides**.
- Each nucleotide consists of a nucleoside and a phosphate group, joined together by ester bonds.
- It has four bases, e.g., adenine, guanine, cytosine and thymine.
- DNA was discovered by **James D Watson** and Francis Crick, who got Nobel Prize for this discovery.

### DNA SYNTHESIS RNA

 **Note:** **DNA:** DNA is mainly found in nucleus in small amount. It is also found in mitochondria and chloroplast.

**Gene:** Gene is hereditary unit which is made by a segment of DNA found on the chromosome.

**Ribonucleic Acid (RNA):** RNA is single stranded nucleic acid made up to phosphate, ribose sugar and nitrogenous base uracil, adenine, guanine and cytosine. It is found in nucleus as well as cytoplasm.

**Function:** Synthesis of protein.

Propagation	DNA is self-replicating.	RNA is synthesized from DNA on an as-needed basis.
Base-pairing	AT (adenine-thymine) GC (guanine-cytosine)	AU (adenine-uracil) GC (guanine-cytosine)
Reactivity	The C-H bonds in DNA make it fairly stable, plus the body destroys enzymes that would attack DNA. The small grooves in the helix also serve as protection, providing minimal space for enzymes to attach.	The O-H bond in the ribose of RNA makes the molecule more reactive, compared with DNA. RNA is not stable under alkaline conditions, plus the large grooves in the molecule make it susceptible to enzyme attack. RNA is constantly produced, used, degraded, and recycled.
Ultraviolet Damage	DNA is susceptible to UV damage.	Compared with DNA, RNA is relatively resistant to UV damage.

## CELL CYCLE

It is the sequence of events in which cell duplicates its genetic material, synthesises the other constituents of the cell and ultimately divide into two daughter cells.

## CELL DIVISION

The process in which cells increase in their number is called cell division.

- (A) **Mitosis:** Mitosis cell division occurs in somatic cells which take part in growth, repair and development. In an unicellular organism, asexual reproduction takes place by this type of cell division.
- (B) **Meiosis:** Meiosis cell division occurs in a reproductive cell. This type of division takes place during the formation of haploid gamete, i.e., over a sperm.

## GENETICS

The process of transfer of hereditary characters from one generation to next generation is called **Genetics**. **Johan Mendel** is known as **Father of Genetics**.

- **Chromosomal aberrations:** Any changes in chromosomal structure are known as **Chromosomal aberrations**.
- **Cloning:** It is a process of producing many identical organisms from a single cell having the same genetic characters as their mother.
- **Totipotency:** It is the potential ability of a plant cell to grow into a complete plant.

• **Pluripotency:** It is the potential ability of a cell to develop 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 determines the sex of an organism is called sex chromosome.
- **Genome:** All genes present in a haploid cell are called genome.

## SEX DETERMINATION IN HUMAN

In human male sex chromosome is 'XY', whereas 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 type of chromosome that is 'X'. Thus, when a male gamete i.e. sperm carrying 'X' chromosome fertilises an ova, the zygote develops into female. When a sperm carrying 'Y' chromosome fertilises an egg, zygote develops into a male.

In human each cell contains 46 chromosomes. Any addition or removal in the number of sex chromosomes or autosomes causes genetic disorder.

- **Klinefelter Syndrome:** Individuals with this syndrome have masculine development but feminine development is not completely suppressed and the individual become sterile.
- **Turner's Syndrome:** When female has single sex chromosome (Xo) their ovaries are rudimentary, lack of secondary, sexual character.
- **Down's Syndrome:** When an extra chromosome is added to 21st autosomal chromosomes, this leads to the development of Down's syndrome. In this syndrome, a person suffers from Mongolism. The person is mentally retarded and eyes get protruded in an irregular physical structure.
- **Patau's Syndrome:** There is a cut mark in the lip and person is mentally retarded.
- **Sickle Cell Anaemia:** In this disorder erythrocytes destroyed more rapidly than normal leading to anaemia.
- **Phenylketonuria:** It is an inborn error of metabolism which result in mental retardation cause due to change in 12th autosomal chromosome.
- **Haemophilia:** Gene responsible for this disorder is linked with sex chromosomes. This disease leads to failure of blood clotting.
- **Colour blindness:** This disorder lead to failure to distinguish red and green colour. The gene responsible for this disease is situated on sex chromosome.

## ORGANIC EVOLUTION

### HOMOLOGOUS ORGANS

- The organs which are similar in basic structure and origin but dissimilar in functions are called **homologous organs**, e.g., wings of bat, cat's paws, front-foot of a horse, human's hand and wings of a bird.

### ANALOGOUS ORGANS

- These are developed in widely different organism phylogenetically due to similar habitats and modes of life, e.g., wings of

insects, birds and bats eyes of octopus and mammals.

- **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.
- **Fossils:** Fossils are the remains of ancient plant or animal which provide evidences for evolution.
- **Archaeopteryx:** It is a fossil looks like bird but bear a number of features found in reptiles. So, it is a connecting link between abes and reptile.

## THEORIES OF EVOLUTION

### Atavism or Reversion

- It is the sudden reappearance of some ancestral features. Appearance of thick body hair, large cannes, monstral face, short temporary tails, addition, fairs of nipples, etc. are examples of atavism.

### Theories of Evolution—Lamarckism

- Jean-Baptiste de Lamarck gave the idea that an organism can pass on characteristics that it acquired during its lifetime to its offspring (also known as heritability of acquired characteristics).

### Darwinism

- Darwin's theory of evolution was Origin of Species by Natural Selection and it was published in 1859.
- The theory consists of four propositions, they are:
  - Overproduction or enormous fertility.
  - Variations and heredity.
  - Survival of the fittest or natural selection.
  - Origin of species.

### Mutation Theory

- Hugo de Vries proposed the theory of mutation, working while on *Oenothera lacerations* plant.
- Mesozoic era is known as Age of Reptiles.

# BOTANY

- Theophrastus is called the father of Botany.

## PLANTS

### CRYPTOGAMUS PLANTS

There is no flower and seed in these types of plants.

### THALOPHYTA

- This is the largest group of the plant kingdom.
- There is no conducting tissue.

### ALGAE

The algae normally have chlorophyll and autotrophic mode of nutrition.

### USEFUL ALGAE

- As food:** Porphyra, Ulva, Sargassum, Laemina, Nostoc, etc.
- In making iodine:** Laemina, Fucus, Echlonia, etc.
- As manure:** Nostoc, Anabina, Kelp, etc.
- In making medicines:** Chloreloline from chlorella and Tincture iodine is made from Laemina.

 **Note:** An astronaut can get protein food, water and oxygen by sowing the chlorella algae in the tank of the aircraft so chlorella is known as space algae.

### FUNGI

Fungi are chlorophyll-less, central carriers, tissueless, thalophytes.

### BRYOPHYTA

In bryophyta, there is lack of xylem and phloem tissues.

- They lack true roots, stem and leaves.
- This community is also called Amphibian category of the plant kingdom.
- The moss namely Sphagnum is capable of soaking water 18 times of the own weight. Therefore, garden use it to protect from drying while taking the plants from one place to another.
- The Sphagnum moss is used as fuel.
- The Sphagnum moss is also used as antiseptic.

### PTERIDOPHYTA

The body of the plant is differentiated into root, stem and leaf.

**Examples:** Ferns, Azolla, etc.

## PHANEROGAMS OR FLORAL PLANT

### (A) GYMNOSPERM

- These plants are in the forms of trees and bushes.
- Plants are woody, perennial and tall. Plants bear naked seeds.

The longest plant of the Plant kingdom, *Sequoia gigantea* comes under it. This is also called Red Wood of California.

- The smallest plant is *Zamia pygmaea*.
- Ginkgo biloba* is also called Maiden hair tree. The pollen grains of *Pinus* are so much in number that later it turns into sulphur showers.

### Importance of Gymnosperm

- As food:** Sago is made by extracting the juice from the stems of Cycas. Therefore, Cycas is called Sago-palm.
- 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 Cadcast 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.

### (B) ANGIOSPERM

In the plants of this sub-group seeds are found inside the fruits.

### VIRUS

- Virus was discovered by Russian scientist Ivanovsky.
- In nature, there are ultra-microscopic particles known as viruses. Viruses are a connecting link between living and non-living organisms.

### CHARACTERISTICS OF VIRUS

1. They become active inside living cells.
  2. Nucleic acids replicate themselves and they reproduce rapidly.
  3. They cause disease like bacteria and fungi.
- In man virus cause disease like mumps, chicken pox, hepatitis, polio, AID and Herpes.
  - **Bacteriophages:** Bacteriophages are those viruses which infect the bacteria. **Example:** *Tobacco mosaic virus.*

**Note:** Those viruses in which RNA substance is found as genetic material are called Retrovirus.

### BACTERIA

It was discovered by Antonie van Leeuwenhoek.

- Leeuwenhoek is called the father of Bacteriology.
- Louis Pasteur discovered the vaccine of Rabies and pasteurization of milk.
- *Anabaena* and *Nostoc cyanobacteria* fix atmospheric nitrogen into soil.

**Note:** To preserve the milk for many days pasteurization is done.

There are two methods of pasteurization—

- (a) **Low Temperature Holding method (LTH):** Milk is boiled at 62.8 degree Celsius for 30 minutes.
  - (b) **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 plasmolysed and destroyed. Therefore pickles, etc. do not get spoiled soon and can be preserved for long time.
  - In the cold storage objects are kept at low temperature.
  - **Mycoplasma:** Smallest known prokaryotic cell causing pleuropneumonia. It is also known as PPLO.

## PLANT MORPHOLOGY

### ROOT

Root is the descending part of the plant which develops from radicle. Root always grows in the soil away from light.

Modification of Tap roots are:

1. Conical-like Carrot.
2. Napiform-like Turnip, beet, etc.
3. Fusiform-like Radish.

### STEM

This is the part of a plant which grows towards light. It develops from plumule.

### 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

Its main function is to make food through photosynthesis.

### 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.

- **Pollination:** After maturation of Anther, the process of reaching of pollen grains to stigma is called pollination.

- **Fertilization:** Pollen tube reaches the egg cell after entering into the ovule through a pore called micropyle. After that, a male nucleus fuses with an egg-cell. This is called fertilization. Fertilized egg is called zygote. In angiosperm, the fertilization is triple fusion whereas in other category of plants it is double fusion.

## FORMATION OF FRUITS

Fruit is a matured or ripened ovary developed after fertilization.

## PLANT TISSUE

**Tissue:** The group of cells of similar origin, structure, and functions in called tissue.

- (A) **Meristematic tissue:** Growing regions of the plants are Meristem. Meristematic tissues have capability of cell division.

- **Apical Meristems:** These tissues are found in the root and stem apex and the initial growth (especially length) of the plants take place due to these tissue.

- **Lateral Meristems:** Due to the division in these tissues, 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 internodes and apex parts are eaten by vegetarian animals.

- (B) **Permanent tissue:** Permanent tissues are made of those mature tissues that have lost their capacity of division and attain a definite form of various works. These cells can be alive or dead.

- **Xylem:** This is usually called wood. This is a conducting tissue. Its two main functions are—

- i. Conduction of water and minerals, and
- ii. To provide mechanical consistency.

The determination of age of the plant is done by counting annual rings of the xylem tissue.

- **Phloem:** This is a conducting tissue. Its main function is to conduct foods prepared by the leaves to different parts of the plant.

## PHOTOSYNTHESIS

In the presence of water, light, chlorophyll, and carbon dioxide, the formation of carbohydrates in plant is called photosynthesis.

Terrestrial plants takes CO<sub>2</sub> from atmosphere whereas aquatic plants use carbon dioxide mixed in water.

Water enters into cells of the leaves through osmosis and CO<sub>2</sub> through diffusion from atmosphere or release during respiration.

- The green colour of the plants is due to the presence of chlorophyll. There are different types of chlorophyll molecules like 'a', 'b', 'c', 'd', and 'e'. Chlorophylls 'a' and 'b' are most common and are found in a plant.
- There is an atom of magnesium in the centre of chlorophyll.
- Chlorophyll absorbs the violet, blue, and red colour 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 reductions.

The stages of process of photosynthesis:

- (i) Photochemical reaction or light reaction.
- (ii) Dark chemical reaction.

- i. **Photochemical reaction:** This reaction is completed in the grand part of the chlorophyll. This is called Hill reaction. At the end of this process, ATP is formed from ADP and P.

- ii. **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

is formed. It is also known as Calvin Benson cycle.

## PLANT HORMONES

Following five hormones are found in plants-

1. **Auxins:** This is the hormone which controls the growth of plants.
2. Gibberellins
3. Cytokinins
4. Abscisic Acid or ABA
5. Ethylene
6. **Florigens:** It is formed in leaves but helps in blooming of the flowers. Therefore, it is also called flowering hormones.

## PLANT DISEASES

### 1. Viral Diseases

- i. **Mosaic disease of tobacco:** The factor of this disease is Tobacco Mosaic Virus (TMV).
- ii. **Bunchy top of banana:** This disease is caused by banana virus.

### 2. Bacterial Diseases

- i. **Wilt of Potato:** It is also known as rin's disease because brown sign is formed on the xylem.
- ii. **Black Arm of cotton:** The factor of this disease is *Xanthomonas* Bacteria. In this disease a water body (brown) is formed on the leaves.
- iii. **Bacterial blight of Rice:** This disease is caused by *Xanthomonas*.
- iv. **Citrus Canker:** The factor of this disease is *Xanthomonas citri* bacteria.
- v. **Tundu disease of wheat:** The factors of this disease are *Corynebacterium titric* bacteria and *Enzuina titriki* Nematode.

## NITROGEN CYCLE

- Nitrogen fixation is a process in which free atmospheric nitrogen is converted by living organism into nitrogenous compound that can be used by plant.

- **Ammonification:** Formation of ammonia from organic compound.
- **Nitrification:** A process in which ammonia is converted into nitrates by Nitro bacteria.
- **Denitrification:** It is a microbially facilitated process of nitrate reduction performed by a large group of heterotrophic facultative anaerobic bacteria) that may ultimately produce molecular nitrogen ( $N_2$ ) through a series of intermediate gaseous nitrogen oxide products. This respiratory process reduces oxidized forms of nitrogen in response to the oxidation of an electron donor such as organic matter. The preferred nitrogen electron acceptors in order of most to least thermodynamically favorable include nitrate ( $NO_3^-$ ), nitrite ( $NO_2^-$ ), nitric oxide ( $NO$ ), nitrous oxide ( $N_2O$ ) finally resulting in the production of dinitrogen ( $N_2$ ) completing the nitrogen cycle.

## POPULATION AND BIOTIC COMMUNITY

- **Population:** Population is a group of individuals of same species occupying the same area at a given time.
- **Population density:** Total number of individuals present in per unit area.
- **Natality:** Increase in the number of individuals in a given population by birth is called natality.
- **Mortality:** Number of individuals removed from a population due to death under given environmental condition at a given time is called mortality.
- **Biotic potential:** It refers the maximum capacity of inherent of an organism to reproduce.
- **Mutualism:** It is a functional association between two different species in which both the species are benefited.
- **Commensalism:** It is an association between individuals of two different species in which one species is benefited and other one is neither benefited nor affected.

**Plant Diseases**

Fungal Diseases	Bacterial Diseases	Viral Diseases
Late blight of Potato	Paddy blight	Tobacco Mosaic
Downy Mildew	Brown rot of Potato	Bunchy top of Banana
Loose smut of Wheat, Karnal bunt	Ring rot of Potato	Leaf curl
Smut of Bajra	Tundu disease of wheat	Potato leaf roll
Bunt of rice	Citrus canker	Carrot red leaf
Coffee rust	Crown Gall of fruits	Cauliflower mosaic Potato mosaic
Black/Brown rust		
Red rot of sugarcane		
Wilt of cotton, yellow rust of wheat		
Ergot of Bajra		
Foot rot of Paddy, Tikka of groundnut		

# ZOOLOGY

## CLASSIFICATION OF ANIMAL KINGDOM

### A. Phylum Protozoa

#### **Main features**

- i. Its body is made of only one cell.
- ii. There are one or more nuclei in its cytoplasm.
- iii. These are of both types—commensalism and parasite.
- iv. All the metabolic activities (eating, digestion, respiration, excretion, reproduction) take place in unicellular body.
- v. Respiration and excretion take place by diffusion.

**Example:** Amoeba and Euglena.

### B. Phylum Porifera

#### **Main features**

All animals of this group are found in water and bear pores in the body.

- i. These are multicellular animals but cells do not make regular tissues.
- ii. Numerous pores known as ostia found on body wall.
- iii. Skeleton is made up of minute calcareous or silicon spicules.

**Examples:** Sycon, Sponge, etc.

### C. Phylum Coelenterata

#### **Main features**

- i. Animals are aquatic and diploblastic.
- ii. Around the mouth some thread-like structures are found known as tentacles.
- iii. Body radial symmetry.

- iv. Specialised cnidoblast cells are found which help in catching the food.

**Example:** Hydra, Jelly fish.

### D. Phylum Platyhelminthes

#### **Main features:**

- i. Triploblastic and no body cavity.
- ii. Dorsoventrally flattened animal.
- iii. Alimentary canal with single opening, anus absent.
- iv. Excretion takes place by flame cells.
- v. There is no skeleton, respiratory organ, circulatory system, etc.
- vi. These are hermaphrodite animals.

**Example:** Planaria.

### E. Phylum Aschelminthes

#### **Main features**

- i. Long, cylindrical, unsegmented worm.
- ii. Bilaterally symmetrical and triploblastic.
- iii. Alimentary canal is complete in which mouth and anus both are present.
- iv. There is no circulatory system and respiratory system but nervous system is developed.
- v. Excretion takes place through Protonephridia.
- vi. They are unisexual.

**Example:** Roundworm.



**Note:** Enterobius (pinworm/threadworm): It is found mainly in the anus of a child. Filarial disease is caused by *Wuchereria bancrofti*.

## F. Phylum Annelida

### Main features

- i. Body is long, thin, soft and metamerically segmented.
- ii. Locomotion takes place through Setae made up of Chitin.
- iii. Alimentary canal is well developed.
- iv. Nervous system is normal and blood is red.
- v. Excretion by nephridia.
- vi. Both unisexual and bisexual.

**Example:** Earthworm.

 **Note:** There are four pairs of heart in earthworm.

## G. Phylum Arthropoda

### Main features

- i. Body is divided into three parts- Head, Thorax and Abdomen.
- ii. Body is covered with a thick chitinous exoskeleton.
- iii. Jointed leg.
- iv. Circulatory system is of open type.
- v. Its body cavities are called haemocoels.
- vi. Trachea, book lungs, body surface are respiratory parts.
- vii. These are mainly unisexual and fertilization takes place inside the body.

**Example:** Cockroach and Prawn.

- i. There are six feet and four wings in insects.
- ii. There are 13 chambers in a cockroach's heart.

## H. Phylum Mollusca

### Main features

- i. Body is divided into head and muscular foot.
- ii. Mantle is always present in it.
- iii. Alimentary canal is well developed.
- iv. Respiration takes place through gills or ctenidia.
- v. Blood is colourless.
- vi. Excretion takes place through kidneys.

**Example:** Pila, Octopus.

## I. Phylum Echinodermata

### Main features

- i. All the animals in this group are marine.
- ii. Water vascular system is present.
- iii. There are tube feet for locomotion, taking food which works as sensational organ.
- iv. Brain is developed in nervous system.
- v. There is a special capacity of regeneration.

**Examples:** Star fish, Sea urchin.

## J. Phylum Chordata

### Main features

- i. Notochord is present in it.
- ii. All the chordates are triploblastic, coelomate and bilaterally symmetrical.
- iii. A dorsal hollow tubular nerve cord and paired pharyngeal gill slits are other features of chordates.

## SOME MAIN GROUPS OF PHYLUM CHORDATA

### PISCES

#### Main features

- i. Aquatic life.
- ii. All these are cold blooded animals.
- iii. Heart pumps only impure blood and have two chambers.
- iv. Respiration takes place through gills.

**Example:** Hippopotamus.

### AMPHIBIA

- i. These are found both on land and water. All these are cold-blooded.
- ii. Respiration takes place through gill, skin and lungs.
- iii. They have three chambered heart.

**Example:** Frog, Necturus, Toad, Ichthyophis, Salamander.

### REPTILIA

#### Main features

- i. Land vertebrate, cold-blooded, terrestrial or aquatic vertebrates.

- ii. Respiration takes place through lungs.
- iii. Its eggs are covered with shell made up of calcium carbonate.

**Example:** Lizard, snake, tortoise.

☞ **Note:** Mesozoic era is called the era of reptiles.

Cobra is the only snake which makes nests. Heloderma is the only poisonous lizard. Sea snake which is called Hydrophis is the world's most poisonous snake.

## AVES

### Main features

- i. The animals of this group are warm-blooded tetrapod vertebrates with flight adaptation.
- ii. Their four-feet are modified into wings to fly.
- iii. They respire through lungs.

**Example:** Crow, Peacock, Parrot, etc.

## MAMMALIA

### Main features

- i. These are warm-blooded animals.
- ii. There is no nucleus in their red blood cells (except in camel and lama).
- iii. Skin of mammals has hair.
- iv. Mammalia is divided into three subclasses:
  - i. **Prototheria:** It lays eggs, e.g., Echidna.
  - ii. **Metatheria:** It bears the immature child, e.g., Kangaroo.
  - iii. **Eutheria:** It bears the well developed child, e.g., humans.

### Types of Vertebrates

Jawless fishes (Agnatha)	Hagfish, lamprey
Cartilaginous fishes	Sharks, skates, rays, chimaeras
Bony fishes	Sturgeon, herring, salmon, perch, cod, coelacanth
Amphibians	Frogs and toads, salamanders, newts, caecilians
Reptiles	Snakes, crocodiles, alligators, lizards, turtles, tortoises

Birds (Aves)	Penguin, flamingo, eagle, turkey, thrush, parrot
Mammals	Platypus, kangaroo, bat, lion, wolf, mouse, seal, antelope, cow, dolphin, whale, lemur, monkey, ape, human

## ANIMAL TISSUE

i. **Epithelial Tissue:** Epithelial tissue cover the external surface of the body and internal free surface of many organs.

**Example:** skin, intestine, gland.

ii. **Connective Tissue:** These tissues connect and bind different tissues and organs.

**Example:** Adipose tissue found beneath the skin. Ligament is made up of fibrous connective tissue, cartilage, bone and blood.

☞ **Note:** Blood is only tissue which is found in the form of fluid.

iii. **Muscular Tissue:** This is also known as contractile tissue. All the muscles of the body are made up of this tissue.

(a) **Unstriped:** This muscle tissue is found on the walls of those parts which are not controlled by will.

(b) **Striped:** These muscles are found in the parts of the body that move voluntarily.

(c) **Cardiac:** These muscles are found only on the walls of the heart.

The largest muscle of the human body is Gluteus Maximus.

The smallest muscle of the human body is Stapedius.

iv. **Nervous Tissue:** This tissue is also called sensitive tissue.

## HUMAN BLOOD

- The quantity of blood in the human's body is 7% of the total weight.
- Blood is fluid connective tissue and composed of blood corpuscles, plasma and platelets.
- It is slightly alkaline in nature (pH 7.4).
- Its volume in an adult is 5.8 L.

- People who live at high altitudes have more blood than those who live in low regions. This extra blood supplies additional oxygen to body cells.
- During blood clotting fibrinogen changes into fibrin by thrombin which is obtained from thromboplastin in the presence of  $\text{Ca}^{2+}$ .
- Female contains half litre of blood less in comparison to male.

## BLOOD CONSISTS OF TWO PARTS

(A) Plasma; and (B) Blood corpuscles.

(A) **Plasma:** This is the liquid part of blood. 60% of the blood is plasma. Its 90% part is water, 7% protein, 0.9% salt and 0.1% is glucose.

- **Function of plasma:** Transportation of digested food, hormones, excretory product, etc. from the body takes place through plasma.
- **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.

i. **Red Blood Corpuscles (RBC):** Red Blood Corpuscles (RBC) in mammal is biconcave.

- There is no nucleus in it. Exception-Camel and Lama. RBC is formed in Bone marrow.
- Its life span is from 20 days to 120 days.
- Its destruction takes place in liver and spleen. Therefore, liver is the grave of RBC.
- It contains haemoglobin, in which haeme iron containing compound found and due to this the colour of blood is red.
- The main function of RBC is to carry oxygen to all cells of the body bring back the carbon dioxide.

ii. **White Blood Corpuscles (WBC) or Leucocytes:**

- Its formation takes place in Bone marrow, lymph node and sometimes in liver and spleen.
- Its life span is from 1 to 2 days.

- Nucleus is present in the White Blood Corpuscles.
- Its main function is to protect the body from the disease. The ratio of RBC and WBC is 600 : 1.

iii. **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.

## FUNCTIONS OF BLOOD

- i. To control the temperature of the body and to protect the body from diseases.
  - ii. Clotting of blood.
  - iii. Transportation of  $\text{O}_2$ ,  $\text{CO}_2$ , digested food, conduction of hormones, etc.
  - iv. To help in establishing coordination among different parts.
- The main reason behind the difference in blood of human is the glycoprotein which is found in Red Blood Corpuscles called antigens. Antigens are of two types: Antigen A and Antigen B.
  - On the basis of presence of Antigen or Glycoprotein, 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 Antigens A and B-Blood Group AB.
    - (d) That contains neither of the Antigens-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'.

**Blood Transfusion:** Antigen 'A' and antibody 'a', Antigen 'B' and antibody 'b' cannot live together. In case of so happened these get most sticky, such spoils the blood. This is called agglutination of blood.

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. If in the blood of people it is found, their blood is said to be Rh-positive and if in the blood of people it is not found, their blood is said to be Rh-negative.

At the time of blood transfusion, Rh-factor is also tested. Rh-positive is given to Rh-positive blood and Rh-negative is given to Rh-negative blood only.

**Erythroblastosis Fetalis:** If the father's blood is Rh-positive and the mother's blood is Rh-negative, then the child to be born dies at pregnancy or short span of time after the birth. (This happens in the case of second issue).

#### Possible Combinations of Blood Groups

Male	Female	Blood group of Children not possible
A	A	B & AB
A	B	-
A	AB	O
A	O	B or AB
B	B	A, AB
B	AB	O
B	O	A, AB
AB	AB	O
AB	O	O, AB
O	O	A, B, AB

#### BLOOD PRESSURE (BP)

- The pressure created by the blood on the walls of the blood vessels due to the repeated pumping of heart is called **blood pressure**. It is measured by **sphygmomanometer**.
- Blood pressure in a normal person is 120/80 mm Hg.
- If a person has persistent high blood pressure then it is called hypertension and persistent high blood pressure is 150/90 mm Hg.
- Hypotension** is condition of low blood pressure, i.e., persistent 100/50 mm Hg.
- Electrocardiograph (ECG) is used to check proper working of heart.

## SYSTEM OF THE HUMAN BODY

#### ■ EPIDERMIS

- The top layer of skin made up of epithelial cells and does not contain blood vessels.

#### ■ DERMIS

- It gives elasticity to the integument, allowing stretching and conferring flexibility, while resisting distortions, wrinkling and sagging.

#### ■ HYPODERMIS

- It is made up of adipose tissue.

#### ■ TEETH

- With the help of teeth the food is chewed. Teeth are of four types
  - Incisors
  - Canines
  - Premolars
  - Molars
- Hardest part in the body is tooth enamel.

#### ■ TONGUE

- Saliva, secreted by the salivary glands, is mixed with the chewed food by the tongue.
- Complete digestion process takes place in following four steps:
  - Ingestion of Food
  - Digestion in Mouth.
  - Digestion in Stomach.
  - Digestion in Intestine.

- The food passes down through the oesophagus into stomach.
- Now food is mixed with gastric juice and hydrochloric acid which disinfect the food and creates acidic medium.
- Pepsin digests proteins and converts them into peptones.
- Renin converts milk into curd.
- The digested food now is called chyme.
  - Ingestion:** Taking the food into the mouth is called ingestion.
  - Digestion:** Conversion of non-absorbable food into absorbable form. The digestion of the food is started in the mouth.
- Saliva is secreted by salivary gland in mouth in which two types of enzymes are found, ptyalin and maltase. They convert starch into simple sugar and make it digestible.

- From the mouth the food goes into stomach through foodpipe.
- No digestion takes place in foodpipe.

### DIGESTION IN STOMACH

- The food lies approximately for four hours in the stomach.
- Hydrochloric acid secreted from the Oxytic cells of the stomach kill all the bacteria coming with food and accelerate the reaction of enzymes.
- 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.

### DIGESTION IN DUODENUM

As soon as the food reaches the duodenum bile juice from liver combines with it. Bile juice is 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:

- Trypsin:** It converts the protein and peptone into polypeptides and amino acid.
- Amylase:** It converts the starch into soluble sugar.
- Lipase:** It converts the emulsified fats into glycerol and fatty acids.

### SMALL INTESTINE

#### *Digestion in Intestine*

Food passes into ileum and mixes with intestinal juice, where:

- Maltase converts into glucose.
- Lactose converts into glucose and galactose.
- Sucrose converts into glucose and fructose.
- Trypsin digests the peptides into amino acids.
- Food now is called chyle.

### ABSORPTION AND ASSIMILATION OF DIGESTED FOOD

- Ileum's internal surface has finger-like folds called **villi**.
- It helps in absorption of food.

### EJECTION OF UNWANTED FOOD

- Digested food passes into large intestine.
- Large intestine cannot absorb food, but absorbs much of the water.
- The remaining semi-solid waste is called **faeces** and is passed into rectum.

### 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.
- Liver converts excess of amino acid into ammonia by deamination. The ammonia is further converted into urea by ornithine cycle. Urea comes out from body through kidney.
- Liver converts some quantity of protein into glucose during defecation of carbohydrate.
- Liver regulates the quantity of glucose in the blood.
- In case of decrease of fat in food liver converts some of the parts of 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 prevent the clotting of blood inside the body.
- The liver reserves some quantity of iron, copper and vitamin.
- It helps in regulating the body temperature.
- Liver is an important clue in investigating a person's death that is 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 is a yellowish-green coloured alkaline liquid, whose pH value is 7.7.
  - The quantity of water is 85% and the quantity of bile pigment is 12% in water.
- The main functions of bile are as under:

- It makes the medium of food alkaline so that pancreatic juice can work.
- It kills the harmful bacteria coming with food.
- It emulsifies the fats.

- iv. It accelerates the bowel movement of intestine by which digestive juices in the food mix well.
- v. 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 form. 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 simultaneously as endocrine and exocrine type of gland.

**Islets of Langerhans:** This is a part of the pancreas.

**Insulin:** It is secreted by  $\beta$ -Cells of Islets of Langerhans which is a part of pancreas. It controls the process of making glycogen from glucose.

Diabetes is caused due to the deficiency of insulin.

- Excessive flow of insulin causes Hypoglycemia in which one loses the producing capacity and vision deterioration.

**Glucagon:** It re-converts the glycogen into glucose.

## CIRCULATORY SYSTEM

The discovery of blood circulation was done by William Harvey.

### HEART

It remains safe in the pericardial membrane. Heart of the human is made up of four chambers.

- The chamber which receives the blood from body tissues is called **auricles** and the chambers of heart which pump blood to body tissues are called **ventricles**.
- There is a thin two layered sac around the heart known as **pericardium**, filled with a watery fluid called pericardial fluid, which allows frictionless movements of heart and protects it from mechanical shocks.
- The blood vessel 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 with the exception is pulmonary vein, which always carry pure blood.

- Pulmonary vein carrying the blood from lungs to left auricle. It has pure blood.
- The blood vessel 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.
- The artery carrying blood to the muscles of the heart are called coronary arteries. Any type of hindrance in it cause heart attack.
- **A fish** has only two-chambered heart.
- **In amphibians**, heart is three-chambered.
- In **crocodile, birds** and **mammals** the heart is divided into four chambers.

**Course of circulation:** Mammals have double circulation. It is because blood have to cross two times from heart before circulating throughout body.

- To pump out blood, the heart chamber undergoes alternate contraction called **systole** and relaxation called **diastole**.
- Arteries carry **pure blood** from the heart while veins carry **impure blood** to the heart.
- Human heartbeat is myogenic in nature, i.e., initiated by a patch of modified heart muscles itself without requiring an external stimulation. This patch is called **SA node** (sino-auricular node) or **pacemaker**.
- The normal **rate of heartbeat** of a newborn baby is about 140 per minute.
- When SA-node becomes defective, i.e., it does not generate cardiac impulse, it can be cured by surgical grafting of an artificial pacemaker (an electric device) in the chest of the patient. It stimulates the heart electrically at regular intervals.
- The blood pressure of a normal human is 120/80.
- Blood pressure is measured by sphygmomanometer.
- Thyroxine and adrenaline are the hormones which independently controls the heartbeat.
- The  $\text{CO}_2$  present in the blood accelerates the heartbeat by reducing the pH.

### CAPILLARIES

- These are the thinnest blood vessels and connect arteries to the veins.

## ■ LYMPH CIRCULATORY SYSTEM

- The light yellow fluid found in the inter-cellular spaces between different tissues and cells is called lymph.
- The corpuscles found in lymph are called lymphocytes.
- Lymph flows only in one direction from tissue towards heart.

### Functions of Lymph

- The lymphocytes present in lymph help prevent the body from disease by killing the harmful bacteria.
- Lymph forms the lymphocytes.

## EXCRETORY SYSTEM

### ■ KIDNEY

- It is bean-shaped, chocolate brown structure lying in the abdomen, one on each side of the vertebral column just below the diaphragm.
- The left kidney is placed in little higher than the right kidney (but reverse in rabbit).
- These form the urine and controls osmotic pressure within the organism with respect to external environment.
- Nephrons are the functional and structural unit of kidney. They contain Bowman's capsule and Henle's loop.
- The process of filtration of liquids into the cavity of Bowman's capsule is called ultrafiltration.
- The main function of the kidneys is purification of blood plasma, i.e. to excrete the unwanted nitrogenous waste substances through urination.
- In the kidneys average 125 ml per minute blood is filtered.

### ■ URETERS

- These bring the urine downwards and open into urinary bladder.

### ■ URINARY BLADDER

- It temporarily stores the urine.

### ■ URETHRA

- In females, this tube is small and serves as a passage of urine only.

- In males, it is long and functions as a common passage for urine and spermatic fluids.

## ■ URINE

- It is pale yellow coloured fluid due to presence of urochrome pigment.
- It is acidic in nature (pH 6.0) and is slightly heavier than water.
- Chemical composition of urine:** Water is 95-96%, urea is 2% and some other substances like uric acid, creatinine, etc. are 2-3%.
- Kidney stone is calcium oxalate.
  - Skin:** Oil glands and sweat glands found in the skin secrete sebum and sweat.
  - Liver:** Liver cells play the main role in excretion by converting more amino acids and ammonia of blood into urea.
  - Lungs:** The lungs excrete two types of gaseous substances—carbon dioxide and water vapour.

**Hemodialysis:** Process of removal of excess urea from the blood of patient using artificial kidney.

## EXCRETORY PRODUCTS

### ■ AMMONOTELIC ANIMALS

- These animals excrete nitrogen in the form of ammonia, e.g., aquatic invertebrates.

### ■ UREOTELIC ANIMALS

- They excrete nitrogen in the form of urea, e.g., mammal (man).

### ■ URICOTELIC ANIMALS

- They excrete the nitrogenous wastes in the form of uric acid, e.g., Reptiles, snakes.

## CENTRAL NERVOUS SYSTEM

- Nervous system is found only in animals and absent in plants.
- 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 a membrane called meninges. It is situated in a bony box.

called cranium which protects it from external injury.

## BRAIN

- Brain lies in the cranium of skull.
- The functions of brain parts are as follows:
  - i. **Cerebrum** leads to consciousness, storage of memory of information.
  - ii. **Thalamus** deals with pain, pressure and temperature.
  - iii. **Hypothalamus** deals with water balance in body, behavioural patterns of sex, sleep, stress emotions, etc. It also regulates pituitary hormones and metabolism of fat, carbohydrate and water.
  - iv. **Midbrain** deals with visual analysis, etc.
  - v. **Cerebellum** controls coordination of accurate movements and balancing.
  - vi. Medulla oblongata is long connecting part of brain to spinal cord. It deals with control of heartbeats, blood vessels, breathing, salivary secretion and most of reflex and involuntary (uncontrolled) movements.

## SPINAL CORD

The posterior region of the medulla oblongata is 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 waves coming out of the brain.

## PERIPHERAL NERVOUS SYSTEM

- Peripheral Nervous System is made up of the nerves arising from brain and spinal cord.
- The unit of nervous tissues is called neuron of nerve cell.

## AUTONOMOUS NERVOUS SYSTEM (ANS)

- It is entirely motor and operates without conscious control. Autonomic Nervous System consists of two divisions.
  - i. **Sympathetic nervous system** increases defence system of body against adverse conditions.
  - ii. **Parasympathetic nervous system** provides relaxation, comfort, pleasure at the time of rest.
- Electroencephalogram (EEG) is a test that measures and records the electrical activity of our brain.

## SKELETAL SYSTEM

### (i) Axial Skeleton (80 Bones)

- It includes skull, vertebral column and bones of chest.
- Vertebral column is responsible for the upright position of the human body.

### (ii) Appendicular Skeleton (126 Bones)

- Their functions are to make locomotion possible and to protect the major organs of locomotion, digestion, excretion, and reproduction.
- i. **Skull:** There are 29 bones in it.
- ii. **Vertebral Column:** The vertebral column of the human is made up of 33 vertebrae.

## FUNCTIONS OF VERTEBRAL COLUMN

- i. Holds the head.
- ii. It provides the base to the neck, and body.
- iii. It helps the human in standing, walking, etc.
- iv. It provides flexibility to the neck and body by which a human can move his neck and body in any direction.
- v. It provides protection to spinal cord.

## FUNCTIONS OF THE SKELETAL SYSTEM

- i. To provide a definite shape to the body.
- ii. To provide protection to soft parts of the body.
- iii. To provide a base to the muscles for joining.
- iv. To help in respiration and nutrition.
- v. 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 largest bone of the body—Femur (bone of thigh).
- The smallest bone of the body—Stapes (bone of ear).

**Note:** The muscles and bones are joined together by tendon. The muscle which joins bone to bone is called ligament.

## DISEASES OF SKELETAL SYSTEM

- Hard tissue deposits over articular cartilage along with higher secretion of synovial fluid causing pain and stiffness lead to **rheumatoid arthritis**.
- Tearing of articular cartilage and development of bony lumps at places causing pain, stiffness and permanent bending lead to **osteoarthritis**.
- Osteoporosis** is loss of bone density due to excessive absorption of calcium and phosphorus from the bone.
- Osteoporosis is a hereditary disease marked by abnormally dense bone, and by the common occurrence of fractures of affected bone.
- Tendons join the muscles and bones.
- The muscles which join bone-to-bone are called ligaments.

## MUSCULAR SYSTEM

- Human body has about 639 types of muscles.

## ENDOCRINE SYSTEM

- Exocrine glands:** Glands which have duct are called exocrine glands. Secretion of enzymes pass through it. **Example:** Lactic gland, Sweat gland.
- Endocrine glands:** These are ductless glands. Hormones are secreted by these glands. Hormones are sent to the different parts of the body through

blood plasma. **Example:** Pituitary gland, Thyroid gland.

### PITUITARY GLAND

- STH hormone (Somatotropic 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.
- TSH hormone (Thyroid Stimulating Hormone):** It stimulates its thyroid gland to secrete hormone.
- ACTH hormone (Adrenocorticotrophic Hormone):** It controls its secretion of adrenal cortex.
- GTH hormone (Gonadotropin Hormone):** It controls the function of gonads.
  - FSH Hormone (Follicle-stimulating Hormone):** In males, it stimulates Sertoli Cells to genesis in the seminiferous tubules of the testis. In female, it stimulates the Graafian follicles of the ovary to secret the hormone oestrogen.
  - LH Hormone (Luteinizing Hormone):** Also called Interstitial cell-stimulating hormone (ICSH). Secretion of testosterone hormone takes place in male and in case of female estrogen hormone secreted.
- LTH Hormone (Lactogenic Hormone):** Its main function is to stimulate secretion of milk in breasts for infants.
- ADH Hormone (Antidiuretic Hormone):** It causes increase in blood pressure. It is helpful in maintaining the water balance in the body and reducing the volume of urine.

### Classification of Hormones

Amines	Peptide hormones	Steroids/sterols	Lipids
Adrenaline	Acth Or Corticotropin	Cortisol	Prostaglandins
Dopamine	Vasopressin	Aldosterone	Leukotrienes
Noradrenaline	Calcitonin	Testosterone	Prostacyclin

Melatonin	Corticotropin-Releasing Hormone (Crh)	Androstenedione	Thromboxane
Serotonin	Erythropoietin (Epo)	Oestrogen	
Thyroxine	Follicle-Stimulating Hormone (Fsh)	Estradiol	
Triiodothyronine	Gastrin	Progesterone	
	Glucagon	Progestins	
	Gonadotropin-Releasing Hormone (Gnrh)	Calcitriol	
	Growth Hormone-Releasing Hormone (GHRH)	(Sterol)	
	Insulin		
	Leptin		
	Luteinizing Hormone (LH)		
	Oxytocin		
	Parathyroid Hormone (PTH)		
	Prolactin (PRL)		

## THYROID GLAND

- The hormones secreted by it are Thyroxine and Triiodothyronine. Iodine is secreted in more quantity.

## FUNCTIONS OF THYROXIN

- It increases the speed of cellular respiration.
- It is necessary for the normal growth of the body particularly for the development of bones, hair, etc.
- The normal function of reproductive organs depends on the activeness of thyroid gland.
- It controls the water balance of the body in coordination with the hormones of pituitary gland.

## DISEASES CAUSED BY THE DEFICIENCY OF THYROXIN

- Cretinism
- Myxedema
- Hypothyroidism
- Goitre

**Diseases caused by the Excessiveness of Thyroxin:** Exophthalmic Goitre.

## PARATHYROID GLAND

- Parathyroid hormone:** This hormone is secreted when there is a deficiency of calcium in the blood.
- Calcitonin:** This hormone is released when there is excess of calcium in the blood.

Hence, hormone secreted by parathyroid gland controls the quantity of calcium in blood.

## PANCREAS

- It is both an exocrine and endocrine gland. The islet of Langerhans (endocrine) has three major types of cells:
  - alpha-cells** secrete glucagon hormone.
  - beta-cells** secrete insulin,
  - delta-cells** secrete somatostatin.

## ADRENAL GLAND

- It is also known as **emergency glands**.
  - Cortex
  - Medulla

## OVARIAN HORMONES (OESTROGENS)

- It helps in the development of primary and secondary sexual characters (oestradiol, oestriol and estrone).

## TESTICULAR HORMONES (ANDROGENS)

- It stimulates growth, maturation and maintenance of male gonads and development of secondary sexual characters, e.g., testosterone and sterone, etc.

## PINEAL GLAND

- It is situated in the brain and also known as **clockwork gland**.
- It regulates the ovaries and has an effect on the biological rhythm.
- BCG (Bacillus Calmette Guerin) vaccine is given to protect against TB (Tuberculosis).
- DPT (diphtheria, Pertussis and Tetanus) vaccine is given to babies within first 6 weeks of their birth.
- Fishes like cat fish, gambusia and aquatic birds eat mosquito larvae.

## VACCINATION

- It is the process of artificial introduction of germs or the germ substance called **antigen** into the body for developing resistance to a particular disease.
- A vaccine is dead or weakened microbes.

## HORMONES SECRETED BY MEDULLA

- Epinephrine
  - Nor epinephrine
- The work of both the hormones is similar. These equally increase the relaxation and contraction of heart muscles. As a result, blood pressure increases.
  - In case of sudden stop of heartbeat, epinephrine is helpful in re-starting the heartbeat.
  - The hormone secreted by Adrenal gland is called fight flight, fight fight hormone.

## REPRODUCTIVE SYSTEM

- The process by which new individuals are produced from their parents is called **reproduction**.
- In asexual reproduction, only one parent is involved and sex cells are not involved.
- In **sexual reproduction**, two parents are involved and formation and fusion of gametes takes place.
- Males can produce spermatozoa (sperm) throughout their life from age of 13-14 years.

- If sperm is present, the egg will be fertilized in the fallopian tube.
- After maturity the ovary releases an ovum (egg cell) after every 28 days.
- The connection between developing embryo and mother is by **placenta**. It supplies blood, etc.
- The embryo develops for nine months in uterus. It is called **gestation period**.

## GONADS

**Ovary:** The following hormones are secreted by this:

- Estrogen:** It completes the increase of oviduct.
- Progesterone:** It stimulates the thickening of uterus lining during ovarian cycle.
- Relaxin:** During pregnancy it is found in uterus and placenta. This hormone smoothens the pubic symphysis and it widens the uterine cervix, so that the child is delivered easily.

**Testes:** The hormone secreted by it is called testosterone. It motivates the sexual behaviour and growth of secondary sexual characters.

## MENSTRUAL CYCLE

- Reproductive period of a human female extends from puberty (10-14 years) to menopause (40-50 years).
- Menopause is stopping of ovulation and menses.
- The periodic vaginal bleeding may be suppressed during pregnancy, during lactation and permanently stops at menopause.
- Menstrual cycle is controlled by FSH, LH, oestrogen and progesterone.

## BIRTH CONTROL METHODS OR CONTRACEPTION

- The prevention of union of sperm and ovum is known as **contraception**. The various methods used for it are diaphragm, contraceptive pills, tubectomy, vasectomy, copper-T, etc.
- Amniocentesis or amniotic fluid test is technique of finding out sex and disorder of foetus.

## RESPIRATORY SYSTEM

- Respiration is a catabolic process in which the respired oxygen is used in the oxidation of food resulting in the release of energy.

### HUMAN RESPIRATORY SYSTEM

- Overall passage of air in humans is as follows: Nostrils–Pharynx–Larynx–Trachea–Bronchi–Bronchioles – Alveoli–Cells–Blood.

### EXTERNAL RESPIRATION

- It involves inspiration and expiration of air.
- Inspiration** is the process of intake of air. During inspiration, muscles of the diaphragm contract and diaphragm flatten. The lower ribs are raised upward and outwards, the chest cavity enlarges, the air pressure in the lungs is decreased, air rushes into the lungs.
- Expiration** is breathing out of air. During expiration, relaxation of muscles of the ribs and diaphragm takes place. Diaphragm again becomes dome-shaped. Chest cavity is reduced and air is forced outward through nose and trachea.

### INTERNAL RESPIRATION (OXIDATION OF FOOD)

- It is a complex process in which food is broken down to release energy. It is a biochemical phase takes place inside the cell.
- Transportation of oxygen takes place by haemoglobin of blood, whereas transportation of only 10-20% carbon dioxide takes place by haemoglobin of blood.
- Respiration being a catalytic process also **reduces the weight** of the body.

Glucose is oxidised by oxygen reached into the cell. This process is called cellular respiration.

### TYPES OF RESPIRATION

#### Aerobic Respiration

- The respiration which takes place in the presence of oxygen is known as aerobic respiration.
- In this process, in fact, each glucose molecule is converted into two molecules of pyruvic acid by the process, called **glycolysis**. It

takes place in the cytoplasm of the cell. The pyruvic acid formed, releases energy with the formation of carbon dioxide and water (in Krebs' cycle which occur in mitochondria).

#### Anaerobic Respiration

- The respiration which takes place in the absence of oxygen is known as anaerobic respiration.
- In this process, the respiratory substances are incompletely oxidized to carbon dioxide and alcohol.

i. **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 are formed.
- There is no need of oxygen in glycolysis.

ii. **Krebs' Cycle:** 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 our system maximum ATP atoms are formed during Krebs' Cycle.

Carbohydrate, fat and 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.

## SENSE ORGANS

### EYE

It consists of three parts.

#### 1. Sclerotic Layer

- Cornea
- Conjunctiva

#### 2. Choroid Layer

It is the middle layer and consists of:

- Pupil:** It changes size as the amount of light changes.

- ii. Ciliary body.
- iii. **Iris:** It controls the amount of light that enters the eye by changing the size of the pupil.
- iv. Lens is a biconvex transparent circular solid part located just behind the iris.

### 3. Retina

- Light sensitive tissue that lines the back of the eye.
- The image formed on retina is real and inverted.
- Rods are highly sensitive to dim light and contain a reddish purple pigment called rhodopsin.
- Cones are sensitive to bright light, hence differentiate the colours.
- The **fovea centralis** is the area of sharpest vision.
- The **blind spot:** no image is formed in this region.

#### Eye Defects

- **Nearsightedness** (Myopia)
- **Farsightedness** (Hypermetropia)
  - Astigmatism
  - Presbyopia
- **Conjunctivitis**

### EAR

- Human ear can list in the sound of 60-80 decibel.
- Defects of ear are: **Otalgia ear-ache** (Pain in ear); **Otitis media** (acute infection of middle ear), **labyrinthine** disease (malfunction of inner ear).

### NOSE (OLFFACTORY ORGAN)

#### Olfactory cells

- Dos have an acute olfactory sense.

### NUTRIENTS

- These are metals, non-metals and their salts other than the four elements—carbon, hydrogen, nitrogen and oxygen and constitute about 4% of total body weight.

- Milk, eggs, meat, fruit, food, vegetables, etc. are the sources of minerals.
- Nutrition is one of the basic functions of life in which intake of food, digestion, absorption, assimilation are included.

### CARBOHYDRATES

Carbohydrates are organic compounds in which the ratio of Carbon, Hydrogen and Oxygen is 1: 2: 1.

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 are glucose. Triose, tetrose, pentoses, heptoses are the type of monosaccharides.
- (b) **Oligosaccharides:** When 2 to 10 monosaccharides join together they form oligosaccharides. Maltose, sucrose, lactose are disaccharides made up of two monosaccharides.
- (c) **Polysaccharides:** These are the compounds of sugar which are formed due to joining large number of monosaccharide. Some examples of polysaccharides are starch, glycogen, cellulose, chitin, etc.

#### Functions of Carbohydrates

1. Carbohydrate works as fuel during the process of respiration, glucose break into  $\text{CO}_2$  and  $\text{H}_2\text{O}$  with the release of energy. One gram of glucose gives 4.2 kilo calories energy.
2. Nucleic acids are polymers of nucleosides and nucleotides and contain pentose sugar.
3. Lactose of milk is formed from glucose and galactose.
4. Glucose is used for the formation of fat and amino acid.
5. Carbon skeleton of monosaccharides is used in the formation of fatty acid, chitin, cellulose, etc.

## Sources of Carbohydrates

Wheat, rice, maize, sweet potato and other plant and animals are the sources of carbohydrate.

## PROTEINS

- This is a complex organic compound made up of 20 types of amino acids.
- Nitrogen is present in protein in addition to C, H and O.
- Twenty-two types of protein is necessary for human body, out of which 12 are synthesized by body itself and remaining 10 are obtained by food are called essential amino acid.
- These are the compounds of carbon (C), hydrogen (H), oxygen (O), nitrogen (N) and sulphur (S). These form 15% part of human body.
- Their main sources are groundnuts, soyabean, pulses, fish, etc.

## Functions of Proteins

1. It takes part in the formation of cells, protoplasm and tissues.
2. These are important for physical growth. Physical growth hampers by their deficiency. Lack of proteins causes Kwashiorkor and Marasmus diseases in children.
3. In case of necessity they provide energy to the body.
4. They control the development of genetic characters.
5. These are helpful in conduction also.

**Kwashiorkor:** In this disease hands and legs of children get slimmed and the stomach comes out.

**Marasmus:** In this disease muscles of children are loosened.

## FATS

- Fat is an ester of glycerol and fatty acid.
- Normally fat remains as solid at 20°C temperature, but if it is in liquid form at this temperature, this is called oil.
- 9.3 kilocalorie energy is liberated from 1 gram fat.
- These are also the compounds of carbon (C), hydrogen (H) and oxygen (O).

- Fatty acids are of two types. Saturated and Unsaturated. Saturated fatty acids are found in coconut oil and palm oil, while unsaturated fatty acids are found in fish oil and vegetable oil.
- Excess of saturated fats raises the level of blood cholesterol and may cause arteriosclerosis (hardening of arteries). This may lead to heart attack.

## 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 tasty.
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.

## ROUGHAGE

- Roughage is another term for dietary fibre, e.g., natural food, *dalia*, etc.
- Helps in retaining water in the body.

## VITAMINS

It was first invented by FG Hopkins. However, the term vitamin was coined by **C Funk**.

- They provide no calories, they only regulate chemical reactions occurring in the metabolism of the body.
  - i. **Vitamin soluble in water:** Vitamin-B and Vitamin-C.
  - ii. **Vitamin soluble in fat:** Vitamin-A, Vitamin-D, Vitamin-E and Vitamin-K.
- Cobalt is found in Vitamin-B12.
- Synthesis of vitamins cannot be done by the cells and it is fulfilled by the vitamin foods.
- However, synthesis of Vitamin-D and K takes place in our body.
- Synthesis of Vitamin-D takes place by the ultraviolet rays present in the sunlight through cholesterol (ergosterol) of skin.
- Vitamin-K is synthesized in our colon by the bacteria and from there it is absorbed.

Vitamin	Chemical Name	Solubility	Deficiency Disease	Food Sources
Vitamin A	Retinol	Fat	Night blindness	Orange, ripe, yellow fruits, leafy vegetables, carrots, pumpkin, fish, soymilk, milk
Vitamin B <sub>1</sub>	Thiamine	Water	Beriberi	Pork, oatmeal, brown rice, vegetables, potatoes, liver, eggs
Vitamin B <sub>2</sub>	Riboflavin	Water	Ariboflavinosis, Glossitis	Dairy product, bananas, popcorn, green beans
Vitamin B <sub>3</sub>	Niacin, Nicotinomide	Water	Pellagra	Meat, fish, eggs, mushrooms, seeds, nuts
Vitamin B <sub>5</sub>	Pantothenic	Water	Parestheria	Meat, broccoli, avocados
Vitamin B <sub>6</sub>	Pyridoxine	Water	Anemia	Meat, true nuts, bananas
Vitamin B <sub>7</sub>	Priotin	Water	Dematitis, enteritis	Raw egg yolk, liver, peanuts, leafy green vegetables
Vitamin B <sub>g</sub>	Folic acid	Water	Megalobastic anemia	Leafy vegetables, pasta, bread, coreal.
Vitamin B <sub>12</sub>	Cyanocobalamin	Water	Pernicious anemia	Meat, poultry, fish, eggs, milk
Vitamin C	Ascorbic acid	Water	Scurvy	Many fruits and vegetables
Vitamin D	Cholecalciferol	Fat	Rickets	Fish, eggs, liver, mushrooms
Vitamin E	Tocopherols	Fat	Sterility in males and miscarriage in females	Many fruits and vegetables, nuts and seeds
Vitamin K	Phylloquinone	Fat	Bleeding disthesis	Leafy green vegetables, egg yolks

## MINERALS

These control the metabolism of body.

- Louis Pasteur discovered the vaccine of Rabies and pasteurization of milk.

## WATER

65-75% weight of the body is water.

- ☞ **Note:** AIDS—Acquired Immunodeficiency Syndrome.

## Main Functions of Water

- Water controls the temperature of our body by sweating and vaporizing.
- It is the important way of excretion of the waste substances from the body.
- Most of the organic chemical reactions in our body are performed through hydrolysis.

**Elisa Test:** Test of HIV Virus (AIDS).

## FOOD ADULTERATION

- Indian Standards Institute (ISI) Mark and Agmark (Agricultural Marketing) are given by the Bureau of Indian Standards after testifying the purity and quality of food.

## DISEASES

### DISEASES CAUSED BY PROTOZOA:

- Diarrhoea:** The reason of this disease is the presence of internal protozoa,

## BALANCE DIET

That nutrition, in which all the important nutrients for organism are available in sufficient quantity, is called Balance Diet.

namely *Entamoeba histolytica* which is spread through houseflies.

- ii. **Filaria:** This disease is caused by *Wuchereia baoncrofti*. This is circulated by the stings of *culex* mosquitoes. This disease is also known as Elephantiasis.

## DISEASES CAUSED BY FUNGUS

- i. **Asthma:** This spore of the fungi, namely *Aspergillus fumigatus* reaches the lungs of the human and constitutes a net-like formation, thus obstructs the function of lungs. This is an infectious disease.
- ii. **Athlete's foot:** This disease is caused by the fungi namely *Tinea pedes*.
- iii. **Scabies:** This disease is caused by the fungi, namely *Acarus scabiei*.
- iv. **Baldness:** This is caused by the fungi, namely *Taenia capitis*.
- v. **Ringworm:** This disease spreads through the fungi namely *Trycophyton lericosum*. This is an infectious disease.

## SOME OTHER DISEASES

- **Paralysis or Hemiplegia:** In this disease, within a few minutes, a part of the body is paralysed. The reason of this disease is due to high blood pressure bursting of any nerve of brain or insufficient supply of blood to brain.
- **Allergy:** Itching, pimples, swelling in body, black spot, eczema, etc. are the examples of allergy.
- **Schizophrenia:** This is a mental disease which usually found in youth. Lectropathy is helpful in this disease.
- **Epilepsy:** This disease is caused by the internal disturbance of brain.
- **Diplopia:** This disease is caused by the paralysis of muscles of the eyes, in which double image is formed.
- **Bronchitis:** It is caused by the inflammation of tubes leading from the windpipe to lungs.
- **Cold:** This is a highly infectious disease and is caused by a virus, which results in bad throat, headache and watery nose.
- **Colic:** Severe pain in the abdomen caused by spasm of the internal organs usually the intestines.

- **Delirium:** It is a serious mental disturbance.
- **Hydrophobia:** A disease caused by bite of a mad dog.
- **Leukaemia:** There is a great increase in the number of white blood corpuscles in system. Swelling of spleen takes place. Death occurs within a few days.
- **Migraine:** An allergic disease in which there is a periodic attack of headache. It is an incurable disease.
- **Obesity:** Excessive fatness is called obesity.
- **Piles:** There are various veins in the rectum. Due to extra pressure in the vein, it prevents the free flow of blood, thus creating problems.
- **Rheumatism:** The symptom of this disease is fever with joints pain.
- **Atherosclerosis:** Deposition of cholesterol particles in the lumen of arteries which prevent the flow of blood is called atherosclerosis.
- **Arteriosclerosis:** Due to deposition of cholesterol and calcium salt, arteries become stiff and rigid. It loses the property of elasticity due to which the wall of arteries may get affected.
- **Uremia:** Presence of excess of urea in blood is called uremia. This is caused by malfunctioning of kidney.
- **Glycosuria:** Presence of excess of glucose in urine is known as glycosuria.
- **Arthritis:** It is a disease in which inflammation of joints takes place.
- **Osteoporosis:** It is an age dependent disorder of bone in which low bones mass and increased fragility takes place.
- **Pneumonia:** Acute inflammation of alveoli of lungs.
- **Emphysema:** It is the abnormal distension of alveoli which results in the loss of elasticity. Cigarette smoking and chronic bronchitis are two main causes.

## BIOTECHNOLOGY

- It is the use of microorganisms, their parts or processes for the manufacture of useful or commercial substances. It has two core techniques, i.e. genetic engineering and technique to facilitate the growth and multiplication of only desired microbes.

## APPLICATIONS OF BIOTECHNOLOGY

- A number of transgenic plants, medicines, acids are produced through genetic engineering.

## BT COTTON

- It was developed to reduce the heavy reliance on pesticides.

## BT BRINJAL

- It is a transgenic brinjal created by inserting a crystal protein gene (Cry IAc) from the soil bacterium *Bacillus thuringiensis* into the genome of various brinjal varieties.

## GOLDEN RICE

- Golden rice was developed as a fortified food to be used in areas, where there is a shortage of dietary vitamin A.
- Golden Rice 2** produces up to 23 times more beta-carotene than the original variety of golden rice.

## FLAVOUR SAVOUR

- By the use of antisense RNA technology, the enzyme polygalacturonase, which causes damage to pectin is deactivated and the tomato is kept afresh for longer duration.

## CANOLA

- It refers to either rapeseed or field mustard. Its seeds are used to produce edible oil suitable for consumption by humans and livestock. The oil is also suitable for use as biodiesel.
- Yoghurt** is a preserved milk product having a distinct taste and a thick texture than milk.
- Vitamin C** was the **first vitamin to be produced** by a fermentation process using *Acetobacter*, a wild bacterium.
- The fungus, *Ashbya gossypii* is **used for the microbial production of vitamin B<sub>2</sub>**.
- A biochip** is a discrete collection of gene fragments on a stamp-sized chip that can be used to screen for the presence of particular gene variants.

- Biochips can **help in identifying precise forms of cancer**.
- Gene therapy** is the treatment of disease by replacing, altering or supplementing a gene that is absent or abnormal and whose absence or abnormality is responsible for the disease.

## SOME IMPORTANT FACTS

- At the time of creation of life there was no oxygen.
- The strongest part in the body is the enamel of teeth.
- The fastest nervous speed is 532 kmph.
- The bones are as strong as concrete and as hard as granite.
- Inside the body approximately 150 lakh cells are destroyed every second.
- The weight of the kidney is approximately 150 gram.
- The blood circulation inside the body takes approximately 23 seconds.
- The antibiotic, namely penicillin is obtained from *penicillium* fungus.
- Albatross is the largest sea bird, whose spread of feather is 10-20 ft.
- 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.
- The heartbeat of a child is more than that of an adult.
- A single respiration completes in five seconds, i.e. two seconds of inspiration and three seconds of expiration.
- 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.

## Deficiency Diseases

Deficiency	Diseases	Comments
Vitamin A (retinol)	Xerophthalmia Dermatitis	Lachrimal glands stop producing tears leading to blindness.

(Vitamin B <sub>1</sub> ) Thiamine	Beri-Beri	Extreme weakness, swelling, pain in legs, loss of appetite, enlarged heart, headache and shortness of breath.
(Vitamin B <sub>2</sub> ) Riboflavin	Ariboflavinosis	Blurred vision, burning of the eye and tongue, cracking of skin at angle of mouth.
(Vitamin B <sub>3</sub> ) Niacin (Nicotinamide)	Pellagra,Glossitis	Tip and lateral margins of tongue, mouth and gums become red, swollen and develop ulcers
(Vitamin B <sub>5</sub> ) Pentothenic Acid	Achromotrichia	
Pyridoxine (Vitamin B <sub>6</sub> )	Abnormal Protein Metabolism	
(Vitamin B <sub>7</sub> ) Pantothenic Acid Biotin	Dermatitis, enteritis and anaemia	
(Vitamin B <sub>9</sub> ) Folic and Folinic Acid	Megaloblast and Birth defects	
(Vitamin B <sub>12</sub> ) Cyanocobalamin	Pernicious or Megaloblastic Anaemia	Reduction of Haemoglobin due to disturbance in the formation of RBC.
Vitamin C (Ascorbic acid)	Scurvy	Pain in joints, loss of weight, gums become spongy and bleed Teeth loose and fragile.
Vitamin D (Cholecalciferol)	Rickets Osteomalacia	Occurs in Children. Softness and deformities of bones Bones susceptible to fracture.
Vitamin E (Tocopherol)		
Vitamin K (Phylloquinone)		
Potassium	Hypokalaemia	Rise in heart beat rate Kidney damage.
Sodium	Hyponatraemia	Low blood pressure.
Proteins	Kwashiorkor	Potbelly due to retention of water by the cells (Oedema).

### Diseases caused by Microorganisms

<b>Virus</b>	<b>Bacteria</b>	<b>Protozoas</b>	<b>Fungi</b>	<b>Worms</b>
Small Pox	Sore throat	Malaria	Ringworm	Taeniasis
Chicken Pox	Diphtheria	Amoebic dysentery	Athlete's Foot	Schistosomiasis
Common Cold	Pneumonia	Trypanosomiasis	Madura Foot	Bilharziasis
Influenza/Flu	Tuberculosis	Oriental Sore	Dhobie Itch	Ancylostomiasis
Measles	Plague	Kala Azar		Hookworm
Mumps	Tetanus	Giardiasis		Ascariasis
Encephalitis	Typhoid	Diarrhoea		Enterobiasis
Poliomyelitis	Cholera	Vaginitis		Pinworm disease
Rabies	Bacillary Dysentery			Filariasis
Dengue	Whooping Cough			Elephantiasis
Herpes	Gonorrhoea			
AIDS	Leprosy Botulism			

## Hormones

Gland	Hormone	Effect
Pituitary/ Hypophysis Anterior Lobe	Growth Hormone or Somatotrophic Hormone (STH)	Growth of long bones, muscles.
	Thyroid Stimulating Hormone (TSH)	
	Adrenocorticotrophic Hormone (ACTH)	Influences the production of corticosteroids by adrenal cortex involved in defending body against physiological stress.
	Follicle-stimulating Hormone (FSH)	Growth and maturation of follicles in the ovary, production of female sex hormone estrogen and maturation of spermatozoa in males..
	Luteinizing Hormone (LH)	Stimulates interstitial cells in the testis to produce testosterone. Causes ovulation. Release of estrogen & formulation of corpus luteum in female.
	Prolactin or Luteotrophic Hormone (LH)	Helps to maintain pregnancy. Stimulate mammary glands to secrete milk.
Middle Lobe	Melanophore-stimulating Hormone (MSH)	Associated with melanophyte which gives skin its colour.
Posterior Lobe	Vasopressin or Anti-diuretic Hormone	Controls water reabsorption in the kidney tubule.
	Oxytocin	Causes uterine contractions and active expulsion of milk during and after birth.
Hypothalamus	Releasing Hormone (RH) for each anterior pituitary hormone: GH- RH, TSH-RH, ACTH-RH, FSH-RH and likewise	Production of all the anterior pituitary hormones is controlled by messages from the hypothalamus via hypophyseal portal vessels.
Thyroid	Thyroxine/Calcitonin	BMR influences heat production, Calcium level in blood.
Parathyroids	Parathormone	Raises blood calcium level.
Adrenals	Aldosterone	Regulates sodium and potassium levels in the blood to control blood pressure.
	Hydrocortisone	Plays key role in stress response; increases blood glucose levels and mobilises fat stores; reduces inflammation.
	Epinephrine or Adrenalin	Increases blood pressure, heart and metabolic rate, and blood sugar levels; dilates blood vessels. Also released during exercise
	Norepinephrine/Noradrenalin	Increases blood pressure and heart rate; constricts blood vessels.

Thymus	Thymosin	Development of white blood cells.
Pancreas	Insulin Glucagon	Controls blood sugar level. Increase the blood sugar level
Ovaries	Estrogen	Secondary sexual characteristics.
	Progesterone	Prepares Endometrium (inner lining of Uterus) and maintains it during pregnancy.





## SCIENCE AND TECHNOLOGY

# INDIAN SPACE RESEARCH ORGANISATION

- The Indian Space Research Organisation is the space agency of the Indian government headquartered in the city of Bengaluru.
- Indian Space Research Organisation (ISRO), Indian space agency, founded in 1969 to develop an independent Indian space program.
- Its chief executive is a chairman, who is also chairman of the Indian government's Space Commission and the secretary of the Department of Space.
- Development and Educational Communication Unit (DECU):** DECU at Ahmedabad is involved in the conception, definition, planning, implementation and socio-economic evaluation of innovative configuration for space applications.
- ISRO Telemetry, Tracking and Command Network (ISTRAC):** ISTRAC provides mission support to low-earth orbit satellites as well as launch vehicle missions.
- Master Control Facility:** MCF at Hassan in Karnataka and Bhopal in Madhya Pradesh monitors and controls all the geostationary satellites of ISRO.
- Liquid Propulsion System Centre (LPSC):** LPSC is the lead centre in development of liquid and cryogenic propulsion for launch vehicles and satellites.
- ISRO Inertial System Unit (IISU):** IISU at Thiruvananthapuram carries out resource and development in inertial sensors and systems.
- Physical Research Laboratory (PRL):** PRL at Ahmedabad is an autonomous institution supported mainly by DOS. It is premier institute for multi-disciplinary research in astronomy and astrophysics, earth sciences, planetary sciences, space sciences and basic science.
- National Atmospheric Research Laboratory (NARL):** NARL at Gadanki near Tirupati is an autonomous society supported by DOS. It is a premier centre for atmospheric research facilities like Mesosphere, Stratosphere, Troposphere, RADAR, LIDAR, etc.

## OTHER ORGANISATIONS

- ISRO Satellite Centre (ISAC):** ISAC at Bengaluru is the lead centre for developing satellite technology and implementation of satellite system for scientific technological and application missions.
- Satish Dhawan Space Centre (SDSC) SHAR:** SDSC SHAR is the main launch centre of ISRO and has facilities for solid propellant casting, static testing of solid motors, launch vehicles integration and launch operations, range operation comprising telemetry tracking and command network and mission control centre.
- Vikram Sarabhai Space Centre (VSSC):** VSSC at Thiruvananthapuram is the head centre for the development of satellite launch vehicles and associated technology.
- Space Applications Centre (SAC):** SAC at Ahmedabad is engaged in the development of payloads for communication, meteorological and remote-sensing satellites.

- Regional Remote-sensing Service Centres (RRSSCs):** Five RRSSCs have been established by the DOS at Bengaluru, Jodhpur, Kharagpur, Dehradun and Nagpur. RRSSCs support the various remote-sensing tasks specific to their regions as well as at the national level.
- North-Eastern Space Application Centre (NESAC):** NESAC, located at Shillong, is a joint initiative of DOS and North Eastern Council to provide development support to the North-Eastern region using space science and technology.
- National Remote-sensing Agency (NRSA):** NRSA at Hyderabad is an autonomous institution under DOS. The agency is responsible for satellite data acquisition and processing data dissemination, aerial remote-sensing and decision support for disaster management.
- Semi-conductor Laboratory (SCL):** SCL is entrusted with design and development of very large-scale integration (VLSI) devices and development of systems for telecommunications and space sectors.
- Antrix Corporation Limited:** The Antrix Corporation Limited, Bengaluru is the apex marketing agency under DOS with access to resources of DOS as well as Indian space industries.

#### List of Indian satellites

Satellite	Launch Date	Launch Vehicle	Remarks
Aryabhata	19 April 1975	u-11 Interkosmos	Active technological experience in building and operating a satellite system. India's first satellite.
Bhaskara-I	7 June 1979	C-1 Interkosmos	First experimental remote-sensing satellite. Carried TV and microwave cameras.
Rohini Technology Payload	10 August 1979	SLV-3	Intended for measuring in-flight performance of first experimental flight of SLV-3, the first Indian launch vehicle. Did not achieve orbit.
Rohini RS-1	18 July 1980	SLV-3	Used for measuring in-flight performance of second experimental launch of SLV-3. India's first indigenous satellite launch.
Rohini RS-D1	31 May 1981	SLV-3	Used for conducting some remote-sensing technology studies using a landmark sensor payload. Launched by the first developmental launch of SLV-3.
Ariane Passenger Payload Experiment	19 June 1981	Ariane-1 (V-3)	First experimental communication satellite. Provided experience in building and operating a payload experiment three-axis stabilised communication satellite.
Bhaskara-II	20 November 1981	C-1 Interkosmos	Second experimental remote-sensing satellite; similar to Bhaskara-1. Provided experience in building and operating a remote-sensing satellite system on an end-to-end basis.
INSAT-1A	10 April 1982	Delta 3910 PAM-D	First operational multipurpose communication and meteorology satellite. Procured from USA. Worked for only six months.

Satellite	Launch Date	Launch Vehicle	Remarks
Rohini RS-D2	17 April 1983	SLV-3	Identical to RS-D1. Launched by the second developmental launch of SLV-3.
INSAT-1B	30 August 1983	Shuttle [PAM-D]	Identical to INSAT-1A. Served for more than designated life of seven years.
Stretched Rohini Satellite Series (SROSS-1)	24 March 1987	ASLV	Carried payload for launch vehicle performance monitoring and for gamma.
IRS-1A	17 March 1988	Vostok	Earth observation satellite. First operational remote-sensing satellite.
Stretched Rohini Satellite Series (SROSS-2)	13 July 1988	ASLV	Carried remote-sensing payload of German Space Agency in addition to Gamma Ray astronomy payload. Did not achieve orbit.
INSAT-1C	21 July 1988	Ariane-3	Same as INSAT-1A. Served for only one-and-a-half years.
INSAT-1D	12 June 1990	Delta 4925	Identical to INSAT-1A. Still in service. A third-stage motor landed from its launch, landed in Australia in 2008.
IRS-1B	29 August 1991	Vostok	Earth observation satellite. Improved version of IRS-1A.
INSAT-2DT	26 February 1992	Ariane-44L H10	Launched as Arabsat 1C. Procured in orbit from Arabsat in January 1998.
Stretched Rohini Satellite Series (SROSS-C)	20 May 1992	ASLV	Carried gamma ray astronomy and aeronomy payload.
INSAT-2A	10 July 1992	Ariane-44L H10	First satellite in the second-generation Indian-built INSAT-2 series. Has enhanced capability over INSAT-1 series. Still in service.
INSAT-2B	23 July 1993	Ariane-44L H10+	Second satellite in INSAT-2 series. Identical to INSAT-2A. Still in service.
IRS-1E	20 September 1993	PSLV-D1	Earth observation satellite. Did not achieve orbit.
Stretched Rohini Satellite Series (SROSS-C2)	4 May 1994	ASLV	Identical to SROSS-C. Still in service.
IRS-P2	15 October 1994	PSLV-D2	Earth observation satellite. Launched by second developmental flight of PSLV. Mission accomplished after 3 years of service in 1997.
INSAT-2C	7 December 1995	Ariane-44L H10-3	Has additional capabilities, such as mobile satellite service, business communication and television outreach beyond Indian boundaries. Still in service.
IRS-1C	29 December 1995	Molniya	Earth observation satellite. Launched from Baikonur Cosmodrome.
IRS-P3	21 March 1996	PSLV-D3	Earth observation satellite. Carries remote-sensing payload and an X-ray astronomy payload. Launched by third developmental flight of PSLV.
INSAT-2D	4 June 1997	Ariane-44L H10-3	Same as INSAT-2C. Inoperable since 1997-10-04 due to power bus anomaly.

Satellite	Launch Date	Launch Vehicle	Remarks
IRS-1D	29 September 1997	PSLV-C1	Earth observation satellite. Same as IRS-1C.
INSAT-2E	3 April 1999	Ariane-42P H10-3	Multipurpose communication and meteorological satellite.
Oceansat-1 (IRS-P4)	26 May 1999	PSLV-C2	Earth observation satellite. Carries an Ocean Colour Monitor (OCM) and a Multifrequency Scanning Microwave Radiometer (MSMR).
INSAT-3B	22 March 2000	Ariane-5G	Multipurpose communication: business communication, developmental communication, and mobile communication.
GSAT-1	18 April 2001	GSLV-D1	Experimental satellite for the first developmental flight of Geosynchronous Satellite Launch Vehicle, GSLV-D1.
Technology Experiment Satellite (TES)	22 October 2001	PSLV-C3	Experimental satellite to test technologies such as attitude and orbit control system, high-torque reaction wheels, new reaction control system, etc.
INSAT-3C	24 January 2002	Ariane-42L H10-3	Designed to augment the existing INSAT capacity for communication and broadcasting and provide continuity of the services of INSAT-2C.
Kalpana-1 (METSAT)	12 September 2002	PSLV-C4	First meteorological satellite built by ISRO. Originally named METSAT. Renamed after Kalpana Chawla who perished in the Space Shuttle Columbia.
INSAT-3A	10 April 2003	Ariane-5G	Multipurpose satellite for communication, broadcasting, and meteorological services along with INSAT-2E and Kalpana-1.
GSAT-2	8 May 2003	GSLV-D2	Experimental satellite for the second developmental test flight of Geosynchronous Satellite Launch Vehicle (GSLV)
INSAT-3E	28 September 2003	Ariane-5G	Communication satellite to augment the existing INSAT System.
RESOURCESAT-1 (IRS-P6)	17 October 2003	PSLV-C5	Earth observation/remote sensing satellite. Intended to supplement and replace IRS-1C and IRS-1D.
EDUSAT	20 October 2004	GSLV-F01	Also designated GSAT-3. India's first exclusive educational satellite.
HAMSAT	5 May 2005	PSLV-C6	Microsatellite (42.5 kilograms) for providing satellite-based amateur radio services to the national as well as the international community.
CARTOSAT-1	5 May 2005	PSLV-C6	Earth observation satellite. Provides stereographic in-orbit images with a 2.5-meter resolution.
INSAT-4A	22 December 2005	Ariane-5GS	Advanced satellite for direct-to-home television broadcasting services.

Satellite	Launch Date	Launch Vehicle	Remarks
INSAT-4C	10 July 2006	GSLV-F02	Geosynchronous communications satellite. Did not achieve orbit.
CARTOSAT-2	10 January 2007	PSLV-C7	Advanced remote sensing satellite carrying a panchromatic camera capable of providing scene-specific spot images.
Space Capsule Recovery Experiment (SRE-1)	10 January 2007	PSLV-C7	Experimental satellite intended to demonstrate the technology of an orbiting platform for performing experiments in microgravity conditions. Launched as a co-passenger with CARTOSAT-2. SRE-1 was de-orbited and recovered successfully after 12 days over Bay of Bengal.
INSAT-4B	12 March 2007	Ariane-5ECA	Identical to INSAT-4A. Further augments the INSAT capacity for direct-to-home (DTH) television services and other communications. On the night of 7 July INSAT-4B experienced a power supply glitch which led to switching 'off' of 50 per cent of the transponder capacity (6 Ku and 6 C-Band transponders).
INSAT-4CR	2 September 2007	GSLV-F04	Identical to INSAT-4C. It carried 12 high-power Ku-band transponders designed to provide direct-to-home (DTH) television services, Digital Satellite News Gathering, etc.
CARTOSAT-2A	28 April 2008	PSLV-C9	Earth observation/remote sensing satellite. Identical to CARTOSAT-2.
IMS-1 (Third World Satellite-TWsat)	28 April 2008	PSLV-C9	Low-cost microsatellite imaging mission. Launched as co-passenger with CARTOSAT-2A.
Chandrayaan-1	22 October 2008	PSLV-C11	Unmanned lunar probe. Carries 11 scientific instruments built in India, USA, UK, Germany, Sweden and Bulgaria.
RISAT-2	20 April 2009	PSLV-C12	Radar imaging satellite used to monitor India's borders and as part of anti-infiltration and anti-terrorist operations. Launched as a co-passenger with ANUSAT.
ANUSAT	20 April 2009	PSLV-C12	Research microsatellite designed at Anna University. Carries an amateur radio and technology demonstration experiments.
Oceansat-2 (IRS-P4)	23 September 2009	PSLV-C14	Gathers data for oceanographic, coastal and atmospheric applications. Continues mission of Oceansat-1.
GSAT-4	15 April 2010	GSLV-D3	Communications satellite technology demonstrator. Failed to reach orbit due to GSLV-D3 failure.
CARTOSAT-2B	12 July 2010	PSLV-C15	Earth observation/remote sensing satellite. Identical to CARTOSAT-2A.

Satellite	Launch Date	Launch Vehicle	Remarks
StudSat	12 July 2010	PSLV-C15	First Indian pico-satellite (weighing less than 1 kg). Developed by a team from seven engineering colleges from Karnataka and Andhra Pradesh.
GSAT-5P/ INSAT-4D	25 December 2010	GSLV-F06	C-band communication satellite, failed to reach orbit due to GSLV-F06 failure.
RESOURCESAT-2	20 April 2011	PSLV-C16	RESOURCESAT-2, ISRO's eighteenth remote-sensing satellite, followed RESOURCESAT-1. PSLV-C16 placed three spacecraft with a total payload mass of 1404 kg-RESOURCESAT-2 weighing 1206 kg, the Indo-Russian YOUTHSAT weighing 92 kg and Singapore's X-SAT weighing 106 kg-into an 822 km polar Sun Synchronous Orbit (SSO).
Youthsat	20 April 2011	PSLV-C16	Indo-Russian stellar and atmospheric satellite with the participation of university students. It weighed 92 kg.
GSAT-8/ INSAT-4G	21 May 2011	Ariane-5VA-202	Communications satellite carries 24 Ku-band transponders and 2 channel GAGAN payload operating in L1 and L5 band.
GSAT-12	15 July 2011	PSLV-C17	GSAT-12 communication satellite built by ISRO, weighs about 1410 kg at lift-off. GSAT-12 is configured to carry 12 Extended C-band transponders to meet the country's growing demand for transponders in a short turn-around-time. The 12 Extended C-band transponders of GSAT-12 will augment the capacity in the INSAT system for various communication services like Tele-education, Telemedicine and for Village Resource Centres (VRC). Mission life about 8 years.
Megha-Tropiques	12 October 2011	PSLV-C18	Megha-Tropiques weighs about 1000 kg Lift-off Mass, developed jointly by ISRO and the French Centre National d'Études Spatiales (CNES). 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.
Jugnu	12 October 2011	PSLV-C18	Nano-satellite weighing 3 kg developed by IIT Kanpur.
RISAT-1	26 April 2012	PSLV-C19	RISAT-1, first indigenous all-weather Radar Imaging Satellite (RISAT-1), whose images will facilitate agriculture and disaster management weighs about 1858kg.
SRMSAT	26 April 2012	PSLV-C18	Nano-satellite weighing 10.9 kg developed by SRM University.

Satellite	Launch Date	Launch Vehicle	Remarks
GSAT-10	29 September 2012	Ariane-5VA-209	GSAT-10, India's advanced communication satellite, is a high power satellite being inducted into the INSAT system. Weighing 3400 kg at lift-off.
SARAL	25 February 2013	PSLV-C20	SARAL, The Satellite with ARGOS and ALTIKA (SARAL) is a joint Indo-French satellite mission for oceanographic studies.
IRNSS-1A	1 July 2013	PSLV-C22	IRNSS-1A is the first satellite in the Indian Regional Navigation Satellite System (IRNSS). It is one of the seven spacecraft constituting the IRNSS space segment.
INSAT-3D	26 July 2013	Ariane-5	INSAT-3D is the meteorological Satellite with advanced weather monitoring payloads.
GSAT-7	30 August 2013	Ariane-5	GSAT-7 is the advanced multi-band communication satellite dedicated for military use.
Mars Orbiter Mission (MOM)	5 November 2013	PSLV-C25	The Mars Orbiter Mission (MOM), informally called Mangalyaan is India's first Mars orbiter.
GSAT-14	5 January 2014	GSLV-D5	GSAT-14 is the twenty third geostationary communication satellite of India to augment the In-orbit capacity of Extended C and Ku-band transponders.
IRNSS-1B	4 April 2014	PSLV-C24	IRNSS-1B is the second satellite in the Indian Regional Navigation Satellite System (IRNSS).
IRNSS-1C	10 November 2014	PSLV-C26	IRNSS-1C is the third satellite in the Indian Regional Navigation Satellite System (IRNSS).
GSAT-16	7 December 2014	Ariane-5	GSAT-16 is twenty fourth communication satellite of India configured to carry a total of 48 communication transponders.
IRNSS-1D	28 March 2015	PSLV-C27	IRNSS-1D is the fourth satellite in the Indian Regional Navigation Satellite System (IRNSS).
GSAT-6	27 August 2015	GSLV-D6	GSAT-6 is a communication satellite. GSAT-6 features an unfurlable antenna, largest on board any satellite. Launch of GSLV-D6 also marks the success of indigenously developed upper stage cryogenic engine.
Astrosat	28 September 2015	PSLV-C30	ASTROSAT is India's first dedicated multi wavelength space Observatory.
GSAT-15	11 November 2015	Ariane 5 VA-227	Communications satellite, carries communication transponders in Ku-band and a GPS Aided GEO Augmented Navigation (GAGAN) payload operating in L1 and L5 bands. Weight 3164 kg.

Satellite	Launch Date	Launch Vehicle	Remarks
IRNSS-1E	20 January 2016	PSLV-C31	IRNSS-1E is the fifth satellite in the Indian Regional Navigation satellite system.
IRNSS-1F	10 March 2016	PSLV-C32	IRNSS-1F is the sixth satellite in the Indian Regional Navigation Satellite system.
IRNSS-1G	28 April 2016	PSLV-C33	IRNSS-1G is the seventh and final satellite in the Indian Regional Navigation System.
Cartosat-2C	22 June 2016	PSLV-C34	Earth observation/remote sensing satellite.
Satyabamasat	22 June 2016	PSLV-34	A micro-satellite designed and built by the students of Sataybhama University Chennai, India. This satellite will collect data on green house gases.
Swayam-1	22 June 2016	PSLV-C34	A-1-U Pico Satellite designed and built by the students of college of Engineering, Pune. This satellite provides Point-to-Point communication for HAM Community. A second version of the satellite is now being planned.
INSAT-3DR	28 August 2016	GSLV-F05	An advanced metrological satellite of India configured with an imaging system and an Atmospheric sounder.
Pratham	26 September 2016	PSLV-C35	A mini satellite built by students and researchers at IIT Mumbai to study electrical characteristics of the earth's atmosphere.
PI Sat	September 26, 2016	PSLV-C35	A micro satellite designed and built by the students of PES Institute of Technology, Bengaluru at their crucible of research and innovation Laboratory to develop remote sensing applications.
Scat Sat-1	26 September 2016	PSLV-C35	Miniature Satellite to provide weather forecasting, Cyclone Prediction, and tracking services to India.
GSAT-18	5 October 2016	Ariane-5ECA	At 3-4 tones, this was the heaviest satellite being owned/operated by India at the time of its launch.
Resource Sat-2A	7 December 2016	PSLV-C36	Its mission is identical to its predecessors (Resource Sat-1 and Resource Sat-2).
Carto Sat-2D	15 February 2017	PSLV-C37	ISRO holds the world record for launching the highest number of satellites by a single launch vehicle (104 satellite).
INSAT-1A	15 February 2017	PSLV-C37	This is one of the two nano-satellites designed and manufactured by SAC, ISRO as part of the constellation of 104 satellites launched in a single go.
INSAT-1B	15 February 2017	PSLV-C37	This is one of the two nano-satellites designed and manufactured by SAC, ISRO are part of the constellation of 104 satellites launched in a single go.

Satellite	Launch Date	Launch Vehicle	Remarks
GSAT-9	5 May 2017	GSLV-F09	This satellite is being offered by India as a diplomatic initiative to its neighbouring countries (SAARC Region) for communication, remote sensing resource mapping and disaster management applications.
GSA-19	5 June 2017	GSLVMK-III-D1	Maiden orbital flight of GSLV MK-III. This is the heaviest rocket to be launched by ISRO from Indian soil.
Cartosat-2E	23 June 2017	PSLV-C38	This is the 7th satellite on the carto Sat Series of earth observation satellite by ISRO from Indian soil.
NIV Sat	23 June 2017	PSLV-C38	This is a Satellite designed for remote sensing application, and built by the students of Noorul Islam University, Kanyakumari.
GSAT-17	29 June 2017		This is India's heaviest satellite till date.

### Research Centres of ICAR

ICAR Research Centre	Location	Year of Estb.	Objective
National Research Centre for Grapes	Pune	1977	To undertake the programmes involving basic and strategic research for resolving the major biotic and abiotic constraints affecting the grapes production, productivity and sustain productivity and promote diversification to wine production and other value added products.
National Camel Research Centre	Rajasthan	1984	To carry out basic and applied research on camel production and health as influenced by different farming practices, etc.
National Research Centre on Equines	Rajasthan	1985	To improve and conserve Marwari Horses and also to produce French male donkeys for improving indigenous donkeys and mule production.
National Research Centre For Citrus	Nagpur	1985	To undertake basic and applied research to develop technologies for improvement and increased productivity in citrus, etc.
National Research Centre on Plant Biotechnology	New Delhi	1985	To undertake research, teaching and training personnel in the modern areas of Molecular Biology and Biotechnology.
National Research Institute on Mithun	Nagaland	1988	Identification, evaluation and characterization of mithun germplasm available in the country.

ICAR Research Centre	Location	Year of Estb.	Objective
National Centre for Integrated Pest Management (NCIPM)	New Delhi	1988	To cater to the emerging plant protection needs of different agro-ecological zones of the country.
National Research Centre for Agroforestry	Uttar Pradesh	1988	To undertake basic and applied research for developing and delivering technologies based on sustainable agroforestry practices on farms, marginal and wastelands for different agroclimatic zones in India, etc.
National Research Centre on Yak	West Kemang	1989	To establish a small herd of pure yaks to carry out observations on performances under range and semi-range systems of management, to conduct research on improvement of yak and its products through selection and breeding with exotic frozen semen, etc.
National Centre for Agricultural Economics and Policy Research (NCAP)	New Delhi	1991	To strengthen agricultural economics research through integration of economics input in planning, designing, and evaluation of agricultural research programs and enhancing the competence in agricultural policy analysis within the National Agricultural Research System.
National Research Centre for Banana	Tamil Nadu	1993	To undertake basic and strategic research for developing technologies to enhance productivity and utilization of Banana.
National Research Centre on Orchids	Sikkim	1996	To collect, conserve, characterise and evaluate germplasm and develop national repository of orchids and bulbous flowering plants, etc.
National Research Centre on Meat	Hyderabad	1999	To conduct basic and applied research in the frontier areas of meat science and technology and to develop human resource for the fast-growing meat sector.
National Research Centre on Seed species	Ajmer	2000	To conduct basic and strategic research to enhance production, productivity and quality of seed species with special reference to export and domestic demand, etc.
National Research Centre on Pomegranate	Maharashtra	2005	To develop suitable varieties with high yield potential and quality fruits having resistance to biotic and abiotic stresses.

ICAR Research Centre	Location	Year of Estb.	Objective
National Research Centre on Pig	Assam	-	To bring in excellence in pig production, health and product processing through innovative research in order to provide technology backstopping for enhanced pork production, employment generation and poverty reduction among socially and economically weaker sections through the medium of pig husbandry.

### Nuclear Research Centres in India

Nuclear Research Centre	Location	Year of Estb.	Objective
Physical Research Laboratory (PRL)	Ahmedabad	1947	To provide services such as networking, email, printing, back-up and maintaining computational environment for scientific and engineering research.
Atomic Minerals Directorate for Exploration and Research	Hyderabad	1948	To carry out geological exploration and discover mineral deposits required for nuclear power programme of India.
Atomic Energy Commission (AEC)	Mumbai	1948	To continue services to the country's needs for the peaceful uses Atomic Energy.
Saha Institute of Nuclear Physics	Kolkata	1949	To conduct and foster excellent and interesting interdisciplinary research of significant utility.
National Chemical Laboratory (NCL)	Pune, Maharashtra	1950	To design new solid catalysts for chemical transformations with high conversion and selectivity for petrochemicals, selected high value fine chemicals and organic intermediates, develop catalysts for pollution abatement, etc.
India Rare Earths Limited	Alwaye (Kerala)	1950	To become nationally and globally competitive player in beach sand minerals and to achieve annual production of ilmenite with associate minerals of 8 lakh tons by the year 2012, etc, to improve productivity, capacity utilisation, and cost effectiveness, etc.
Central Mining Research Institution	Dhanbad, Bihar	1956	To carry out the work of research and development in the area of mining and allied subjects.
Bhabha Atomic Research Centre	Trombay (Mumbai)	1957	To fulfill its mandate of indigenous nuclear power programme and various other applications of nuclear energy, etc.
Central Mechanical Engineering Research Institute	Durgpur, West Bengal	1958	To provide assistance to mechanical engineering industries in the form of feasibility studies, research, training, consultancy etc. for import substitution & export.

Nuclear Research Centre	Location	Year of Estb.	Objective
High Altitude Research Laboratory	Gulmarg, Kashmir	1963	To provide the scientific community of the country a self contained high altitude/high-latitude laboratory for scientific research.
Electronics Corporation of India	Hyderabad	1967	To continue services to the country's needs for the peaceful uses of Atomic Energy. Special and Strategic requirements of Defence and Space, Electronics Security Systems and Support for Civil Aviation sector.
Uranium Corporation of India	Jadugoda	1967	Mining and processing of uranium ore to produce uranium concentrate.
Radio Astronomy Centre	Tamil Nadu	1968	To provide stimulating environment for the front-line research in radio astronomy and astrophysics.
Nuclear Fuel Complex	Hyderabad	1971	To identify strenuous jobs and awkward postures during work causing musculoskeletal problems in various plants and suggest remedial measures.
Indira Gandhi Centre for Atomic Research	Tamil Nadu	1971	To conduct broad based multidisciplinary programme of scientific research and advanced Engineering, directed towards the development of sodium-cooled Fast Breeder Reactor [FBR] technology.
Variable Energy Cyclotron Centre	Mumbai	1977	Development around the accelerator technology and research in the fields of accelerator physics, nuclear physics, quark-gluon plasma, theoretical physics, material sciences, chemistry, isotope production, etc.
Centre of Earth Science's Studies	Trivandrum (Kerala)	1978	To promote and establish modern scientific and technological research and development studies of importance to India and to Kerala in particular, in the field of Earth Sciences, etc.

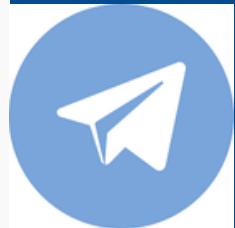
### Nanotechnology Research Centres in India

Nanotechnology Research Centre	Location	Year of Estb.	Objective
Indian Association for the Cultivation of Sciences (IACS)	Kolkata	1876	To foster high-quality fundamental research in frontier disciplines of the basic sciences.
National Centre for Biological Sciences	Karnataka	1892	To conduct fundamental research in the frontier areas of biology.
Institute of Fundamental Research	Mumbai	1945	To conduct research primarily in natural sciences, mathematics and theoretical computer science.
National Physics Laboratories	New Delhi	1947	To maintain standards of SI units in India and calibrates the national standards of weights and measures.

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Nanotechnology Research Centre	Location	Year of Estb.	Objective
Raman Research Institute	Bengaluru	1948	To conduct research in Astronomy, Astrophysics, Liquid Crystals, Theoretical Physics, Optics.
Saha Institute of Nuclear Physics	Kolkata	1949	Basic research and training in physical and biophysical sciences.
National Chemical Laboratories	Pune	1950	To conduct research, development and consultancy services in the related field of science.
National Metallurgical Laboratory	Jamshedpur	1950	Progressive enhancement of its resources, generation and acquisition of 'Intellectual Property Assets' and strives to maximise the business of R&D meeting the customer requirements through maintenance of sustainable growth.
Central Electronics Research Institute	Rajasthan	1953	Advanced research and development in Electronics.
Bhabha Atomic Research Centre	Mumbai	1954	To fulfill its mandate of indigenous nuclear power programme and various other applications of nuclear energy, etc.
Central Scientific Instruments Organisation	Chandigarh	1959	Promotion, guidance and coordination of scientific and industrial research in India including other institutions and financing the specific research activities.
Regional Research Laboratories	Thiruvananthapuram	1961	To undertake externally funded projects and offers know-how, feasibility reports, analysis and testing facilities, consultancy and technical information services and human resource development in its various R&D Divisions.
Solid State Physics Laboratory	Delhi	1962	Research in the field of Solid State Materials, Devices and Sub-systems.
Defence Research and Development Establishment (DRDE)	Gwalior	1973	Research and development of detection and protection against toxic chemical and biological agent.
Central Glass and Ceramic Research Institute	Kolkata	1977	To provide scientific industrial research and development in the area of glass, ceramics and related materials that maximizes the economic, environmental and societal benefit for the people of India.
S.N. Bose National Centre for Basic Sciences (DST)	Kolkata	1986	To foster, encourage and promote the growth of advanced studies in selected branches of basic sciences, etc.
Centre of Materials for Electronics Technology	Pune	1990	To establish technology strength in electronics materials for the present and future industrial requirement.

### Health and Medicinal Research Centres In India

Health and Medicinal Research Centre	Location	Year of Estb.	Objective
Indian Veterinary Research Institute	Mukteshwar (H.P.), Izzatnagar (U.P.)	1889	To conduct research, provide postgraduate education and transfer of the technology in all areas of animal sciences with emphasis on animal health and production, etc.
Haffkine Institute	Mumbai	1899	To support the Learning Community, Faculty, Researchers and Scientists in their day-to-day information needs, to collect, process, organize and disseminate the scientific information in print and other media in the field of Biomedicine and allied subjects, etc.
King Institute of Preventive Medicine	Guindy (Chennai)	1899	To revive the manufacturing unit according to GMP norms utilising it as a common facility for the production of anti-snake venom, cholera and typhoid vaccine, etc.
Indian Council of Medical Research	New Delhi	1911	To augment the national capability strengthening of the institutions involved in both basic and clinical sciences in the country, etc.
National Institute of Nutrition	Hyderabad	1918	To study the health-related nutrition and food hygiene problems and to train nutrition and food hygiene specialists.
School of Tropical Medicine	Kolkata	1921	To provide research modules in the field of medicine in tropical and developing countries.
All India Institute of Hygiene & Public Health	Kolkata	1932	To deliver integrated occupational health care programme by conducting short-term certificate course in occupational health and safety for the medical/non-medical personnel attached to different industries, research studies in the field of occupational health and safety, etc.
Vallabh Bhai Patel Chest Institute	Delhi	1949	To conduct research on basic and clinical aspects of chest medicine, to train postgraduates in pulmonary medicine and allied subjects, to develop new diagnostic technology and disseminate scientific knowledge related to chest medicine.
Indian Cancer Research Center	Mumbai	1952	To carry out mission-oriented research and development on cancers prevalent in the Indian subcontinent, and where there are internationally competitive opportunities, will use state-of-the-art technology.
Central Leprosy Training and Research Institute	Chingelpet	1955	To provide diagnostic treatment and referral services to leprosy patients, training aspects of leprosy and its control.

Health and Medicinal Research Centre	Location	Year of Estb.	Objective
National Tuberculosis Institute	Bengaluru	1959	To develop a nationally applicable tuberculosis control programme on a community basis and to train the key personnel to execute this programme in the states.
P.G.I. Medical Education and Research	Chandigarh	1962	To provide high-quality patient care, to attain self-sufficiency in postgraduate medical education and to meet the country's need for highly qualified medical teachers in all medical and surgical fields, etc.
National Institute of Communicable Diseases	Delhi	1963	To provide training, service and operational research in the field of communicable diseases and their prevention and control in the country.
National Institute of Occupational Health	Ahmedabad	1969	Epidemiological and environmental monitoring and corollary toxicological studies in hazardous occupations for recognition and evaluation of risk factors, development of tools for early diagnosis of health impairment and design of appropriate intervention measures for the prevention of hazards at workplaces, etc.
All India Malaria Research Institute	New Delhi	1977	To find short-term as well as long-term solutions to the problems of malaria through basic, applied and operational field research.
Indian institute of health management research	Jaipur	1984	Organisation and management of health system based on primary health care with particular emphasis on district health system in urban and rural areas.
Institute of Ayurvedic Studies and Research	Jamnagar (Gujarat)	2006-07	To establish a quality Ayurveda Institute for providing value added and globally relevant education based on eternal human values.

### Agricultural Research Centres In India

Agricultural Research Centre	Abbr.	Location	Year of Estb.	Objective
Indian Agricultural Research Institute	IARI	New Delhi	1905	Agriculture research, education, extension and information.
Sugarcane Breeding Institute	SBI	Tamil Nadu	1912	To evolve superior varieties of sugarcane suitable for various agroclimatic zones in India.
National Dairy Research Institute	NDRI	Haryana	1923	To enhance animal productivity and also to develop cost-effective technologies for the benefit of the teeming millions.

Agricultural Research Centre	Abbr.	Location	Year of Estb.	Objective
Central Institute for Research on Goats	CIRG	Uttar Pradesh	1929	To plan, undertake, aid, promote and co-ordinate education, research and its application in agriculture, agroforestry, animal husbandry, fisheries, home science and allied sciences.
Central Inland Fisheries Research Institute	CIFRI	West Bengal	1947	To conduct investigations for a proper appraisal of inland fisheries resources of the country and to evolve suitable methods for their conservation and optimum utilisation.
National Botanical Research Institute	NBRI	Uttar Pradesh Found as the National Botanic Gardens in 1948		Creation of website on 'Plants and Pollution' with regional language interface for easy accession of information, To document information in the form of database, newsletters, reports, To generate and disseminate information on "Plants and Pollution", To respond to the user queries on the subject, To co-ordinate with the focal point for supplying relevant and adequate information to end-users.
Central Institute of Freshwater Aquaculture	CIFA	Odisha	1949	To conduct investigations for a proper appraisal of inland fisheries resources of the country and to evolve suitable methods for their conservation and optimum utilisation.
Central Food Technological Research Institute	CFTRI	Mysore	1950	Employment generation, Food processing, Rural Development.
Central Arid Zone Research Institute	CAZRI	Rajasthan	1952	To find ways to stabilising shifting sand dunes, establishing silipastoral and firewood plantations, planting windbreaks to reduce wind speed and subsequent erosion, rehabilitating degraded forests and starting afforestation of barren hill slopes.
Directorate of Wheat Research	DWR	Haryana	1966	Organise, evolve, coordinate and supervise research to develop and identify superior and high-yielding varieties.

Agricultural Research Centre	Abbr.	Location	Year of Estb.	Objective
Central Plantation Crops Research Institute	CPCRI	Kerala	1970	To develop appropriate production, protection and processing technologies for coconut, arecanut and cocoa through basic and applied research, etc.
Central Institute for Cotton Research	CICR	Maharashtra	1976	To characterise the bio-physical and socio-economic factors under the selected area of that Agro Ecological sub-region. To identify the agro-economic constraints in rainfed cotton based production system.
National Academy of Agricultural Research Management	NAARM	Andra Pradesh	1976	To build the capacity of India's National Agricultural Research System in Research Management by providing online, non-formal, free and interactive learning opportunities.
Central Institute of Agricultural Engineering	CIAE	Bhopal	1976	To develop appropriate equipment and processes for modernisation of agriculture utilising animate and mechanical power sources, To develop technology for reducing post harvest losses and add value to agro-produce through processing.
National Bureau of Plant Genetic Resources	NBPGR	New Delhi	1976	To plan, organize, conduct and coordinate exploration and collection of indigenous and exotic plant genetic resources, To undertake introduction, exchange and quarantine of plant genetic resources, etc.
National Bureau of Plant Genetic Resources	NBPGR	New Delhi	1976	To serve and promote the scientific cause and advance academic interests in the field of plant genetic resources, both in India and abroad.
Indian Agricultural Statistics Research Institute	IASRI	New Delhi	estb. as full-fledged national institute of ICAR in 1978	To provide statistical methodology for national agricultural statistics system of the country for generating crop statistics and livestock statistics.

Agricultural Research Centre	Abbr.	Location	Year of Estb.	Objective
Indian Institute of Forest Management	IIFM	Bhopal	1982	To fulfill the growing need for managerial human resource in forest and allied sectors. IIFM has developed as an educational, research, training and consultancy organisation and is gradually acquiring an internationally visible name.
National Bureau of Animal Genetic Resources	NBAGR	Haryana	1984	To conduct systematic surveys to characterise, evaluate and catalogue farm livestock and poultry genetic resources and to establish their National Data Base, etc.
National Institute of Agricultural Extension Management	MANAGE	Hyderabad	1987	To develop systematic linkages between state, regional, national and international institutions of outstanding accomplishments in the field of Agricultural Extension Management.
Central Institute of Brackishwater Acquaculture	CIBA	Chennai	1987	To conduct research for development of technoeconomically viable and sustainable culture systems for finfish and shellfish in brackishwater.
Directorate of Water Management	DWM	Bhubaneswar	1988	To develop improved water management technologies for sustainable agricultural production and disseminate it amongst researchers, government functionaries, NGOs and farmers.
National Institute of Agricultural Marketing	NIAM	Rajasthan	1988	To undertake and study of applied and operational research in problem areas of agricultural marketing. To impart training, to various levels of functionaries involved in agricultural marketing activities. To offer consultancy services to the State and Central Departments, Public Sector Undertakings, Cooperatives, etc; in formulation of Projects, preparing Master Plans for States, Export Institutions, Traders and Farmers.

Agricultural Research Centre	Abbr.	Location	Year of Estb.	Objective
National Centre for Agricultural Economics and Policy Research	NCAP	New Delhi	1991	Enhance the availability of reliable household, individual and field specific, high frequency, time series data in selected villages and meso-level.
Directorate of Maize Research	DMR	New Delhi	1994	To carry out basic, strategic and applied research aimed at enhancement of production and productivity of maize crop in the country, etc.

### Institute of Science and Technology

Institution	Headquarters
Indian Association for the Cultivation of Science	Kolkata
Indian Institute of Tropical Meteorology	Pune
Indian Astro-physics Institute	Bengaluru
Jawahar Lal Nehru Developed Scientific Research Centre	Bengaluru
Indian Institute of Geomagnetism	Mumbai
Indian Science Academy	Bengaluru
Indian National Science Academy	New Delhi
Indian Science Congress Association	Kolkata
Indian National Engineering Academy	New Delhi
Indian National Oceanic Information Service Centre	Hyderabad
Indian Oceanic Technical Institute	Chennai
National Antarctic and Ocean Research Centre	Goa
National Biological Science Centre	Bengaluru
National Institute of Reservation	New Delhi

Institution	Headquarters
Centre of National Cell Science	Pune
Centre of National Mental Research	Manesar
National Plant-Genome Research Centre	New Delhi
National Earthquake Science Data Centre	New Delhi
Indian Science Academy	Allahabad
Survey Training Institute	Hyderabad (with the help of U.N.D.P.)
Bose Institute	Kolkata
Agarkar Research Institute	Pune
Sri Chitra Triunial Medical Science and Technical Institute	Thiruvananthapuram
Wadia Institute of Himalayan Geology	Dehradun
N.N. Bose National Fundamental Science Centre	Kolkata
Birbal Sahani Institute of Paleo-botany	Lucknow
Technology Information, Forecasting and Assessment Council	New Delhi
Science Expansion (Vigyan Prasar)	New Delhi
Liquid Crystal Research Institute	Bengaluru

Institution	Headquarters	Institution	Headquarters
Aryabhatta Research Observatory	Nainital	D.N.A. Finger Print and Centre	Hyderabad
Directorate of Atomic Mineral Investigation and Research	Hyderabad	Biotic Resources and Continuous Development Centre	Imphal
Indian Uranium Corporation Ltd.	Jaduguda	Life Science Institute	Bhubaneshwar
Heavy Water Board	Mumbai	Physical Research Laboratory	Ahmedabad (Gujarat)
Nuclear Fuel Campus	Hyderabad	S.V. National Technical Institute	Surat
Bhabha Atomic Research Centre	Mumbai	Saha Nuclear Physics Institute	Kolkata (West Bengal)
Shri Ram Institute of Chemical Research	New Delhi	Cosmic Rays Research Institute	Gauribidanow
Institute for Plasma Research (I.P.R.)	Ahmedabad	Shri Ram Chennai Research Institute	New Delhi
Harish Chand Research Institute	Chennai	Tata Institute of Fundamental Research	Mumbai
Physics Institute	Bhubaneshwar	Centre for Marine Living Resources and Ecology	Kocchi
Variable Energy Cyclotron Centre	Kolkata	Institute of Mathematical Science	Chennai
Department of Atomic Energy	Mumbai	Institute of Physics	Bhubaneshwar
Project Directorate, Integrated Coastal and Sea Coast Management	Chennai	National Biology Centre	Bengaluru
Sea-biotic Resources and Ecology Centre	Cochin	Uranium Corporation of India Ltd.	Jaduguda (Jharkhand)
Hindustan Zinc Limited	Udaipur	Vishveshraiya National Technical Institute	Nagpur

### Nuclear Power Plants in India

Powerstation	Operator	State	Type	Units	Total capacity (MW)
Kaiga	NPCIL	Karnataka	PHWR	220 × 4	880
Kakrapar	NPCIL	Gujarat	PHWR	220 × 2	440
Madras (Kalpakkam)	NPCIL	Tamil Nadu	PHWR	220 × 2	440
Narora	NPCIL	Uttar Pradesh	PHWR	220 × 2	440
Kota	NPCIL	Rajasthan	PHWR	100 × 1 200 × 1 220 × 4	1180
Tarapur	NPCIL	Maharashtra	BWR PHWR	160 × 2 540 × 2	1440
Kudankulam	NPCIL	Tamil Nadu	VVER-1000	1000 × 1	1000
			<b>Total</b>	<b>21</b>	<b>5780</b>

# INFORMATION TECHNOLOGY

- Information is data processed for some purpose. Information can only be considered to be 'real' info if it meets certain criteria i.e.
  1. It must be communicated to the recipient.
  2. It must be in a language that is understood.
  3. It must be in a suitable form.
  4. It must be relevant for achieving some purpose.

## COMPUTERS

- 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.
- Blaise Pascal had developed the first mechanical calculator in 1642 AD, which is called 'Pascalene'.
- 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 programme goes to Lady Ada Augusta, a student of Babbage.
- Howard Eskin developed the first Mechanical Computer 'Mark-I' in 'ENIAC-I' in 1946.

## GENERATIONS OF COMPUTERS BASED ON HARDWARE

- Computers may be classified into a number of generations.
- The classification may be based on the hardware technology used in building a computer or based on its application software used.

### FIRST-GENERATION COMPUTERS (1945-55)

- The first generation of computers started with ENIAC.
- It was then followed by the IBM UNIVAC I (Universal Automatic Computer) built by Mauchly and Eckert in 1951.
- This machine could perform business data processing.
- The first-generation computers used vacuum tubes. Because of vacuum tubes, the first-generation computers were very large, required lot of energy, slow in input/output, and suffered with heat and maintenance problems.
- Further, the vacuum tubes needed to be replaced often as they had short life-span.

### SECOND-GENERATION COMPUTERS (1955-64)

- To overcome difficulties faced in the first generation computers due to the use of vacuum tubes, transistors were used in the second generation computers.
- Transistor is a small component made of semiconductor material. With transistors, the problem of heat was minimized and computers size was reduced.
- The computers now could perform operations comparatively faster.
- The storage capacity was also improved. Instead of working with machine language now the machine could work with higher level languages such as ALGOL and FORTTRAN.

### THIRD-GENERATION COMPUTERS (1964-75)

- The third-generation computers used the integrated circuits (IC).

- Jack Kilby developed the concept of integrated circuit in 1958.
- It was an important invention in the computer field. The first IC was invented and used in 1961.
- The size of an IC is about  $\frac{1}{4}$  square inch. A single IC chip may contain thousands of transistors.
- The computer became smaller in size, faster, more reliable and less expensive. The examples of third generation computers are IBM 370, IBM System/360, UNIVAC 1108 and UNIVAC AC 9000 etc.

## FOURTH-GENERATION COMPUTERS (1975-PRESENT)

- The fourth-generation computers started with the invention of Microprocessor. The Microprocessor contains thousands of ICs.
- Ted Hoff produced the first microprocessor in 1971 for Intel.
- It was known as Intel 4004. The technology of integrated circuits improved rapidly.
- The LSI (Large Scale Integration) circuit and VLSI (Very Large Scale Integration) circuit was designed.
- It greatly reduced the size of computer.
- The size of modern Microprocessors is usually one square inch. It can contain millions of electronic circuits.
- The examples of fourth generation computers are Apple Macintosh & IBM PC.

## FIFTH-GENERATION COMPUTERS (PRESENT AND BEYOND)

- Scientists are working hard on the 5th-generation computers with quite a few breakthroughs.
- It is based on the technique of Artificial Intelligence (AI).
- Computers can understand spoken words and imitate human reasoning. It can respond to its surroundings using different types of sensors.
- Scientists are constantly working to increase the processing power of computers. They are trying to create a computer with real IQ with the help of advanced programming and technologies.

- IBM Watson computer is one example that outsmarts Harvard University Students.
- The advancement in modern technologies will revolutionise the computer in future.

## CLASSIFICATION OF COMPUTERS

Computers are classified into three broad categories based upon-type, purpose, capacity.

### TYPES

1. **Analog Computers:** These are measuring devices that work on volatile data, e.g., heat, pressure, humidity, speed, etc. For example thermometers, barometers, speedometers. These are sensitive to the slightest changes.
2. **Digital Computers:** Deal with numbers; can be used to manipulate data with great accuracy. Take input and give output. Can store large quantities of data, e.g., All electronic computers, calculators, quartz watches, etc.
3. **Hybrid Computers:** Mixture of analog and digital computers. Input is generally in the analog form like heat/pressure, etc. measured by analog part of computer and then used by digital part for further operations, e.g., computers used in factories for controlling manufacturing processes, launching a rocket, etc.

### PURPOSE

1. **General-purpose Computers:** Capable of handling many kinds of operations. Used for both business and scientific applications with equal efficiency. Can be used at any place like offices, banks, schools, etc.
2. **Special-purpose Computers:** Designed to perform specific task and cannot be used for other purposes. e.g., Monitor patient's health in hospitals, in airports to monitor arrival/departure of flights, etc.

### CAPACITY

1. **Micro Computer:** Computers used by individuals and hence are also called Personal Computers or PCs.

2. **Mini computer:** This type of computers are comparatively larger and are also 5 to 50 times powerful than that of a Micro Computer.
3. **Main Frame Computer:** These are large-sized computers. These are generally used for scientific and research-based projects.
4. **Super Computer:** These are much more powerful in terms of their storage capacity, efficiency and output ratio. These are the most efficient and fastest computers.
5. **Quantum Computer:** This stage of computers is still in its development phase.

#### Some Important Facts Related to Computers

- 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.
- Bangalore (now Bengaluru) is also known as the Silicon Valley of India.
- First Indian Newspaper to be available on Internet is *The Hindu*.
- First Indian magazine to be available on Internet is *India Today*.
- First Indian political party which has created its website on Internet is 'Bharatiya Janata Party (BJP)'.
- First Super Computer of the world is CRAY K-1-S, developed by Cray K Company of USA.
- Most popular Operating System in the world is WINDOWS.
- First book on Personal Computer was written by Ted Nelson.
- The book written by Ted Nelson – 'Soul of New Machine' – won the Pulitzer prize.
- First home computer is Commodore VIC/20.
- First Practical Digital computer is UNIVAC.
- FORTRAN is the first programming Language.
- PROLOG is the language of the fifth generation of computer.
- J.S. Kilby 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.
- National Aeronautics Laboratories, Bangalore was the first in India to develop a Super Computer named FLO SOLVER.
- Laser Printers are the fastest printers.
- Computer virus is a man-made digital parasite, which corrupts the file and known as 'File corrupter'.
- Modem is a device which connects the computers and works based on telephone lines.
- The development of computer started in India since 1955.
- Vellanad of Thiruvananthapuram district in Kerala has been declared the first fully computerised village of India.

#### SOFTWARE

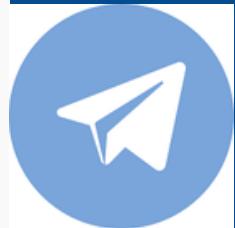
- Software relates to set of programs.
  - Applications programs are programs that permit the computer to be used as a tool for some specific tasks.
  - A common term used for special text editors is the Data Base Management System (DBMS).
  - The most important system's programme is an operating system.
  - Operating systems help users interact with the computer.
  - Example: Unix, Ms DOS, Linux.
- The computer software is classified into two broad categories:

- (a) **Application Software:** Also known as application packages. This is a set of one or more programmes that are developed or written to do a specific job, e.g., an application package of a company to process its sales data and to generate various sales reports.
- (b) **System Software:** Set of one or more programmes which are developed to control the operation of the computer system. These programmes do not solve specific problems but they are general programs which help the user in the use of the computer system.

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## FIRMWARE

- Firmware is the technology which has the combination of both hardware and software, e.g., BIOS (Basic Input/Output System).

## LIVEWARE

- At times, the users working on the system are termed as 'Liveware'.

## HARDWARE

- A computer has three main units: 1. Input unit, 2. Processing unit and 3. Output unit. These are the physical units of a computer system. These units constitute the hardware of a computer.
- The computer has its own internal 'language'.
- The computer is essentially made of electronic components. All these components are capable of generating any one of the two states, either a low (or a 0 volt) or a high (say 5 volts).
- It is difficult to talk always in terms of currents and voltages to represent information. Therefore, computer scientists use a special convention. A high is symbolically represented by a '1' and a low is represented by a '0'. The 1s and 0s are known as binary digits, or in short '**bits**' (the term 'binary' refers to something that has two parts).
- Computers always work with bits. They do not understand any other form.
- Because every bit can take one of two possible values, the total number of combinations possible, using eight bits, the computer can represent 256 different symbols.
- This is enough to cover our entire range of alphabets, numbers and other special characters like \$, @, +, etc. Such a combination of eight bits is called a **byte**.
- 1 kilobyte = 1024 bytes.
- In computers information is represented using multiples of eight (23) bits, since eight bits are the smallest unit of information. Therefore, higher units are expressible in multiples of 23.
- 1 MB = 1000 KB
- 1 GB = 1000 MB
- The basic elements of computers that can signal a 1 or 0 are called flip-flops. It is a simple electrical device and can either be

a '0' or a '1', which means that the flow of current is either inward or outward.

- Silicon is obtained from sand and is a poor conductor of electricity. But, by chemical processes it becomes good conductor. The surface and the interior of a silicon 'chip' are called Integrated Circuits (IC).
- By 1971, engineers were able to put a few component switches necessary to build a complete computer on a single chip of silicon. This silicon chip was called the microprocessor.
- The computer converts all decimal number into binary numbers of combinations of bits. Then by acting upon individual bits, it can perform the required mathematical operation addition, subtraction, etc.
- The internal circuits that can perform mathematical operations on bits are usually made of two or more logic gates. Logic gates are components that generate a 1 or a 0 depending on the input.
- The three basic logic gates are AND, OR and NOT.
- A computer is organized into three basic units:
  - The Central Processing Unit (CPU).
  - The Memory Unit (MU).
  - The Input/Output Unit.

## CENTRAL PROCESSING UNIT (CPU)

- It is called the brain of the computer.
- 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):** 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.

## MAIN ATTRIBUTES OF CPU

**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.

**Address Range:** Address range refers to the amount of memory that can be directly read/written by the CPU.

**Clock Speed:** The speed of CPU is known as Clock Speed.

- 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.
- Higher the clock-speed, faster the computer.

## MEMORY UNIT (MU)

The storage device of a computer system is known as memory.

(a) **Primary Memory:** It is often referred to as the working memory of the main memory of a computer system. It is temporary in nature. So it is also called volatile memory. An example of primary memory is RAM.

- Primary memory is directly accessible to the CPU.
- 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 ROM can be altered.
- Information is stored on the ROM at the time of its manufacture.
- The ROM is non-volatile and retains its information even after the power is turned off.
- The PROM (Programmable Read

Only Memory) has the option of being programmed.

- (b) **Secondary Memory:** It is used to store data for a long term. Secondary memory is permanent in nature, so it is also called non-volatile, memory are floppy disks, hard disks, magnetic tapes, etc.
- Information is moved from the secondary memory to the primary memory first and then the CPU.
  - Magnetic tapes are long plastic tapes coated with magnetic material.
  - Magnetic tapes can store far largest amounts of data than the floppy diskette.
  - Another popular storage medium is the compact disk (CD). CDs are 'optical' medium.
  - Conventional CDs are made of a special kind of plastic.
  - The CD is read using a laser beam.

## INPUT/OUTPUT

- Devices that permit users to supply information to the computer are called 'input' devices.
- The common input devices are keyboard and mouse.
- Physical channel that permits a computer to convey the processed information to the outside world. Devices that permit such a function are called 'output' devices.
- The common output devices are monitor, printer and speakers.
- Output devices are indispensable, but are not a part of the CPU. They are also called peripheral devices.
- These devices are also called an interface, because they translate information for man and machine.
- Another way to input information into a computer is to use an Optical Mark Reader (OMR). Optical Mark Readers are capable of reading specially prepared forms. These forms have a provision for black marks to be made using a pen or a pencil in a specific position.

- Most competitive examinations that deal with a large number of students usually use this system.
- Banks use another input device called a Magnetic Ink Character Reader (MICR).
- 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. Bar code reader is used to read the bar codes by detecting the bars by using light.
- The mouse is a pointing device. It can be gripped in the palm of the hand 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 on-screen mark called a cursor from one option to another.
- 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 information.
- 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 come in three popular versions: dot matrix printers, ink-jet printers and laser printers.
- Dot matrix printers print character in the form of combinations of very tiny dots.
- Ink-jet printers spray jets of ink on the paper to print any character.
- Laser printer uses a laser beam to actually 'burn' the characters on 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 programme.
- A programme may directly be written to the RAM or may be stored in some form of secondary memory.

- Computer programs are written using special languages called programming languages.

### **TYPES OF PROGRAMMING LANGUAGES**

- Machine language and the assembly language are examples of low-level languages.
- A special programme 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.

## **COMPUTER LANGUAGES**

- Computer processes information under instructions from the user which are given to the computer by way of input.
- These instructions can be written in one of various languages evolved over years.

There are two major types of programming languages. These are Low-level Languages and High-level Languages. Low-level Languages are further divided into Machine language and Assembly language.

**Low-level languages:** The term 'low level' means closeness to the way in which the machine has been built. Low-level languages are machine-oriented and require extensive knowledge of computer hardware and its configuration.

**High-level Languages:** Assembly language and machine language require extensive knowledge of computer hardware. To overcome this limitation, a user writes the instructions in English, like sentences to perform the logic of the problem irrespective of the type of computer you are using. The language used for this is referred to as high-level language.

Some high-level languages are:

- (a) **BASIC:** Beginners' All Purpose Symbolic Instruction Code. Easy to learn.
- (b) **FORTRAN:** Formula Translation was the first computer language developed by IBM in 1957. Used in engineering

and scientific applications. Syntax is very rigid in FORTRAN.

- (c) **PASCAL:** Designed for teaching computer science and used on small computers and is better structured than BASIC.
- (d) **COBOL:** Common Business-oriented Language is the most popular business language for data processing. We use this language even today for developing programmes.
- (e) **C:** It is a middle-level general-purpose language. It is used both with UNIX and DOS. Developed in Bell Laboratories in early 1970s. C++ is C's object-oriented version.

### THE WORLD WIDE WEB

- The web is organised like a library.
- It has websites and each website has a title and a number to identify it.
- The title of a website is called a URL (Uniform Resource Locator).
- It is easy to remember the URL of the website than its number.
- The URL of a website is also called its address.

### INTERNET

- Computers in an office are networked using LAN (Local Area Network).
- Computers in different locations are connected by WAN (Wide Area Network).
- Both these network systems are not for public use and have limited usage.
- The Internet is a network of thousands of networks.
- Millions of computer networks are connected to the Internet network and are available to the public.
- Internet was invented by American Department of Defence in 1969.

### SEARCH ENGINES

- These are websites available on the Internet that provide information on any topic that you want.
- Search engines contain a programme that collects information from other websites.
- This information is then stored according to the category it belongs to, e.g., websites about music will be stored in a category named Fine Arts. Examples of popular search engines are Yahoo, Alta Vista and Google.





## WORLD PANORAMA

## **UNITED NATIONS**

- The UNO was formed on 24 October 1945.
- At present, 192 countries are members of the UN. Monte Negro is the latest (192nd) member.
- The UN Charter came into force on October 24, 1945, when the Governments of China, France, the UK, the Soviet Union, and the USA and a majority of other countries had ratified it.
- The Headquarter of the UN is situated in New York (USA).

### **■ 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.

#### **1. GENERAL ASSEMBLY**

- It is also called as the town meeting of the world.
- The presidency of the Assembly rotates each year among the five geographical groups of the countries, viz. Asia, African, Latin America, East European and West European and other states.
- Consist of all member states of the UN.
- The headquarter of General Assembly is at New York (US).

#### **2. SECURITY COUNCIL**

- The main aim of Security Council is the maintenance of the international peace and security.

- Security Council comprises five permanent members, namely China, UK, Russia, France and USA and 10 non-permanent members, elected for a term of 2 years by a two-third majority of the General Assembly, five non-permanent members retire every year. Retiring members cannot be re-elected immediately.
- The headquarter of Security Council is at New York (US).

#### **3. ECONOMIC AND SOCIAL COUNCIL (ECOSOC)**

- Its main aim is to promote social progress and better standards of life.
- ECOSOC comprises 54 members.
- The headquarter of ECOSOC is at New York (US).

#### **4. THE TRUSTEESHIP COUNCIL**

- The United Nations Trusteeship Council was established to ensure that trust territories were administered in the best interest of their inhabitants and an international peace and security.

#### **5. THE INTERNATIONAL COURT OF JUSTICE (ICJ)**

- Its main functions are to settle legal disputes submitted to it by states and to provide advisory opinions on legal questions submitted to it by only authorised international organs, agencies and the UN General Assembly.
- The headquarter of ICJ is at Hague (Netherlands).

#### **6. THE SECRETARIAT**

- The United Nations Secretariat is one of the principle organs of the United Nations, an inter governmental organisation charged with the promotion of aiding states to collectively maintain international peace and security.

- The Secretary General is appointed by the General Assembly upon the recommendation of the Security Council.
- The Secretary General of the UN is elected for five years and eligible for re-election.

### United Nations, Specialised Agencies and Related Bodies

United Nations, specialised agencies and related bodies	Abbreviation (f. = formerly)	Headquarters	Member since
United Nations	UN	New York	1946
Food and Agriculture Organization	FAO	Rome	1945
International Atomic Energy Authority	IAEA	Vienna	1957
International Civil Aviation Organization	ICAO	Montreal	1944
International Labour Organization	ILO	Geneva	1945
International Maritime Organization	IMO (f. IMCO)	London	1960
International Seabed Authority	ISA	Kingston	1994
International Telecommunications Union	ITU	Geneva	1949
International Tribunal for the Law of the Sea	ITLOS	Hamburg	1996
United Nations Educational, Scientific and Cultural Organization	UNESCO	Paris	1964
Universal Postal Union	UPU	Berne	1874
World Health Organization	WHO	Geneva	1948
World Intellectual Property Organization	WIPO	Geneva	1986

### UNITED NATIONS INTERNATIONAL YEARS

Since 1959 the UN has designated International Years in order to draw attention to major issues and to encourage international action to address concerns which have global importance and ramifications.

S.No.	Year	Designated by UN as
1.	2019	International Year of Indigenous Languages
2.	2018	–
3.	2017	International Year of Sustainable Tourism for Development
4.	2016	International Year of Pulses
5.	2015	International Year of Light and Light-based Technologies
6.	2015	International Year of Soils
7.	2014	International Year of Solidarity with the Palestinian People

8.	2014	International Year of Small Island Developing States
9.	2014	International Year of Family Farming
10.	2014	International Year of Crystallography
11.	2013	International Year of Water Cooperation
12.	2013	International Year of Quinoa
13.	2012	International Year of Cooperatives
14.	2012	International Year of Sustainable Energy for All
15.	2011	International Year for People of African Descent
16.	2011	International Year of Chemistry
17.	2011	International Year of Forests
18.	2011	International Year of Youth

19.	2010	International Year of the Seafarer	25.	2009	International Year of Astronomy
20.	2010	International Year of Biodiversity	26.	2009	International Year of the Gorilla
21.	2010	International Year for the Rapprochement of Cultures	27.	2008	International Year of Planet Earth
22.	2009	International Year of Reconciliation	28.	2008	International Year of Languages
23.	2009	International Year of Natural Fibres	29.	2008	International Year of Sanitation
24.	2009	International Year of Human Rights Learning	30.	2008	International Year of the Potato
			31.	2007	International Polar Year

### World Bank and Related Bodies

World Bank and related bodies	Abbreviation (f. = formerly)	Headquarters	Member since
International Bank for Reconstruction and Development	IBRD	Washington	1945
International Centre for the Settlement of Investment Disputes	ICSID	Washington	1966
International Development Association	IDA	Washington	1961
International Finance Corporation	IFC	Washington	1956
International Monetary Fund	IMF	Washington	1945
Multilateral Investment Guarantee Agency	MIGA	Washington	1998

### Other International Organizations and Bodies

Other international organizations and bodies	Abbreviation (f. = formerly)	Headquarters	Member since
Comprehensive Nuclear-Test-Ban Treaty Organization (Preparatory Commission)	CTBTO	Vienna	2000
International Council for the Exploration of the Sea	ICES	Copenhagen	1938
International Criminal Police Organization	INTERPOL	Lyon	1971
International Exhibitions Bureau (Bureau International d'Expositions)	BIE	Paris	1999
International Hydrographic Organization	IHO	Monte Carlo	1970
International Maritime Satellite Organization	INMARSAT	London	1991
International Telecommunications Satellite Organization	ITSO (f. INTELSAT)	Washington	1975
International Customs Tariffs Bureau	BITD	Brussels	1891
Organisation for the Prohibition of Chemical Weapons	OPCW	Haag	1997
Permanent Court of Arbitration	PCA	Haag	1955
World Customs Organization	WCO	Brussels	1950

**First in World (Male Personalities)**

<b>Role</b>	<b>Male Personality</b>	
The First US President to Resign Presidency	Richard Nixon	The First Batsman to Score Three Test Centuries In Three Successive Test Debut Matches
The First Chinese Traveller to Visit India	Fahien	Mohd. Azharruddin
First Man to Walk in Space	Alexie Leonov	Nawang Gombu
The First Residents of International Space Stations	Bill Shepherd (USA), Yuri Gidzanko and Sergie Krikalev (Russia)	The First Man to Have Climbed Mt. Everest Twice
The First Blind Man to Scale Mt. Everest	Eric Weihenmayer (USA, May 25, 2001)	The First Adventurer Flying Successfully Across the English Channel Without Aircraft
The First Space Astronaut to go into Space Seven Times Till Date	Jerry Ross (USA)	Felix Baumgartner (July 2003)
The First South African to Become The Second Space Tourist	Mark Shuttleworth	China's First Man in Space
The First Grandmaster of the World in Chess	Sergey Karjakin (Ukraine)	Yang Liwei
The First European to Attack India	Alexander, The Great	The First Aircraft Pilot to Round the Entire World non-stop by his 2-engine aircraft in 67 hours
The First European to Reach China	Marco Polo	Steve Fossett (March 2005)
The First Person To Sail Around The World	Magellan	The First Hindu Chief Justice of Pakistani Supreme Court Justice
The First man to go into space	Major Yuri Gagarin (USSR, now Russia)	Rana Bhagwan Das Took over on September 2, 2005 as Acting Chief Justice
The First European Invader of Indian soil	Alexander, The Great	The First Double Amputee to Scale Mt. Everest
The First man to compile Encyclopaedia	Aspheosis (Athens)	Mark Englis (May 15, 2006)
The First eldest man to climb Mt. Event	Richard Wass	The First Hindu Chief Justice of Pakistani Supreme Court
The First Asian to win Wimbledon Trophy	Arthur Ashe (USA)	First Man to Climb Mt. Everest
The First man to win Nobel Prize for Literature	Rene FA and Suilt Pradhom (France)	Sherpa Tenzing Norgay & Sir Edmund Hillary (29th May, 1953)
The First man to win Nobel Prize for Peace	Jin F Dunant (Switzerland) and Frederic Peiry (France)	First Man to reach North Pole
The First man to win Nobel prize for Physics	WK Roentgen (Germany)	Robert Peary
The First man to win Nobel prize for Chemistry	JH Wenthoff (Howlland)	First Man to reach South Pole
		Ronald Amundsen
		First President of United States of America
		George Washington
		First Prime Minister of Great Britain
		Robert Walpole
		First Secretary General of United Nations
		Trigve Li
		Pakistan's First Governor General
		Mohammed Ali Jinnah

First Man to Fly an Aeroplane	Wright Brothers	First Woman To Command A Space Mission	Colonel Eileen Collins (USA)
First Person to Sail around the World	Ferdin and Magellan	The First Muslim Woman to Become the Secretary General of Amnesty International	Irine Zubeida Khan
First President of the Republic of China	Dr. Sun Yat-sen	The First Woman Prime Minister of South Korea	Ms Chang Sang
First Russian (Soviet) Prime Minister to Visit India	V.I. Bulganin	The First Mislim Woman to Recieve Nobel Prize	Shirin Ebadi (Nobel Peace Prize 2003)
First Man to Set Foot on the Moon	Neil Armstrong (U.S.A)	The Woman With the Highest Individual Test Score making a new world record	Kiran Baloch
First man to win Nobel Prize Medicine (Medical Science)	AE Wonn Behring (Germany)	The First Woman in the world to climb Mt. Everest four times	Lakpa Sherpa (Nepali)
First Man to Win Nobel Prize Economics	Ranger Fish (Norway) and John Tinbergen (Holland)	The First Woman Prime Minister of England	Margaret Thatcher
First Space Tourist (Male)	Dennis Tito	First Woman Prime Minister of	Benazir Bhutto (Pakistan)
Chairman of People's Republic of China	Mao-Tse-Tung	The First Woman Civilian Advisor of the U.N.	Kiran Bedi

### First in World (Woman)

Role	Female Personalities
Athelete to Touch 5.0 Metres mark in Pole Vault	Ms. Yelena Isinbayeva
Foreign secretary of England	Margaret Backett
Prime Minister of Jamaica	Portia Simpson Miller (Feb. 2006)
President of Chile	Dr. Michelle Bachelet
Chancellor of Germany	Angela Markel (Since November. 2005)
Governor of the State Bank of Pakistan	Shanshad Akhtar (Dec. 2005)
The First Duly Elected Woman President of an African Country	Allen Johnson Sirleaf
The First Lady to Climb Mt. Everest	Junko Taibei
The First Woman Cosmonaut in Space	Valentina Tereshkova
The First Woman Prime Minister of a Country	Mrs. Srimavo Bhandarnaike
First Woman President of a Country	Maria Estela Peron

The First Woman Bishop	Rev Barbara C. Harris (USA)
The First Woman to Cross Seven Important Seas of the World by Swimming	Bula Chaudhury (India)
The Woman to be Appointed as Governor of the Province in Afghanistan	Habiba Sorabhi
The First Woman of the World to Swim Accross Five Continents	Bula Chaudhury (India)
The First Space Tourist	Mrs. Anousheh Ansari
The First Woman to Reach Antarctica	Caroline Michaelson
The First Woman President of UN General Assembly	Smt. Vijayalakshmi Pandit (1953)
The First Woman Ambassador of Britain	Anne Warburton

### List of Countries, Capitals, Currencies, and Languages

Countries	Capitals	Currencies	Languages
Afghanistan	Kabul	Afghani	Dari Persian; Pashto
Albania	Tirane	Lek	Albanian
Algeria	Algiers	Algerian Dinar	Arabic; Tamazight; French
Andorra	Andorra la Vella	Euro	Catalan
Angola	Luanda	Kwanza	Portuguese
Antigua and Barbuda	Saint John's	East Caribbean Dollar	English
Argentina	Buenos Aires	Argentine Peso	Spanish
Armenia	Yerevan	Dram	Armenian
Australia	Canberra	Australian Dollar	English
Austria	Vienna	Euro	German
Azerbaijan	Baku	Manat	Azerbaijani
The Bahamas	Nassau	Bahamian Dollar	English
Bahrain	Manama	Bahraini Dinar	Arabic
Bangladesh	Dhaka	Taka	Bangla
Barbados	Bridgetown	Barbadian Dollar	English
Belarus	Minsk	Belarusian Ruble	Belarusian; Russian
Belgium	Brussels	Euro	Dutch; French; German
Belize	Belmopan	Belize Dollar	English
Benin	Porto-Novo	West African CFA Franc	French
Bhutan	Thimphu	Ngultrum	Dzongkha
Bolivia	La Paz; Sucre	Boliviano	Spanish; Quechua; Aymara
Bosnia and Herzegovina	Sarajevo	Convertible Mark	Bosnian; Croatian; Serbian
Botswana	Gaborone	Pula	English; Tswana
Brazil	Brasilia	Real	Portuguese
Brunei	Bandar Seri Begawan	Brunei Dollar	Malay
Bulgaria	Sofia	Lev	Bulgarian
Burkina Faso	Ouagadougou	West African CFA Franc	French
Burundi	Bujumbura	Burundi Franc	Kirundi; French
Cambodia	Phnom Penh	Riel	Khmer
Cameroon	Yaounde	Central African CFA Franc	French; English
Canada	Ottawa	Canadian Dollar	English; French
Cape Verde	Praia	Cape Verdean Escudo	Portuguese
Central African Republic	Bangui	Central African CFA Franc	Sango; French

Chad	N'Djamena	Central African CFA Franc	French; Arabic
Chile	Santiago	Chilean Peso	Spanish
China	Beijing	Chinese Yuan	Mandarin
Colombia	Bogota	Colombian Peso	Spanish
Comoros	Moroni	Comorian Franc	Comorian; Arabic; French
Democratic Republic of the Congo	Kinshasa	Congolese Franc	French
Republic of the Congo Franc	Brazzaville	Central African CFA	French
Costa Rica	San Jose	Colon	Spanish
Cote d'Ivoire (Ivory Coast)	Yamoussoukro; Abidjan	West African CFA Franc	French
Croatia	Zagreb	Croatian	Kuna
Cuba	Havana	Cuban Peso	Spanish
Cyprus	Nicosia	Euro	Greek; Turkish
Czech Republic	Prague	Czech Koruna	Czech; Slovak
Denmark	Copenhagen	Danish Krone	Danish
Djibouti	Djibouti	Djiboutian Franc	Arabic; French
Dominica	Rosesau	East Caribbean Dollar	English; French; Antillean Creole
Dominican Republic	Santo Domingo	Dominican Peso	Spanish
East Timor (Timor-Leste)	Dilli	United States Dollar	Tetum; Portuguese; Indonesian
Ecuador	Quito	United States Dollar	Spanish
Egypt	Cairo	Egyptian Pound	Arabic
El Salvador	San Salvador	United States Dollar	Spanish
Equitorial Guinea	Malabo	Central African CFA Franc	Spanish; French; Portuguese
Eritrea	Asmara	Nakfa	Arabic; Tigrinya; English
Estonia	Tallinn	Estonian Kroon; Euro	Estonian
Ethiopia	Addis Ababa	Birr	Amharic
Fiji	Suva	Fijian Dollar	English; Bau Fijian; Hindi
Finland	Helsinki	Euro	Finnish; Swedish
France	Paris	Euro; CFP Franc	French
Gabon	Libreville	Central African CFA Franc	French
The Gambia	Banjul	Dalasi	English
Georgia	Tbilisi	Lari	Georgian
Germany	Berlin	Euro	German
Ghana	Accra	Ghanaian Cedi	English

Greece	Athens	Euro	Greek
Grenada	St. George's	East Caribbean Dollar	English; Patois
Guatemala	Guatemala City	Quetzal	Spanish
Guinea	Conakry	Guinean Franc	French
Guinea-Bissau	Bissau	West African CFA Franc	Portuguese
Guyana	Georgetown	Guyanese Dollar	English
Haiti	Port-au-Prince	Gourde	Haitian Creole; French
Honduras	Tegucigalpa	Lempira	Spanish
Hungary	Budapest	Forint	Hungarian
Iceland	Reykjavik	Icelandic Krona	Icelandic
India	New Delhi	Indian Rupee	Hindi; English
Indonesia	Jakarta	Rupiah	Indonesian
Iran	Tehran	Rial	Persian
Iraq	Baghdad	Iraqi Dinar	Arabic; Kurdish
Republic of Ireland	Dublin	Euro	English; Irish
Israel	Jerusalem	Shekel	Hebrew; Arabic
Italy	Rome	Euro	Italian
Jamaica	Kingston	Jamaican Dollar	English
Japan	Tokyo	Yen	Japanese
Jordan	Amman	Jordanian Dinar	Arabic
Kazakhstan	Astana	Tenge	Kazakh; Russian
Kenya	Nairobi	Kenyan Shilling	Swahili; English
Kiribati	Tarawa Atoll	Kiribati Dollar	English; Gilbertese
North Korea	Pyongyang	North Korean Won	Korean
South Korea	Seoul	South Korean Won	Korean
Kosovo	Pristina	Euro	Albanian; Serbian
Kuwait	Kuwait City	Kuwaiti Dollar	Arabic; English
Kyrgyzstan	Bishkek	Som	Kyrgyz; Russian
Laos	Vientiane	Kip	Lao (Laotian)
Latvia	Riga	Lats	Latvian
Lebanon	Beirut	Lebanese Pound	Arabic; French
Lesotho	Maseru	Loti	Sesotho; English
Liberia	Monrovia	Liberian Dollar	English
Libya	Tripoli	Libyan Dinar	Arabic
Liechtenstein	Vaduz	Swiss Franc	German
Lithuania	Vilnius	Lithuanian Litas	Lithuanian
Luxembourg	Luxembourg	Euro	German; French; Luxembourgish

Macedonia	Skopje	Macedonian Denar	Macedonian
Madagascar	Antananarivo	Malagasy Ariary	Malagasy; French; English
Malawi	Lilongwe	Malawi Kwacha	English
Malaysia	Kuala Lumpur	Ringgit	Malay
Maldives	Male	Maldivian Rufiyaa	Dhivehi
Mali	Bamako	West African CFA Franc	French
Malta	Valletta	Euro	Maltese; English
Marshall Islands	Majuro	United States Dollar	Marshallese; English
Mauritania	Nouakchott	Ouguiya	Arabic
Mauritius	Port Louis	Mauritian Rupee	English
Mexico	Mexico City	Mexican Peso	Spanish
Federal States of Micronesia	Palikir	United States Dollar	English
Moldova	Chisinau	Moldovan Leu	Moldovan (Romanian)
Monaco	Monaco	Euro	French; Italian; English
Mongolia	Ulaanbaatar	Togrog	Mongolian
Montenegro	Podgorica	Euro	Montenegrin
Morocco	Rabat	Moroccan Dirham	Arabic
Mozambique	Maputo	Mozambican Metical	Portuguese
Myanmar (Burma)	Nypyidaw	Kyat	Burmese
Namibia	Windhoek	Namibian Dollar	English; Afrikaans; German
Nauru	Yaren	Australian Dollar	English; Nauran
Nepal	Kathmandu	Nepalese Rupee	Nepali
Netherlands	Amsterdam; The Hague	Euro	Dutch
New Zealand	Wellington	New Zealand Dollar	English
Nicaragua	Managua	Cordoba	Spanish
Niger	Niamey	West African CFA Franc	French
Nigeria	Abuja	Naira	English
Norway	Oslo	Norwegian Krone	Norwegian
Oman	Muscat	Omani Rial	Arabic
Pakistan	Islamabad	Pakistani Rupee	Urdu; English
Palau	Melekeok	United States Dollar	English; Palauan
Panama	Panama City	Balboa	Spanish
Papa New Guinea	Port Moresby	Papa New Guinean Kina	English; Tok Pisin; Hiri Motu
Paraguay	Asuncion	Guarani	Spanish; Guarani
Peru	Lima	Nuevo Sol	Spanish

Phillipines	Manila	Phillipine Peso	Filipino; English
Poland	Warsaw	Zloty	Polish
Portugal	Lisbon	Euro	Portuguese
Qatar	Doha	Qatari Riyal	Arabic
Romania	Bucharest	Romanian Rupee	Romanian
Russia	Moscow	Ruble	Russian
Rwanda	Kigali	Rwandan Franc	Kinyarwanda; French; English
Saint Kitts and Nevis	Basseterre	East Caribbean Dollar	English
Saint Lucia	Castries	East Caribbean Dollar	English; French
Saint Vincent and The Grenadines	Kingstown	East Caribbean Dollar	English
Samoa	Apia	Tala	Samoan; English
San Marino	San Marino	Euro	Italian
Sao Tome and Principe	Sao Tome	Dobra	Portuguese
Saudi Arabia	Riyadh	Saudi Riyal	Arabic
Senegal	Dakar	West African CFA Franc	French
Serbia	Belgrade	Serbian Dinar	Serbian
Seychelles	Victoria	Seychoellois Rupee	Seychellois Creole; French; English
Sierra Leone	Freetown	Leone	Krio; English
Singapore	Singapore	Singapore Dollar	English; Malay; Mandarin Chinese
Slovakia	Bratislava	Euro	Slovak
Slovenia	Ljubljana	Euro	Slovene
Solomon Islands	Honiara	Solomon Islands Dollar	Solomons Pijin
Somalia	Mogadishu	Somali Shilling	Somali; Arabic
South Africa	Pretoria; Cape Town; Bloemfontein	Rand	Zulu; Xhosa; Afrikaans
Spain	Madrid	Euro	Spanish
Sri Lanka	Colombo	Sri Lankan Rupee	Sinhala; Tamil
Sudan	Khartoum	Sudanese Pound	Arabic; English
Suriname	Paramaribo	Surinamese Dollar	Dutch
Swaziland	Mbabane	Lilangeni	English; SiSwati
Sweden	Stockholm	Swedish Krona	Swedish
Switzerland	Berne	Swiss Franc	German; French; Italian
Syria	Damascus	Syrian Pound	Arabic

Taiwan	Taipei	New Taiwan Dollar	Mandarin
Tajikistan	Dushanbe	Somoni	Tajik; Russian
Tanzania	Dar es Salaam; Dodoma	Tanzanian Schilling	Swahili
Thailand	Bangkok	Thai Baht	Thai
Togo	Lome	West African CFA Franc	French
Tonga	Nuku'alofa	Pa'anga	Tongan; English
Trinidad and Tobago	Port-of-Spain	Trinidad and Tobago Dollar	English
Tunisia	Tunis	Tunisian Dinar	Tunisian; French
Turkey	Ankara	Turkish Lira	Turkish
Turkmenistan	Ashgabat	Turkmen New Manat	Turkmen; Russian
Tuvalu	Vaiaku	Tuvaluan Dollar	Tuvaluan; English
Uganda	Kampala	Ugandan Shilling	Swahili; English
Ukraine	Kiev	Hryvnia	Ukrainian; Russian
United Arab Emirates	Abu Dhabi	Dirham	Arabic
United Kingdom	London	Pound Sterling	English
United States of America	Washington D.C.	United States Dollar	English; Spanish
Uruguay	Montevideo	Uruguayan Peso	Spanish
Uzbekistan	Tashkent	Uzbekistan Som	Uzbek; Russian
Vanuatu	Port-Vila	Vanuatu Vatu	Bislama; English; French
Vatican City	Vatican City	Euro	Latin; Italian
Venezuela	Caracas	Bolivar Fuerte	Spanish
Vietnam	Hanoi	Dong	Vietnamese
Yemen	Sanaa	Yemeni Rial	Arabic
Zambia	Lusaka	Zambian Kwacha	English
Zimbabwe	Harare	United States Dollar	English

**Parliaments of Different Countries**

Country	Parliament
Afghanistan	Shoora
Andorra	General Council
Albania	People's Assembly
Azerbaijan	Melli Majlis

Algeria	National People's Assembly
Angola	National People's Assembly
Argentina	National Congress
Australia	Federal Parliament
Austria	National Assembly
Bahamas	General Assembly

Bahrain	Consultative Council	Guyana	National Assembly
Bangladesh	Jatiya Sansad	Greece	Chamber of Deputies
Belize	National Assembly	Hungary	National Assembly
Bhutan	Tshogdu	Iceland	Althing
Bolivia	National Congress	India	Parliament
Brazil	National Congress	Indonesia	People's Consultative Assembly
Brunei	National Assembly	Iran	Majlis
Botswana	National Assembly	Iraq	National Assembly
Britain	Parliment (House of Commons and House of Lords)	Israel	Knesset
Bulgaria	Narodno Subranie	Italy	Chamber of Deputies and Senate
Cambodia	National Assembly	Japan	Diet
Congo	Democratic Rep. of National Legislative Council	Jordan	National Assembly
Colombia	Congress	Korea (North)	Supreme People's Assembly
Canada	Parliament	Korea (South)	National Assembly
China	National People's Assembly	Kuwait	National Assembly
Chile	Chamber of Deputies and Senate	Kenya	National Assembly
Comoros	Legislative Council and Senate	Laos	People's Supreme Assembly
Costa Rica	Legislative Council and Senate	Labanon	National Assembly
Croatia	Sabor	Lesotho	National Assembly and Senate
Cuba	National Assembly of People's Power	Lithuania	Seimas
Czech Republic	Chamber of Deputies and Senate	Luxembourg	Chamber of Deputies
Denmark	Folketing	Liberia	National Assembly
Ecuador	Natinal Congress	Libya	General People's Congress
El Salvador	Legislative Assembly	Malaysia	Dewan Rakyat and Dewan Negara
East Timor	Constituent Assembly	Maldives	Majlis
Ethiopia	Federal Council and House of Representative	Madagascar	National People's Assembly
Egypt	People's Assembly	Mongolia	Great People's Khural
Fiji Islands	Senate and House of Representative	Montenegro	Federal Assembly
France	National Assembly	Mozambique	People's Assembly
Finland	Eduskusta (Parliament)	Myanmar	Pyithu Hluttaw
Germany	Bundestag (Lower House) and Bundesrat (Upper House)	Nepal	Rashtriya Panchayat
		Netherlands	The State General
		Norway	Storting
		New Zealand	Parliament (House of Representative)
		Oman	Monarchy

Pakistan	National Assembly & Senate
Paraguay	Senate & Chamber of Deputies
Philippines	The Congress
Papua New Guinea	National Parliament
Poland	Sejm
Romania	Great National Assembly
Russia	Duma & Federal Council
Serbia	Federal Assembly
Senegal	National Assembly
Seychelles	People's Assembly
Somalia	People's Assembly
South Africa	Rep. House of Assembly
Spain	Cortes
Sweden	Riksdag
Saudi Arabia	Majlis Al Shura
Sudan	National Assembly
Switzerland	Federal Assembly
Syria	People's Council
Turkey	Grand National Assembly
Tunisia	National Assembly
USA	Congress
Vietnam	National Assembly
Venezuela	National Congress
Zaire	National Legislative Council
Zambia	National Assembly

## IMPORTANT LINES AND BOUNDARIES

**Durand Line** is the line demarcating the boundaries of Pakistan and Afghanistan. It was drawn up in 1896 by Sir Mortimer Durand.

**Hindenburg Line** is the boundary dividing Germany and Poland. The Germans retreated to this line in 1917 during World War I.

**Mason-Dixon Line** is a line of demarcation between four states in the United States.

**Marginal Line** was the 320 km line of fortification on the Russia Finland border. Drawn up by General Mannerheim.

**MacMahon Line** was drawn up by Sir Henry MacMahon, demarcating the frontier of India and China. China did not recognise the MacMahon line and crossed it in 1962.

**Medicine Line** is the border between Canada and the United States.

**Order-Neisse Line** is the border between Poland and Germany, running along the Order and Neisse rivers, adopted at the Poland Conference (Aug 1945) after World War II.

**Radcliffe Line** was drawn up by Sir Cyril Radcliffe, demarcating the boundary between India and Pakistan. Siegfried Line is the line of fortification drawn up by Germany on its border with France.

**17th Parallel** defined the boundary between North Vietnam and South Vietnam before two were united.

**24th Parallel** is the line which Pakistan claims for demarcation between India and Pakistan. This, however, is not recognised by India.

**26th Parallel** south is a circle of latitude which crosses through Africa, Australia and South America.

**30th Parallel** north is a line of latitude that stands one-third of the way between the equator and the North Pole.

**33rd Parallel** north is a circle of latitude which cuts through the southern United States, parts of North Africa, parts of the Middle East, and China.

**35th Parallel** north forms the boundary between the State of North Carolina and the State of Georgia and the boundary between the State of Tennessee and the State of Georgia, the State of Alabama, and the State of Mississippi.

**36th Parallel** forms the southermost boundary of the State of Missouri with the State of Arkansas.

**36°30' Parallel** north forms the boundary between the Tennessee and the Commonwealth of Kentucky between the Tennessee River and the Mississippi River, the boundary between Missouri and Arkansas west of the White River, and the northermost boundary between the Texas and the Oklahoma.

**37th Parallel** north formed the southern boundary of the historic and extralegal Territory of Jefferson.

**38th Parallel** is the parallel of latitude which separates North Korea and South Korea.

**39th Parallel** north is an imaginary circle of latitude that is 39 degrees north of Earth's equatorial plane.

**40th Parallel** north formed the original northern boundary of the British Colony of Maryland.

**41st Parallel** north forms the northern boundary of the State of Colorado with Nebraska and Wyoming and the southern boundary of the State of Wyoming with Colorado and Utah.

**42nd Parallel** north forms most of the New York-Pennsylvania Border.

**43rd Parallel** north forms most of the boundary between the State of Nebraska and the State of South Dakota and also formed the northern border of the historic and extralegal Territory of Jefferson.

**The Parallel 44o** north is an imaginary circle of latitude that is 44 degrees north of the Earth's equatorial plane.

**45th Parallel** north is often the halfway point between the Equator and the North Pole. The 45th parallel makes up most of the boundary between Montana and Wyoming.

**49th Parallel** is the boundary between USA and Canada.

#### First Heads of States (World)

The first President of the USA	George Washington
The first Prime Minister of Great Britain	Walpole
The first President of the Chinese Republic (1912)	Sun Yat-sen
The first Chairman of the Central Government of the People's Republic of China, formally established in Peking in October, 1949	Mao Tse-tung

The first Governor-General of Pakistan	Mohammad Ali Jinnah
The last king of France	Louis Philippe
The first ever woman Prime Minister of a country in the world	Mrs S. Bandaranaike (Sri Lanka)
The first woman to become the Prime Minister of a country twice	Mrs S. Bandaranaike

#### First Visitors, Invaders

The first European invader on Indian Soil	Alexander, the Great
The first European to visit China	Marco Polo
The first Chinese pilgrim who came to India	Fa-hien
The first British Prime Minister to visit India	Harold Macmillan
The first President of the USA to visit India	D Eisenhower
The first Soviet Prime Minister to visit India	VI Bulganin

#### Intelligence Agencies of the World

Intelligence Agencies	Country
Inter-services Intelligence (ISI)	Pakistan
Central Intelligence Agencies (CIA) and Federal Bureau of Investigation (FBI)	United States of America
Komitet Gosudarstvennoy Bezopasnosti (KGB)/Glavnoye Razvedyvatel'noye Upravlenije (GRU)	Russia
MOSSAD	Israel
Militärischer Nachrichtendienst	Switzerland
Australian Security and Intelligence Organization	Australia
Centro Intelligenza Interforze (CII)	Italy
Royal Intelligence Corps	Malaysia
Mukhabarat	Egypt

Central External Liaison Department	China
Military Counterintelligence Service	Germany
Sazamane Etelaat va Amniate Kechvar (SAVAK)	Iran
Etterretningstjenesten	Norway
Naicho	Japan
Bureau of State Security (BOSS)	South Africa
Canadian Security Intelligence Service	Canada
Al Mukbharat	Iraq
Direction General de Securite Exterieur (DGSE)	France
Secret Intelligence Service	United Kingdom
General Intelligence Presidency	Saudi Arabia
Security and Intelligence Division	Singapore

### National Emblems of Important Countries

Country	Emblem
India	Lion Capital of Ashoka
Pakistan	Crescent and Star
Bangladesh	Water Lilly
Netherlands	Lion
UK	Rose
USA	Golden Rod
Italy	White Lilly
Australia	Kangaroo
New Zealand	Kiwi
Germany	Corn Flower
Norway	Lion
France	Lily
Iran	Rose
Spain	Eagle
Japan	Chrysanthemum
Canada	Maple Leaf, Lily
Sri Lanka	Lion

Hong Kong	Bauhinia
Iran	Rose
Israel	Candelabrum
Turkey	Crescent and Star

### News Agencies of Some Countries

Country	Agency
USA	Associated Press (AP), United Press International (UPI)
UK	Reuters
Russia	Telegraph Agency of the Sovereign States (TASS), Novosti
Malaysia	Malaysian National News Agency (MNNA)
Italy	Agenzia Nazionale Stampa Associate (ANSA)
Israel	Associated Israel Press (AIP)
France	Agence France Presse (AFP)
India	Press Trust of India (PTI), United News of India (UNI), Samachar Bharti
China	Hin Hua
Japan	Kyodo
Indonesia	Antara
Iran	Islamic Republic News Agency (IRNA)
Germany	Deutsche Presse Agentur (DPA)
Palestine	WAFA
Australia	Australian Associated Press
Pakistan	Pakistan Press International (PPI), Associated Press of Pakistan (APP)
Egypt	Middle East News Agency (MENA)

### Signs and Symbols

Signs and Symbols	Meaning
Pen	Symbol of Culture and Civilization
Red Cross	Medical Aid and Hospital

Red Flag	Revolution and Also a Sign of Danger
Black Flag	Symbol of Protest
Yellow Flag	Flown on Ships or Vehicles Carrying Patients Suffering from Infectious Diseases
Flag flown upside down	Symbol of Distress
Flag flown at half mast	Symbol of National Mourning
White Flag	Symbol of Truce
Red Triangle	Sign of Family Planning
Pigeon or Dove	Symbol of Peace
Red Light	Stop or Danger or Emergency
Wheel	Symbol of Progress
Olive Branch	Symbol of Peace
Union Jack	National Flag of UK
Stars and Stripes	National Flag of the USA

### Different Revolutions

Name of the Revolution	Associated Field
Yellow Revolution	Oilseeds
White Revolution	Milk
Black Revolution	Petroleum Production
Red Revolution	Meat and Tomato Products
Round Revolution	Potato
Silver Fiber Revolution	Cotton
Blue Revolution	Fish
Pink Revolution	Shrimp
Grey Revolution	Wool
Evergreen Revolution	Overall Development of Agriculture
Green Revolution	Food Grains
Golden Revolution	Horticulture
Silver Revolution	Egg and Poultry

Brown Revolution	Cocoa
Rainbow Revolution	Amalgamation of all the above revolutions

### Important Festivals in the World

Alba White Truffle Festival	Alba, Italy
Baltic Herring Festival	Helsinki, Finland
Chinchilla Melon Festival (Watermelon)	Australia
Chocolate Festival	London, UK
International Mango Festival	New Delhi, India
Ivrea Orange Festival	Ivrea, Italy
Maine Lobster Festival	Rockland USA
Maslenitsa Festival (Pancake Festival)	Moscow, Russia
Melbourne Food & Wine Festival	Melbourne, Australia
Mistura Food Festival	Lima, Peru
Monkey Buffet Festival	Lopburi Province, Thailand
Oktoberfest	Munich, Germany
Onion Eating Festival	Spain
Orange Festival	Poland
Pancake Festival	Moscow, Russia
San Francisco Street Food Festival	San Francisco, USA
Potato Festival	Sweden
Tomato Festival	Spain
Vegetarian Festival	Thailand

### Famous Monuments around the World

Name of the Monument	Country
Statue of Liberty	New York, USA
The Eiffel Tower	Paris, France
St Basil's Cathedral	Moscow, Russia
Blue Domed Church	Santorini, Greece
The Great Sphinx	Giza, Egypt
Machu Pichu	Peru

Big Ben	London	Faisal Mosque	Islamabad, Pakistan
Burj al Arab Hotel	Dubai	The Empire State Building	New York
Tower of Pisa	Italy	Newgrange Tomb	Ireland
Christ the Redeemer	Rio de Janeiro, Brazil	Tilcho Lake	Nepal
Lascaux Cave Paintings	France	Pompeii	Italy
Loch Ness	Scotland	The Wailing Wall	Jerusalem
Mont St Michel	France	Abu Simbel	Egypt
Bran Castle	Transylvania, Romania	Middle of the Earth or The Ciudad Mitad del Mundo	Ecuador
Agia Sophia	Istanbul, Turkey	Potala Palace	Llasa, Tibet
Branderburg Gate	Berlin, Germany	Angel Falls	Venezuela
Acropolis	Athens, Greece	Ephesus	Turkey
Sagrada Familia	Barcelona, Spain	Twelve Apostles	Australia
Uluru Sandstone	Australia	The National Chiang Kai-shek Memorial Hall	China
Mount Fuji	Japan	The Sultan Ahmed Mosque	Turkey
Mount Eden Crater	New Zealand		
Al Aqsa Mosque	Jerusalem		
Angkor Wat	Cambodia		
St Peter's Cathedral	Vatican City		
Mount Rushmore	South Dakota		
Victoria Falls	Between Zambia and Zimbabwe		
The Great Canyon	Arizona		
Petra Rock cut Architecture	Jordan		
Cape of Good Hope	South Africa		
Chichen Itza	Mexico		
Inukshuk	Canada		
Table Mountain	Cape Town, South Africa		
Golden Gate Bridge	San Francisco, California		
Kilimanjaro	Tanzania		
Forbidden City	Beijing		
Iguazu Falls	On the border of Brazil and Argentina		
The Colosseum	Rome, Italy		
Twyfelfontein—Ancient Rock Engravings	Namibia		
The Blue Mosque	Istanbul		
Millau Bridge	France		
Luxor Temple	Egypt		

### Official Books of Various Countries

Name of Book	Country
Blue Book	Any official of British Government.
Green Book	Official publication of Italy and Iran.
Grey Book	Official reports of the Japanese and Belgian governments.
Orange Book	Official reports of the Netherlands.
White Book	Official publication of Germany, China and Portugal.
Yellow Book	Official book of the French.
White Paper	Short pamphlet giving authoritative account of facts issued by the Indian Government stating its view on a particular issue for the knowledge of general public

### Major Political Parties of Different Countries

United Kingdom	Conservative Party, Labour Party, Liberal Party, Democratic Party
USA	Republican Party, Democratic Party

Russia	Communist Party, Liberal Democratic Party, Russia's Choice
France	Socialist Party, National Front Union for France Democracy
South Africa	African National Congress, National Party, Inkatha Freedom Party
Australia	Liberal Party, Labour Party
Israel	Labour Party, Likud Party, Hamas Party, Shes Party
Iraq	Bath Party

### Superlatives Of World

Tallest Animal on land	Giraffe
Biggest Bell	Great Bell at Moscow
Fastest Bird	Swift
Largest Bird	Ostrich
Smallest Bird	Humming Bird
Longest Bridge (Railway)	Lower Zambezi (Africa)
Tallest Building	Burj Khalifa, Dubai (U.A.E)
Tallest Office Building	Patronas Twin Towers, Kuala Lampur (Malaysia)
Longest Big Ship Canal	Seuz Canal (Linkin Red Sea & Mediterranean)
Busiest Canal (Ship)	Baltic White Sea Canal (152 miles)
Biggest Cinema House	Roxy (New York)
Highest City	Wen Chuan (Tibet, China) (16,732 ft.)
Largest City (in population)	Tokyo [ (3,42,00000), Est. population in 2006]
Biggest City (in area)	Mount Isa, Queensland, Australia (41225 sq. km)
Largest Continent	Asia
Smallest Continent	Australia
Largest Country (in population)	China

Largest Country (in area)	Russia
Largest Coral Formation	The Great Barrier Reef (Australia)
Largest Dam	Grand Coulee-Concrete Dam (USA)
Longest Day	June 21 (in Northern Hemisphere)
Shortest Day	Dec. 22 (in Northern Hemisphere)
Largest Delta	Sundarbans, India (8000 sq. miles)
Longest Desert (World)	Sahara, Africa (84, 00,000 sq. km)
Largest Diamond	The Cullinan (over 1 ½ lb.)
Biggest Dome	Gol Gumbaz (Bijapur), (Old Archi) 144 ft. diameter.
Biggest Dome (New Archi)	Astrodome, Sports
Longest Epic	The Mahabharata
Largest Island	Greenland (renamed Kalaatdit Nunaat)
Largest Lake (Artificial)	Lake Mead (Bouler)
Deepest Lake	Baikal (Siberia); average depth 2300 ft.
Highest Lake	Titicaca (Bolivia) 12645 ft. above sea level.
Largest Lake (Fresh Water)	Lake Superior, USA
Largest Lake (Salt Water)	Caspian Sea (3, 71,000 sq. km)
Largest Mosque	Jama Masjid, Delhi, (area 10,000 sq. ft.)
Biggest Library	National Kiev Library, Moscow & Library of the Congress, Washington
Highest Mountain Peak (World)	Himalayas
Longest Mountain Range	Andes (S. America) 5,500 miles in length
Biggest Museum	British Museum (London)
Tallest Minaret (Free Standing)	Qutub Minar, Delhi (238 ft.)

Tallest Minaret	Great Hassan Mosque, Casablanca, Morocco	Tallest Statue	Spring Temple Budha, China (128m)
Deepest & Biggest Ocean	The Pacific	Tallest Statue (Bronze)	Bronze Statue of Lord Buddha, Tokyo (Japan).
Largest Palace	Imperial Palace (Gugong), Beijing (China)	Longest Swimming Course	English Channel
Largest Park	Yellow Stone National Park (USA).	Tallest Tower	Skytree, Tokyo, Japan (634m)
Largest Peninsula	Arabic (32,50,000 sq. km.)	Longest Train (nonstop)	Flying Scoutsman
Coldest Place or Region	Verkhoyansk (Syberia), Temperature -85° C	Longest Tunnel (Railway)	Seikan Rail Tunnel (Japan), (53.85 km)
Driest Place	Death Valley (California); rainfall 1 ½ inch.	Longest & Largest Canal Tunnel	Le Rove Tunnel (South of France)
Hottest Place (World)	Al-Aziziyah (Libya, Africa) 136°F	Longest Tunnel (Road)	Laerdal, Norway
Largest Planet	Jupiter	Highest Volcano	Ojos Del Salado, Andes Argentine, Chile (6,885 m)
Brightest and Hottest Planet (also nearest to Earth)	Venus	Largest Volcano	Mauna Lao (Hawaii)
Farthest Planet (from the Sun)	Neptune	Longest Wall	Great Wall of China (1500 miles)
Nearest Planet (to the Sun)	Mercury	Highest Waterfall	Salto Angel Falls (Venezuela)
Smallest Planet	Mercury	Longest Strait	Tartar Strait (Sakhalin Island & the Russian Mainland)
Highest Plateau	Pamir (Tibet)	Broadest Strait	Davis Straits (Greenland & Baffin Island, Canada)
Longest Platform (Railway)	Kharagpur, W.B., India (833m)	Narrowest Strait	Chaliks-45 yards (Between the Greek Mainland the Island of Euboea in the Aegean Sea)
Largest Platform (Railway)	Grand Central Terminal, New York (USA)	Largest Bay	Hudson Bay, Canada (Shoreline 7623 miles)
Largest Sea Port	Ningbo-zhoushan, China.	Largest Gulf	Gulf of Mexico, (shoreline 2100 miles)
Busiest Container Port	Shangai, China.	Largest Archipelago	Indonesia (over 3,000 Islands)
Longest Railway	Trans-Siberian Railway (6,000 miles Long)	Tallest Active Geyser	Giant (Geyser) Yellowstone Park, USA 200 ft. high
Longest River	Nile (6690 km), Amazon (6570 km)	Largest River Basin	Amazon Basin (27, 20,000 sq. mile)
Longest River Dam	Hirakund Dam (Orissa), India (15.8 miles.)	World Rainiest Spot	Cherrapunji (Mawsynram), India
Largest Sea-bird	Albatross		
Largest Sea (inland)	Mediterranean		
Brightest Star	Sirius (also called Dog star)		

Largest Gorge	Grand Canyon, on the Colorado River, U.S.A.
Lightest Gas	Hydrogen
Lightest Metal	Lithium
Highest Melting Point	Tungsten, 3,410°C
Hardest Substance	Diamond
Longest Animal	Blue Whale, (recorded length 106 ft., weight-195 tons)
Longest Life Span of an Animal	190 to 200 years, (Giant tortoise)
Largest Land Animal	African Bush Elephant
Fastest Animal	Cheetah (Leopard) 70 mph
Longest Jump Animal	Kangaroo
Longest Wing Spread Bird	Albatross
Slowest Animal	Snail
Domestic Dog	Irish Wolf Hound
Fastest Dog	Persian Grey Hound (speed 43 m.p.h)
Longest Poisonous Snake	King Cobra
Biggest Flower	Rafflesia (Java)
Largest Stadium	Strahov Stadium in Prague, (the Czech Republic)
Largest Church	Basilica of St. Peter, Vatican City, Rome, Italy
Largest Temple	Angkor Vat (Cambodia)
Largest Diamond Mine	Kimbarley (S. Africa)
Largest River in Volume	Amazon, Brazil
Longest Corridor	Rameshwaram Temple's Corridor (5000 ft.)
Highest Straight Dam	Bhakhra Dam
Highest Capital City	La Paz (Bolivia)
Largest Asian Desert	Gobi, Mongolia
Largest Democracy	India

Longest Thoroughfare	Verazano-Narrows, New York City Harbour
Largest Neck Animal	Giraffe
Largest Animal of the Cat Family	Lion
Most Intelligent Animal	Chimpanzee
Bird, that never makes its nests	Cuckoo
Wingless Bird	Kiwi
Reptile which changes its colors	Chameleon
Largest Mammal	Whale

### Geographical Epithets—World

America Motor City	Detroit
Britain of the South	New Zealand
China's Sorrow	River Hwang Ho
City of Dreaming Spires	Oxford (England)
City of Eternal Springs	Quito (S. America)
City of Flowers	Cape Town (S. Africa)
City of Golden Gate	San Francisco (USA)
City of Magnificent Buildings	Washington (USA)
City of Quiet thoroughfares	Venice
City of Seven Hills	Rome (Italy)
City of Skyscrapers	New York (USA)
Cockpit of Europe	Belgium
Dark Continent	Africa
Emerald Isle	Ireland
Empire City	New York
Eternal City of Hopes	Rome, Italy
Forbidden City	Lhasa (Tibet)
Garden City	Chicago
Garden in the Desert	Ethiopia
Garden of England	Kent (England)

Gate of Tears	Strait of Bab-El-Mandeb	Granary of South India	Tanjore
Golden City	Johannesburg	Great Britain of the Pacific	Japan
Gift of Nile	Egypt	Great White Way	Broadway, New York
Granite City	Aberdeen	Horn of Africa	Somalia
Hanging Valleys	Valley of Switzerland	Key to Mediterranean	Gibraltar
Hermit Kingdom	Korea	Land of Contrasts	Colombia
Herring Pond	Atlantic Ocean	Land of Fertile Fields	Algeria
Holy Land	Palestine	Land of Five Rivers	Punjab, India
Human Equator of the Earth	Himalayas	Land of Five Seas	South West Asia
Island Continent	Australia	Land of Golden Fiber	Bangladesh.
Island of Cloves	Zanzibar	Land of Golden Fleece	Australia
Island of Pearls	Bahrain (Persian Gulf)	Land of Golden Pagoda	Myanmar
Islands of Sunshine	West Indies	Land of Kangaroo	Australia
Kashmir of Europe	Switzerland	Land of Lakes	Scotland
Bengal's Sorrow	Damodar River	Land of Lilies	Canada
Big Apple	New York	Land of Maple	Canada
Blue Mountains	Nilgiri Hills	Land of Midnight Sun	Norway
Buffer State of Asia	Afghanistan	Land of Mighty Rivers	Nigeria
City of angels	Bangkok	Land of Milk and Honey	Lebanon
City of Bazaars	Cairo	Land of Morning Calm	Korea
City of Conference	Geneva	Land of Mountain	Nepal
City of Cosmonauts	Moscow	Land of Prophets	Palestine
City of Magnificent Distance	Washington, DC, USA	Land of Rising Sun	Japan
City of Palaces	Kolkata	Land of Setting Sun	United Kingdom
City of Parks	Kiev	Land of Thousand Elephants	Laos
City of Peace	Baghdad	Land of Thousand Lakes	Finland
City of Space Flights	Cape Kennedy	Land of Thunderbolt	Bhutan
Gateway of India	Mumbai	Land of White Elephant	Thailand
Gateway to the East	Beirut	Manchester of Japan	Osaka
Gateway to the Gulf	Abu Dhabi	Mosquito Coast	Nicaragua
Gibraltar of Indian Ocean	Aden	Never Never Land	Prairies of N. Australia

Pearl of East	Penang
Pearl of the Antilles	Cuba
Pearl of the Pacific	Guayaquil Port of Ecuador
Pillars of Hercules	Straits of Gibraltar
Pink City	Jaipur
Playground of Europe	Switzerland
Playground of India	Kashmir
Pyramid City	Cairo
Quaker City	Philadelphia, USA
Queen of Arabian Sea	Kochi
Queen of the Adriatic	Venice, Italy
Remnant of Mighty Empire	Austria
River in the Sea	Gulf Stream
Roof of the World	The Pamirs (Tibet)
Saint of the Gutters	Mother Teresa
Sickman of Europe	Turkey
Site of Ancient Civilization	Iraq
Spice Garden of India	Kerala
Sugar Bowl of the World	Cuba
Switzerland of Africa	Swaziland
Venice of the East	Bangkok
Venice of the North	Stockholm, Sweden
White City	Belgrade, Yugoslavia
Whiteman's Grave	Guinea Coast
Windy City	Chicago, USA
Workshop of Europe	Belgium
World's Loneliest Island	Tristan Da Cunha
World's Bread Basket	Prairies of N. America
Worlds Chocolate Capital	Hershey Pennsylvania

## POPULAR QUOTATIONS

1. Swaraj is my Birthright.  
— *Bal Gangadhar Tilak*
2. Take care to get what you like or you will be forced to like what you get.  
— *GB Shaw*
3. A thing of beauty is a joy forever.  
— *John Keats*
4. To be and not to be that is the question.  
— *Shakespeare*
5. Dilli Chalo.  
— *Netaji Subhash Chandra Bose*
6. Superstition is the religion of feeble minds.  
— *Edmund Burke*
7. Let a hundred flowers bloom and let a thousand school of thought contend.  
— *Mao-Ste-Tunng*
8. Aram Haram Hai.— *Jawahar Lal Nehru*
9. Where wealth accumulates, men decay.  
— *Goldsmith*
10. Beauty is truth, truth is beauty, that is all.  
— *John Keats*
11. I came, I saw, I conquered.  
— *Shakespeare*
12. Good Government is no substitute for self government. — *Alfred Tennyson*
13. A democratic Government is of the people, for the people and by the people.  
— *Abraham Lincoln*
14. Jay Hind.  
— *Netaji*
15. Law grinds the poor and rich men rule the men.  
— *Gold Smith*
16. The human soul needs actual beauty more than bread. — *D.H. Lawrence*
17. War is the greatest crime man perpetrates against man. — *Zarathustra*
18. There never was a good war or a bad peace. — *Benjamin Franklin*
19. The only man who never makes mistakes is the man who never does anything.  
— *Theodore Roosevelt*
20. Truth and Non-violence is my God.  
— *M.K. Gandhi*
21. Jai Jawan, Jai Kisan.  
— *Lal Bahadur Shastri*
22. Eureka Eureka.  
— *Archimedes*

24. Just as I would not like to be a slave,  
so I would not like to be a master.  
— *Abraham Lincoln*
25. Brevity is the soul of wit.  
— *Shakespeare*
26. East is east and west is west and never  
the twin shall meet. — *Kipling*
27. Knowledge is Power. — *Hobbes*
28. Man is by nature a political animal.  
— *Aristotle*
29. Temptation usually comes in through  
a door that has deliberately been left  
open. — *Arnold Glasow*
30. I therefore want freedom immediately  
this very night, before dawn if it can be  
had? — *Gandhiji*
31. Man is not the creature of circumstance.  
Circumstances are the creature of men.  
— *Disraeli*
32. Excellent things are rare. — *Plato*
33. Well done is better than well said.  
— *Benjamin Franklin*
34. Ambition is like love: Impatient both of  
delays as well as rivals. — *Buddha*
35. The child is father of the man.  
— *William Wordsworth*
36. Faith is the bird that feels the light when  
the dawn is still dark.  
— *Rabindra Nath Tagore*
37. Patriotism is religion and religion is love  
for India. — *Bankim Chandra Chatterjee*





## INDIAN PANORAMA

## NATIONAL INSIGNIA

### ■ EMBLEM

- The National Emblem of India is an adaptation of the Buddhist Lion Capital of **Ashoka at Sarnath**, near Varanasi in Uttar Pradesh.
- The words *Satyameva Jayate* are inscribed below the base plate of the Emblem in the Devanagari script. The words Satyameva Jayate are taken from the Mundakka Upanishad, meaning '*Truth alone triumphs*'.

### ■ FLAG

- The National Flag is a horizontal tricolour of deep saffron (Kesaria) at the top, White in the middle and dark green at the bottom.
- The National Flag of India was adopted by the Constituent Assembly on 22nd July, 1947.
- **Saffron** (Kesaria) stands for courage, sacrifice and renunciation. **White** stands for truth and purity; truth in words and actions and purifying thoughts. **Green** is the symbol of life, abundance and prosperity.
- **Chakra** is the symbol of progress and of movement.

### ■ ANTHEM

- **Jana-Gana-Mana**: The song was composed originally in Bengali by **Rabindranath Tagore**, adopted in its Hindi version is our National Anthem.
- Its Hindi version was adopted by the Constituent Assembly as the National Anthem of India on 24 January 1950.
- The playing time of the full version of the National Anthem is approximately **52 seconds**.
- The song 'jana-gana-mana' was first published in January 1912, under the title 'Bharat Vidhata' in the Tatva Bodhini Patrika edited by Tagore himself. The song was translated into English by Tagore in 1919, under the title '*Morning Song of India*'.

### ■ SONG

- The song **Vande Mataram**, composed in Sanskrit by Bankim Chandra Chatterji, is our National Song.
- It was adopted by the Constituent Assembly on 24 January 1950, along with National Anthem. It has an equal status with 'Jana-gana-mana'. It was first sung at the 1896 Session of the Indian National Congress.
- The National Song is taken from Bankim Chandra Chatterji's novel **Anandmath**, published in 1882.

### ■ ANIMAL

- The **Tiger** is the National Animal of India. It is the symbol of India's wealth of wildlife.
- **Lion** was the National Animal of India till 1972. Later on, it was replaced by tiger.

### ■ BIRD

- The **Peacock** *Pavo cristatus* (Linnaeus) is the National Bird of India. It is symbolic of qualities like beauty and grace.

### ■ FRUIT

- The **Mango** is the National Fruit.

### ■ TREE

- The National Tree of India is **The Banyan Tree** (Bargad).

### ■ SPORT

- **Hockey** is considered the National Game of India.

### ■ CALENDAR

- The National Calendar based on the **Saka Era** with Chaitra as its first month and a normal year of 365 days was adopted from 22 March 1957.

### ■ FLOWER

- Lotus scientifically known as *Nelumbo nucifera* is the National Flower of India.

## RIVER

- The Ganga (Ganges) is the National River of India.

### First in India (Male Personalities)

Role	Male Personalities
The First Foreigner to Receive Bharat Ratna	Khan Abdul Ghaffar Khan
The First Person to Receive Nobel Prize in Economics	Amartya Sen
The First Chief Justice of Supreme Court	Justice Hiralal J Kania
The First Governor of Bengal	Lord Clive
The First Governor General of Bengal	Warren Hastings
The First Indian To Pass I.C.S.	Surendra Nath Bannerjee
The First Indian Cosmonaut	Sqn. Ldr. Rakesh Sharma
The First Temporary President of Constituent Assembly	Dr. Sachchida Nand Sinha
The First Indian to Get Jnanpeeth Award	G Shankar Kurup
The First Indian Pilot	JRD Tata
The First Chairman of Prasar Bharti	Nikhil Chakravorty
The First Judge To Face Impeachment in Lok Sabha	Justice V Ramaswami
The First Field Marshall	Arjan Singh
The First Indian Test Cricketer	KS Ranjit Singh
The First Bar-at-law	JM Tagore
The First Indian Member of House of Lords (British)	Lord SP Sinha
The First Indian to Circumnavigate The Globe	Lt. Col. KS Rao
The First Chairman of Rajya Sabha	SV Krishnamurthy
The First Dalit President of India	KR Narayanan
The First Deputy Prime Minister	Vallabh Bhai Patel

Role	Male Personalities
The First Ethnic Indian Prime Minister of Fiji	Mahendra Chaudhury
The First Indian Cricketer to Score Three Centuries in Three Matches Successive on Debut	Mohd. Azharuddin
The First Surveyor General of India	Sir George Everest
The First Indian Johann Sebastian Bach	Ustad Ali Akbar Khan
India's First Longest Serving Chief Minister	Jyoti Basu
The Only Army Chief to be Awarded with Mahavir Chakra Twice	Late Gen. AS Vaidya
The First Sportsman Ever to Win Gold Medal in Shooting in the World Shooting Championship	Abhinav Bindra
The First Indian to Ski to the North Pole	Ajeet Bajaj
The First Wonder Child of Odisha Only about 4 Years and a half of Age Completes a Race of 65 km.	Budhia
The first Indian to Set a World Record of Ever Having Reached the Highest of Heights Yet in a Hot Balloon	Vijaypath Singhamia
The First Indian to Win An Olympic Bronze	Khashaba Jadhav
The First Indian to Win the All England Open Badminton Tournament	Pullela Gopi Chand
The First Indian to Win the World Billiards Championship	Wilson Jones
The First Minister Without Portfolio	N. Gopalswami Ayengar
The First Photographer in India	Raja Deendayal
The First President of the Indian Union of Civil Liberties	Rabindranath Tagore

Role	Male Personalities	Role	Male Personalities
The First Prime Minister to Win a Popular Entertainment Award	Atal Behari Vajpayee	The First European to Invade India	Alexander
The First Secretary General of South-South Commission	Dr. Manmohan Singh	The First Fighter Pilot to Win the Param Vir Chakra	Flying Officer Nirmaljeet Singh Sekhon (Posthumous)
The First Indian to Cross Seven Important Seas by Swimming	Bula Chaudhury	The First Foreign Secretary of Free India	KPS Menon
The First Sikh Prime Minister of India	Dr. Manmohan Singh	The First Indian to be Awarded with the 'Victoria Cross'	Khuda Dad Khan
The First Indian Cricketer to Make Double Centuries Five Times	Rahul Dravid	The First Indian to be Elected a Member of British Parliament	Dadabhai Naoroji
The First Indian Cricketer to Score Triple Century in Test	Virendra Sehwag	The First Indian to be Elected to the US House of Representatives	Dilip Singh Saund
The First Indian Judge of International Court of Justice	Dr. Nagendra Singh	The First Indian to Hoist National Flag over the North Pole	Squadron Leader Sanjay Thapar
The First Indian Member of Viceroy's Executive Council	SP Sinha	First Indian to Record a Song on a Gramophone Disc	Sashi Mukhi
The First Indian to Reach Deep Sea Floor in the Mid Atlantic	PS Rao	The First Vice President of India	Dr. Radhakrishnan
The First person to reach Mount Everest without Oxygen	Sherpa Arga Dorji	The First Education Minister	Abul Kalam Azad
The First British Prime Minister to Visit India	Harold Macmillan	The First Home Minister of India	Sardar Vallabh Bhai Patel
The First Chairman of the University Grants Commission	SS Bhatnagar	The First Indian Air Chief Marshal	S. Mukherjee
The First Chief Election Commissioner of India	Sukumar Sen	The First Indian Naval Chief	Vice Admiral RD Katari
The First Chief Minister of the Tri-Lingual Bombay Presidency	BG Kher	The First Judge of International Court of Justice	Dr. Nagendra Singh
The First Commander-in-Chief	Gen. Sir Roy Bucher	The First Person to Recieve Paramveer Chakra	Major Somnath Sharma
The First Dalit Lok Sabha Speaker	GMC Balayogi	The First Person to Reach Mt. Everest Without Oxygen	Sherpa Anga Dorjee
The First Director General of ICAR	BP Pal	The First Chief Election Commissioner	Sukumar Sen
		The First Person to Receive Magasasay Award	Acharya Vinoba Bhave

Role	Male Personalities	Role	Female Personality
The First Person of Indian Origin to Receive Nobel Prize In Medicine	Hargovind Khurana	The Fastest Asian to Swim Across the English Channel	Anita Sood
The First Chinese Traveller to Visit India	Fa-Hien	The First All-women Crew to Fly an Air Force Chetak Helicopter	Flight Cadets Cheryl Dutta and Simran Sodhi of IAF
The First Person to Receive Stalin Prize	Saifuddin Kitchlu	The First Indian Woman Magistrate Appointed in United Kingdom	Kantha Talwar
The First Person to Resign from the Central Cabinet	Shyama Prasad Mukherjee	The First Woman Cheif Engineer	P.K. Tresia Nanguli

### First in India (Female Personalities)

Role	Female Personality
The First Woman Chairperson of National Woman Commission	Jayanti Patnayak
The First Indian Woman to Receive Asiad Gold Medal	Kamalji Sandhu
The First Woman Speaker of State Assembly	Shano Devi
The First Actress in the Indian Cinema	Devika Rani
The First Woman Finger Prints Expert in India	Sita Varthambal and Bhrangathambal
The First Woman Doordarshan News Reader	Pratima Puri
The First Indian Woman to Reach in Olympic Games	Sini Abraham
The First Indian Woman to Receive Norman Borlaug Award	Dr. Amrita Patel
The First Indian Woman IAS Officer	Anna George
The First Woman President of Student's Union	Anju Sachdeva of Delhi University
The First Woman Chairperson of Rajya Sabha	Violet Alva in 1962
Delhi's First Mayor	Aruna Asaf Ali
Delhi's First Woman Chief Secretary	Shailja Chandra
The First Indian Woman at Antarctica	Meher Moos in 1976
The First Woman Foreign Minister	Lakshmi N. Menon
The First Woman Commercial Pilot	Prem Mathur of Deccan Airways
The First Woman Sahitya Award Winner	Amrita Pritam
The First Woman President of Indian Science Congress	Dr. Ashima Chatterjee
The First Woman to Win WTA Tennis Tournament	Sania Mirza
The First Chief Justice Of Mumbai High Court	Justice Sujaata B. Manohar
The First Indian Woman Advocate	Regina Guha
India's First Woman Railway Driver	Surekha Shankar Yadav
India's First Woman Tabla Maestro	Dr. Aban Mistry
India's First Recognized Billionth Citizen	Astha
India's First Woman Airbus Pilot	Durba Banerjee
The First Woman Secretary General of Rajya Sabha	V.S. Rama Devi
The First Indian Woman to Win Magsasay Award	Kiran Bedi
The First Indian Woman Cricketer to Get 100 Wickets	Diana Eduljee

Role	Female Personality
The First Indian Paratrooper of Indian Air Force	Nita Ghose
The First Indian Woman to Complete Her MBBS	Kadambini Ganguli Bose in 1888
The First Indian Woman Barrister	Cornotia Sorabji
The First Woman Surgeon	Dr. Prema Mukherjee
The First Woman to Get Arjun Award	N. Lumsden (1961)
The First Woman Chairman of Bank	Tarzani Vakil
The First woman Ambassador from India	Vijay Lakshmi Pandit
The First Woman Central Minister	Rajkumari Amrit Kaur
The First Woman Film Star to be a Member of Rajya Sabha	Nargis Dutt
The First Woman Governor of Tamil Nadu	Justice M. Fatima Beevi
The First Woman Judicial Officer	Anna Chandy
The First Woman Minister of an Indian state	Vijay Lakshmi Pandit
The First Woman Speaker of an Indian state	Shano Devi
Grandma Madonna from India	Asha Bhonsle
India's First Test Tube Baby	Kruti Parekh
The First India Woman Mayor in United Kingdom	Lata Patel
The First Indian Woman President of Indian National Congress	Sarojini Naidu
The First Indian Woman Producer and Director	Fatima Begum
The First Indian Woman to Become Miss Universe	Sushmita Sen
The First Indian Woman to Go in Space	Kalpana Chawla

Role	Female Personality
The First woman to head any Wakf Board in India	Bader Sayeed
The First Indian Woman to Reach the Final of an Olympic event	PT Usha
The First Indian Woman to Win a Medal in an Olympic event	Karnam Malleswari
The First Indian Woman Boxer to Win an International event	MC Merykom
The First Indian Woman to Swim Across the English Channel	Arati Saha
First Miss Universe of the New Millennium	Lara Dutta

### Indian States/Union Territories and their Capitals

State/Union Territory	Capital	Year (capital was established)
Andaman and Nicobar Islands	Port Blair	1956
Andhra Pradesh	Hyderabad	1956
Arunachal Pradesh	Itanagar	1987
Assam	Dispur	1975
Bihar	Patna	1912
Chandigarh	Chandigarh	1966
Chhattisgarh	Raipur	2000
Dadra and Nagar Haveli	Silvassa	1945
Daman and Diu	Daman	1987
National Capital Territory of Delhi	New Delhi	1931
Goa	Panaji	1961
Gujarat	Gandhinagar	1960
Haryana	Chandigarh	1966
Himachal Pradesh	Shimla	1971

State/Union Territory	Capital	Year (capital was established)
Jammu and Kashmir	Srinagar (Summer) Jammu (Winter)	1947
Jharkhand	Ranchi	2000
Karnataka	Bengaluru	1940
Kerala	Thiruvanan-thapuram	1956
Lakshadweep	Kavaratti	1956
Madhya Pradesh	Bhopal	1956
Maharashtra	Mumbai	1818, 1960
Manipur	Imphal	1947
Meghalaya	Shillong	1970
Mizoram	Aizawl	1972
Nagaland	Kohima	1963
Odisha	Bhubaneswar	1948
Puducherry	Puducherry	1954
Punjab	Chandigarh	1960
Rajasthan	Jaipur	1950
Sikkim	Gangtok	1890
Tamil Nadu	Chennai	1956
Telangana	Hyderabad	2014
Tripura	Agartala	1956
Uttar Pradesh	Lucknow	1938
Uttarakhand	Dehradun	2000
West Bengal	Kolkata	1947

### Newspapers' and Journals' Founders in India

Newspaper/Journal Name	Founder
Bengal Gazette (1780) (India's First Newspaper)	JK Hikki
Kesari	BG Tilak
Maharatta	BG Tilak
Sudharak	GK Gokhale
Amrita Bazar Patrika	Sisir Kumar Ghosh and Motilal Ghosh
Vande Mataram	Aurobindo Ghosh
Native Opinion	VN Mandalik
Kavivachan Sudha	Bhartendu Harishchandra
Rast Goftar (first newspaper in Gujarati)	Dadabhai Naoroji

Newspaper/Journal Name	Founder
New India (Weekly)	Bipin Chandra Pal
Statesman	Robert Knight
Hindu	Vir Raghavacharya and GS Aiyar
Sandhya	BB Upadhyaya
Vichar Lahiri	Krishnashastri Chiplunkar
Hindu Patriot	Girish Chandra Ghosh (later Harish Chandra Mukherji)
Som Prakesh	Ishwar Chandra Vidyasagar
Yugantar	Bhupendranath Data and Barinder Kumar Ghosh
Bombay Chronicle	Firoze Shah Mehta
Hindustan	MM Malviya
Mooknayak	BR Ambedkar
Comrade	Mohammad Ali
Tahzib-ul-Akhlaq	Sir Syyed Ahmed Khan
Al-Hilal	Abul Kalam Azad
Al-Balagh	Abul Kalam Azad
Independent	Motilal Nehru
Punjabi	Lala Lajpat Rai
New India (Daily)	Annie Besant
Commonweal	Annie Besant
Pratap	Ganesh Shankar Vidyarthi
Essays in Indian Economics	MG Ranade
Samvad Kaumudi (Bengali)	Ram Mohan Roy
Mirat-ul-Akbar	Ram Mohan Roy (first Persian Newspaper)
Indian Mirror	Devendra Nath Tagore
Nav Jeevan	MK Ghandhi
Young India	MK Ghandhi
Harijan	MK Ghandhi
Prabudha Bharat	Swami Vivekananda

Newspaper/Journal Name	Founder
Udbodhana	Swami Vivekananda
Indian Socialist	Shyamji Krishna Verma
Talwar (in Berlin)	Birendra Nath Chattopadhyaya
Free Hindustan (in Vancouver)	Tarak Nath Das
Hindustan Times	KM Pannikar
Kranti	Mirajkar, Joglekar, Ghate

### Famous Nicknames of Eminent Persons

Nickname	Person
Father of the Nation	Mahatma Gandhi
Bapu	Mahatma Gandhi
Frontier Gandhi, Badshah Khan	Khan Abdul Ghaffar Khan
Grand Old man of India	Dadabhai Naoroji
Strong (Iron) Man of India	Sardar Vallabhbhai Patel
Man of Peace	Lal Bahadur Shastri
Punjab Kesari	Lala Lajpat Rai
Bengal Kesari	Ashutosh Mukherji
Bihar Kesari	Dr. Srikrishna Singh
Andhra Kesari	T. Prakasam
Sher-e-Kashmir	Sheikh Abdullah
Bangabandhu	Sheikh Mujibut Rahman
Deshbandhu	Chitta Ranjan Das
Deenbandhu	CF Andrews
Lokmanya	Bal Gangadhar Tilak
Loknayak	Jayaprakash Narayan
Jana Nayak	Karpuri Thakur
Rajarshee	Purushottam Das Tandon
Gurudev	Rabindranath Tagore
Guruji	MS Golvalkar
Desh Ratna	Dr. Rajendra Prasad
Ajatshatru	Dr. Rajendra Prasad
Mahamana	Pt. Madan Mohan Malaviya
Netaji	Subhash Chandra Bose

Nickname	Person
Chacha	Jawaharlal Nehru
Rajaji/C.R.	Chakravarti Rajagopalachari
Sparrow	Major General Rajinder Singh
Young Turk	Chandra Shekhar
Tau	Chaudhury Devi Lal
Sahid-e-Azam	Bhagat Singh
Nightingale of India	Sarojini Naidu
Lady with the lamp	Florence Nightingale
Swar Kokila	Lata Mangeshkar
Udanpari	P.T. Usha
Mother	Mother Teresa
Vishwa Kavi	Rabindranath Tagore
Kaviguru	Rabindranath Tagore
Sardar	Vallabhbhai Patel
Tota-e-Hind	Amir Khushro
Lal, Bal, Pal	Lala Lajpat Rai, Bal Gangadhar Tilak and Bipin Chandra Pal
Bihar Vibhuti	Dr. Anugrah Narayan Singh
Babuji	Jagjeevan Ram
Napoleon of India	Samudra Gupta
Shakespeare of India	Mahakavi Kalidas
Machiavelli of India	Chanakya
Akbar of Kashmir	Jainul Abdin
Father of Gujarat	Ravi Shankar Maharaj
Grandfather of Indian Films	Dhundiraj Govind Phalke
Morning Star of India Renaissance	Raja Ram Mohan Roy
King Maker of Indian History	Sayyed Bandhu
Anna	CN Annadurai
Haryana Hurricane	Kapil Dev
Little Master	Sunil Gavaskar
Magician of Hockey	Dhyanchand
Deshpriya	Yatindra Mohan Sengupta
Kuvempu	KV Puttappa

### Railway Zones in India

Name	Code	Year	H.Q.	Division
Eastern Railway	ER	1952	Kolkata	Howrah, Sealdah, Asansol, Malda
North Central Railway	NCR	2003	Allahabad	Allahabad, Agra, Jhansi
North Eastern Railway	NER	1952	Gorakhpur	Izzatnagar, Lucknow, Varanasi
North Western Railway	NWR	2002	Jaipur	Jaipur, Ajmer, Bikaner, Jodhpur
Central Railway	CR	1951	Mumbai	Mumbai, Bhusawal, Pune, Solapur, Nagpur
East Central Railway	ECR	2001	Hajipur	Danapur, Dhanbad, Mughalsarai, Samastipur, Sonpur
East Coast Railway	ECoR	2001	Bhubaneswar	Khurda Road, Sambalpur, Visakhapatnam
Northeast Frontier Railway	NFR	1958	Guwahati	Alipurduar, Katihar, Rangia, Lumding, Tinsukia
Northern Railway	NR	1952	Delhi	Delhi, Ambala, Firozpur, Lucknow, Moradabad
South Central Railway	SCR	1966	Secunderabad	Secunderabad, Hyderabad, Guntakal, Guntur, Nanded, Vijayawada
South East Central Railway	SECR	2003	Bilaspur	Bilaspur, Raipur, Nagpur
South Eastern Railway	SER	1955	Kolkata	Adra, Chakradharpur, Kharagpur, Ranchi
South Western Railway	SWR	2003	Hubli	Hubli, Bengaluru, Mysore
Southern Railway	SR	1951	Chennai	Chennai, Trichy, Madurai, Palakkad, Salem, Thiruvananthapuram
West Central Railway	WCR	2003	Jabalpur	Jabalpur, Bhopal, Kota
Western Railway	WR	1951	Mumbai	Mumbai Central, Ratlam, Ahmedabad, Rajkot, Bhavnagar, Vadodara
Kolkata Metro Railway	KNR	2009	Kolkata	Kolkata

### Railway Manufacturing Units

Name	Abbr.	Year Established	Location	Main products
Rail Coach Factory	RCF	1986	Kapurthala	Passenger coaches
Rail Spring Karkhana	RSK	1988	Gwalior	Passenger coach springs
Rail Wheel Factory	RWF	1984	Bangaluru	Railway wheels and axles
Rail Wheel Factory	RWF	2012	Chhapra	Railway wheels
Bharat Wagon and Engineering	BWEL	1978	Muzaffarpur	Passenger Coaches (manufacturing + maintenance)

Name	Abbr.	Year Established	Location	Main products
Jamalpur Locomotive Workshop	JLW	1862	Jamalpur	Diesel/Electric Loco maintenance
Golden Rock Railway Workshop	GOC	1928	Trichy	Diesel-electric Locomotives
Chittaranjan Locomotive Works	CLW	1947	Chittaranjan, Asansol	Electric Locomotives
Diesel Locomotive Works	DLW	1961	Varanasi	Diesel Locomotives
Diesel-Loco Modernisation Works	DMW	1981	Patiala	Diesel-electric Locomotives
Integral Coach Factory	ICF	1952	Chennai	Passenger Coaches
Rail Coach Factory	RCF	2012	Raebareli	Passenger Coaches

### Airports in India

State	City	Airport
Andhra Pradesh	Hyderabad	Rajiv Gandhi International Airport
Assam	Guwahati	Lokpriya Gopinath Bordoloi International Airport
Bihar	Gaya	Gaya Airport
Delhi	New Delhi	Indira Gandhi International Airport
Gujarat	Ahmedabad	Sardar Vallabhbhai Patel International Airport
Karnataka	Bengaluru	Bengaluru International Airport
Karnataka	Mangalore	Mangalore Airport
Kerala	Kochi	Cochin International Airport
Kerala	Kozhikode	Calicut International Airport
Kerala	Thiruvananthapuram	Trivandrum International Airport
Madhya Pradesh	Bhopal	Raja Bhoj Airport
Madhya Pradesh	Indore	Devi Ahilyabai Holkar Airport
Maharashtra	Mumbai	Chhatrapati Shivaji International Airport
Maharashtra	Nagpur	Dr. Babasaheb Ambedkar International Airport
Maharashtra	Pune	Pune Airport
Meghalaya	Shillong	Zaruki International Airport
Rajasthan	Jaipur	Jaipur International Airport
Tamil Nadu	Chennai	Chennai International Airport
Tamil Nadu	Coimbatore	Civil Aerodrome
Tamil Nadu	Tiruchirappalli	Tiruchirapalli International Airport
Uttar Pradesh	Lucknow	Amausi Airport
West Bengal	Kolkata	Netaji Subhash Chandra Bose International Airport

### National Highways in India

National Highway	Route	Distance (km)
NH-1	Jalandhar-Uri	663
NH-1A	New Delhi-Ambala-Jalandhar-Amritsar	456
NH-2	Delhi-Mathura-Agra-Kanpur-Allahabad-Varanasi-Kolkata	1465
NH-3	Agra-Gwalior-Nasik-Mumbai	1161
NH-4	Thane and Chennai via Pune and Belgaum	1235
NH-5	Kolkata-Chennai	1533
NH-6	Kolkata-Dhule	1949
NH-7	Varanasi-Kanyakumari	2369
NH-8	Delhi-Mumbai (via Jaipur, Baroda and Ahmedabad)	1428
NH-9	Mumbai-Vijaywada	841
NH-10	Delhi-Fazilka	403
NH-11	Agra-Bikaner	582
NH-12	Jabalpur-Jaipur	890
NH-13	Sholapur-Mangalore	691
NH-15	Pathankot-Samakhiali	1526
NH-17	Panvel-Edapally	1269
NH-22	Ambala-Shipkitr	459
NH-28	Lucknow-Barauni	570
NH-31	Barhi-Guwahati	1125
NH-37	Panchratna (near Goalpara)-Saiknoaghat	680
NH-44	Shillong-Sabroom	630
NH-49	Cochin-Dhanshkodi	440
NH-52	Baihata-Junction NH-47 (near Saikhoaghat)	850
NH-58	Delhi-Mana	538
NH-65	Ambala-Pali	690
NH-75	Gwalior-Ranchi	955
NH-76	Pindwara-Allahabad	1007
NH-78	Katni-Gumla	559
NH-86	Kanpur-Dewas	674

NH-91	Ghaziabad-Kanpur	405
NH-150	Aizawl-Kohima	700
NH-200	Raipur-Chandikhal	740
NH-205	Ananthapur-Chennai	442
NH-209	Dindigul-Bengaluru	456
NH-211	Solapur-Dhule	400
NH-217	Raipur-Gopalpur	508
NH-220	Kollam (Quilon)-Teui	265

### Important units/institutes

Institution	Headquarters
Diesel Locomotive Works	Varanasi
Chitranjan Locomotive Works	Chitranjan
Rail Coach Factory	Kapurthala
Integral Coach Factory	Perambur, Kapurthala
Rail Wheel Factory	Bengaluru
Marine Engineering and Research Institute	Kolkata
Marine Engineering and Research Institute	Mumbai
Lal Bahadur Shastri Coastal Research and Higher Study Institute	Mumbai
Indian Inland Waterways Authority	Noida
Maritime Training Institute Powai	Mumbai
Hindustan Shipyard Limited	Visakhapatnam
Central Inland Water Transport Corporation	Kolkata
Civil Aviation Security Bureau	Delhi
National Aviation Management and Research Institute	Delhi
Fire Training Centre	New Delhi
Fire Service Training School	Narainpur (Kolkata)
Indira Gandhi National Flying Academy	Furshatganj (U.P.)

Indian Tourism and  
Travel Management  
Institute Gwalior

National Water  
Sporting Institute Goa

### DEFENCE OF INDIA

- The defence policy of India aims at promoting and sustaining durable peace in the sub-continent 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.
- In 2002, the Defence Ministry given a new name 'Integrated Headquarters of Ministry of Defence'.
- In the contemporary world India has the fourth largest army in the world, the fifth largest air force and the seventh largest navy.

### INDIAN DEFENCE

- The Ministry of Defence comprises four departments:
  - Department of Defence.
  - Department of Defence Production.
  - Department of Defence Research and Development (DRDO).
  - Department of Ex-Serviceman Welfare.

### THE INDIAN ARMY

- It is headed by the "Chief of the Army Staff" and its headquarters are in New Delhi.

### INDIAN NAVY

- It is headed by the Chief of Naval Staff and its headquarters are in New Delhi.

### INDIAN AIR FORCE

- Headed by Chief of the Air Staff, and its headquarters are in New Delhi.

## DEFENCE RESEARCH IN INDIA

### DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION (DRDO)

- It is an agency of the Republic of India, responsible for the development of technology for use by the military, headquartered in New Delhi, India.
- It was formed in 1958, by the merger of Technical Development Establishment and the Directorate of Technical Development and Production with the Defence Science Organisation.

### INTEGRATED GUIDED MISSILE DEVELOPMENT PROGRAMME (IGMDP)

- The IGMDP was launched in 1983, for the development of a comprehensive range of missiles including the intermediate range Agni Missile (surface to surface) and short range missiles such as the Prithvi Ballistic Missile (surface to surface), Akash Missile (surface to air), Astra Missile (air to air), Trishul Missile (surface to air), and Nag Missile (anti tank).

### INDIA'S ATOMIC RESEARCH

- India's atomic energy research started with the establishment of the Atomic Energy Commission on 10 August 1948. Department of Atomic Energy (DAE) was established in 1954, for implementation of atomic energy programmes.

#### Bhabha Atomic Research Centre (BARC):

It was set up in 1957. At present, BARC houses have three research reactors:

- Apsara, a one MW Swimming pool type reactor.
- Cirus, a 40 MW reactor.
- Dhruva, a 100 MW high power nuclear research reactor.

Earlier, there were two more research reactors at BARC:

- (i) Zerlana and (ii) Purnima I-III

**Centre for Advance Technology (CAT):** It was established in 1984, at Indore.

**Indira Gandhi Centre for Atomic Research (IGCAR):** It was set up in 1971, at Kalpakkam

in Madras for research and development of fast breeder technology.

**Atomic Mineral Directorate (AMD):** It is located in Hyderabad.

**Variable Energy Cyclotron Centre (VECC):** It was setup in 1977, at Kolkata as a national centre.

### INDIA'S NUCLEAR TEST

- On 18 May 1974, India conducted her first underground nuclear explosion at Pokhran (Rajasthan) in the Thar Desert at a depth of 100 metres. The code name was '**Buddha is smiling**'.
- For the second time, India conducted on 11 May 1998 three underground nuclear explosions at the same place i.e., Pokhran in the Thar desert of Rajasthan at a depth of 100 metres. The tests were code named 'Operation Shakti'.

### Indian Air Force Command

S. No.	Command	Headquarter
1.	Western command	New Delhi
2.	Central command	Allahabad
3.	Eastern command	Shillong

4.	South-western command	Jodhpur
5.	Training command	Bengaluru
6.	Maintenance command	Nagpur
7.	Southern command	Thiruvananthapuram

### Indian Navy Command

S.No.	Command	Headquarter
1.	Eastern command	Vishakhapatnam
2.	Southern command	Kochi
3.	Western command	Mumbai

### Indian Army Command

S.No.	Command	Headquarter
1.	Western command	Chandigarh
2.	Eastern command	Kolkata
3.	Northern command	56 APO
4.	Southern command	Pune
5.	Central command	Lucknow
6.	Army Training command	Shimla
7.	South-western command	Jaipur

### Defence Production Units

Unit	Established	Total Factories	Places
Goa Shipyard Limited (GSL)	1957	1	Goa
Bharat Electronics Limited (BEL)	1959	9	Bengaluru, Ghaziabad, Pune, Machilipatnam, Taloja (Maharashtra), Panchula (Haryana), Kotadwara, Hyderabad, Chennai.
Hindustan Aeronautics Limited (HAL)	1964	12	Bengaluru, Koraput, Nasik, Karwa, Kanpur, Lucknow, Barrackpur, Hyderabad
Bharat Earth Movers Limited (BEML)	1964	3	Bengaluru, Mysore, Kolar Gold Fields
Bharat Dynamics Limited	1970	1	Hyderabad
Mishra Dhadu Nigam Limited (MIDHANI)	1973	1	Hyderabad

## Paramilitary and Reserved Forces

<p><b>Assam Rifles</b></p>	<ul style="list-style-type: none"> <li>• It was established in 1835 and is the oldest paramilitary force in the country.</li> <li>• Its main objective is to keep vigilance of international borders in North-east and countering insurgency operations in Arunachal Pradesh, Manipur, Mizoram and Nagaland.</li> </ul>	<p><b>Indo-Tibetan Border Police (ITBP)</b></p>	<ul style="list-style-type: none"> <li>• It was established in 1962 after the Chinese attack.</li> <li>• It is basically employed in the Northern borders for monitoring the borders and also to stop smuggling and illegal immigration.</li> </ul>
<p><b>Intelligence Bureau (IB)</b></p>	<ul style="list-style-type: none"> <li>• It was set up in 1920.</li> <li>• Its objective is to collect secret information relating to country's security</li> <li>• It was originally set up as Central Special Branch (CSB) in 1987 and renamed IB in 1920.</li> </ul>	<p><b>Home Guards</b></p>	<ul style="list-style-type: none"> <li>• It was established in 1962 to assist the police in maintaining security, to help defence forces and to help local authorities in case of any eventuality.</li> </ul>
<p><b>Central Reserve Police Force (CRPF)</b></p>	<ul style="list-style-type: none"> <li>• It was set up in 1939.</li> <li>• Its main objective is to assist the State/Union Territory Police in maintenance of law and order.</li> <li>• The 88th Battalion of CRPF, known as 'Mahila Battalion' (commissioned on March 30, 1986) is the world's first paramilitary force comprising entirely of women.</li> </ul>	<p><b>Border Security Force (BSF)</b></p>	<ul style="list-style-type: none"> <li>• It was established in 1965.</li> <li>• It keeps vigil over the international borders against the intrusion in the country.</li> </ul>
<p><b>National Cadet Corps (NCC)</b></p>	<ul style="list-style-type: none"> <li>• It was established in 1948.</li> <li>• Its main objective is to stimulate interest among the youth in the defence of the country in order to build up a reserve manpower to expand armed forces.</li> </ul>	<p><b>Central Industrial Security Force (CISF)</b></p>	<ul style="list-style-type: none"> <li>• It was set up in 1969 after the recommendations of Justice B Mukherji.</li> <li>• Its objective is to monitor the industrial complexes of Central Government.</li> </ul>
<p><b>Territorial Army (TA)</b></p>	<ul style="list-style-type: none"> <li>• It was established in 1948.</li> <li>• It is a voluntary, part-time force (between 18 and 35 years), not professional soldiers, but civilians, who wish to assist in defence of the country.</li> </ul>	<p><b>Coast Guard</b></p>	<ul style="list-style-type: none"> <li>• It was setup in 1978.</li> <li>• Its main objective is to protect the maritime and other national interests in the maritime zones of India.</li> </ul>
<p><b>Central Bureau of Intelligence (CBI)</b></p>	<ul style="list-style-type: none"> <li>• It was established in 1953.</li> <li>• Its objective is to investigate cases of misconduct by public servants, cases of cheating, embezzlement and fraud.</li> <li>• CBI is also entrusted with the investigation of international crime cases in collaboration with INTERPOL.</li> </ul>	<p><b>National Security Guard (NSG)</b></p>	<ul style="list-style-type: none"> <li>• It was established in 1984.</li> <li>• It has been established to counter the surge of militancy in the country.</li> <li>• It is highly trained force which deals with militants effectively.</li> </ul>
<p><b>Rapid Action Force (RAF)</b></p>		<p><b>National Crime Records Bureau (NCRB)</b></p>	<ul style="list-style-type: none"> <li>• It was established in 1986.</li> <li>• Its objective is to collect crime statistics at the national level, information of inter-state and international criminals to help investigation agencies.</li> </ul>

### Air Force Training Centers

Air Force Training Center	Place
Air Force Administrative College	Coimbatore (Tamil Nadu)
Air Force Academy	Hyderabad (Andhra Pradesh)
Air Force Technical College	Jalahalli
Air Force School	Sambre, Belgaum
Flying Instructors' School	Tambaram (Tamil Nadu)
Elementary Flying School	Bidar (Karnataka)
Fighter Training and Transport	Hakimpur and Yelahanka (Karnataka)
Training Wings of the Air Force Institute of Aviation Medicine	Bangluru (Karnataka)
Paratroopers Training School	Agra (Uttar Pradesh)
Navigation and Signal School	Hyderabad (Andhra Pradesh)
College of Air Warfare	Secunderabad (Andhra Pradesh)
Ground Training Institutes	Vadodara (Gujarat) and Barrackpur (West Bengal)

### Naval Training Centers

Naval Training Center	Place
INS Cilka	Bhubaneshwar (Orrisa)
INS Circars	Visakhapatnam (A.P.)
INS Hamla	Malad, Mumbai (Maharashtra)
INS Mandovi	Goa
INS Shivaji	Lonawala (Maharashtra)
INS Valsura	Jamnagar (Gujarat)
INS Venduruthy	Kochi (Kerala)
Naval Academy	Kochi
Navy Shipwright School	Viskhapatnam (A.P.)
Sailor's Training Establishment	Dabolim (Goa)

### Military Training Centers

Military Training Center	Place
National Defence Academy	Khadakvasla (West Bengal)
Indian Military Academy	Dehra Dun (Uttaranchal)
Rashtriya Indian Military College	Dehra Dun (Uttaranchal)
National Defence College	New Delhi
Defence Services Staff College	Wellington
Armed Forces Medical College	Pune (Maharashtra)
Officer's Training School	Chennai (Tamil Nadu)
College of Combat, Mhow (Army War College) Armoured Corps Centre and School	Deolali
College of Military Engineering	Kirkee (Pune) (Maharashtra)
Military College of Telecommunications Engineering	Secunderabad (Andhra Pradesh)
Army Cadet College	Dehra Dun (Uttaranchal)
College of Material Management	Jabalpur (Madhya Pradesh)
High Altitude Warfare School	Gulmarg (J and K)
Army Service Corps School	Bareilly (U.P.)
EME School	Secunderabad (Andhra Pradesh)
Millitary College of Electronics and Mechanical Engineering, Remount and veterinary Corps Centre and School	Merrut (U.P.)
Army Educational Corps Training School and Depot	Pune (Maharashtra)
Corpse of Military Police Centre and School	Bengaluru (Karnataka)
Army School of Physical Training	Pune (Maharashtra)

Army/Air Transport Support School	Agra (U.P.)
Army Clerk Training School	Aurangabad (Maharashtra)
Army School of Mechanical Transport	Bengaluru (Karnataka)
Counter Insurgency and Jungle Warfare School	Vairengte
Institution of Nation Integration	Pune (Maharashtra)

## INDIA'S MISSILE PROGRAMME

### ASTRA

- Astra is an Air to Air missile.
- The Astra missile programme is headed by the Defence Research and Development Organisation (DRDO).
- Warhead: 15 kg pre-fragmented directional.
- Launch Weight: 154 kg
- Body Diameter: 178 mm
- Length: 3570 mm
- Range: 80 km head on, 15 km tail chase.
- Fuze: Radar Proximity (laser proximity to follow).
- Guidance: Inertial midcourse with data-linked updates, active-radar terminal homing.
- Propulsion: Solid rocket motor.

### TRISHUL

- Trishul (Trident) is a short range, quick reaction, all weather surface-to-air missile designed to counter a low-level attack.
- It has been flight tested in the sea-skimming role and also against moving targets.
- It has a range of 9 km and is fitted with a 5.5 kg HE-fragmented warhead.

### NAG

- The Nag (Cobra) is a third generation, all weather, top-attack, fire-and-forget anti-tank guided missile.
- It is one of five missile systems developed by the Defence Research & Development Organization (DRDO) under the Integrated Guided Missile Development Program (IGMDP).

### MAITRI

- The Maitri missile project is a next-generation quick-reaction surface-to-air missile (QRSAM) with a lethal near-hundred per cent kill probability (according to manufacturer's claim) under development by India's Defence Research and Development Organisation.
- It is a short-range (15 km, 9.3 mi) surface-to-air point defense missile system.

### PRITHVI

- Prithvi is a tactical surface-to-surface short-range ballistic missile (SRBM) developed by DRDO of India under the Integrated Guided Missile Development Program.
- It is deployed by India's Strategic Forces Command.
- Prithvi I (SS-150): Army Version [150 km (93 mi) range with a payload of 1,000 kg]
- Prithvi II (SS-250): Air Force Version [250 km (160 mi) range with a payload of 500 kg]
- Prithvi III (SS-350): Naval Version [350 km (220 mi) range with a payload of 1000 kg]

### AKASH

- The Akash (Sky) is a medium-range, theatre defence, surface-to-air missile.
- It operates in conjunction with the Rajendra surveillance and engagement radar.
- This system will replace the SA-6/Straight Flush in Indian service and is also expected to be integrated with the S-300V (SA-10 Grumble) low-to-high altitude SAM in an integrated air defence system to counter SRBM/IRBM threats along the Pakistani and Chinese borders.

### SHAURYA

- The Shaurya missile is a canister launched hypersonic surface-to-surface tactical missile developed by the Indian Defence Research and Development Organisation (DRDO) for use by the Indian Armed Forces.
- It has a range of between 750 to 1,900 km (470 to 1,180 mi) and is capable of carrying a payload of one ton conventional or nuclear warhead.
- It gives the potential to strike in the short-intermediate range against any adversary.

## DHANUSH

- Dhanush is reportedly a naval version of Prithvi which can be launched from ships.
- Some sources claim that Dhanush is a system consisting of stabilisation platform and missiles, which has the capability to launch both Prithvi II and Prithvi III from ships while others report that Dhanush is a variant of Prithvi-II ballistic missile.

## AGNI

- The Agni missile is a family of medium to intercontinental range ballistic missiles developed by India, named after one of the five elements of nature.
- Agni Missiles are long-range, nuclear weapons capable surface-to-surface ballistic missile. The first missile of the series, Agni-I was developed under the Integrated Guided Missile Development Program and tested in 1991.

Name	Type	Range
Agni-I	MRBM	700-1,250 km (Operational)
Agni-II	IRBM	2,000-3,000 km (Operational)
Agni-III	IRBM	3,500-5,000 km (Operational)
Agni-IV	IRBM	3,000-4,000 km (Operational)
Agni-V	ICBM	5,000-8,000 km (Testing)
Agni-VI	ICBM	8,000-10,000 km (Underdevelopment)

## SURYA

- The Surya missile is an intercontinental ballistic missile speculated to be in development by India.

## NIRBHAY

- Nirbhay is a long range, subsonic cruise missile developed in India by the Defence Research and Development Organisation.
- Nirbhay is an all-weather low-cost long-range cruise missile with stealth and high accuracy. The missile has a range of more than 1,000 km.
- It weighs about one tonne and has a length of 6 metres.
- It carries a ring laser gyroscope for high-accuracy navigation and a radio altimeter for the height determination.

- It is capable of being launched from multiple platforms on land, sea and air and shall be inducted into Indian Navy, Army, and Air Force. In particular, Nirbhay is being adapted for the Indo/Russian Su-30MKI. The missile is capable of carrying nuclear warheads.

## BRAHMOS

- The BrahMos is a short-range ramjet supersonic cruise missile that can be launched from submarines, ships, aircraft or land.
- It is a joint venture between the Russian Federation's NPO Mashinostroyenia and India's Defence Research and Development Organisation (DRDO) who have together formed BrahMos Aerospace Private Limited.
- It is based on the Russian P-800 Oniks cruise missile and other similar sea-skimming Russian cruise missile technology.
- The name BrahMos is a portmanteau formed from the names of two rivers, the Brahmaputra of India and the Moskva of Russia.

## Submarines of Indian Navy

INS Savitri	India's first warship.
INS Shalki	India's first indigenously built submarine.
INS Delhi	India's largest, most sophisticated, indigenously built warship.
INS Vibhuti	Country's first indigenously built missile boat.
INS Chakra	India's first nuclear powered submarine. It has now been decommissioned and returned to Russia.
INS Vipul	Second indigenously built missile boat.
INS Nashak	Third indigenously built missile boat joined the Navy in 1994.

## Defence Institutes

Institution	Headquarters
Air Force Academy	Hyderabad
Air Force Technical College	Bengaluru

College of Military Engineering	Pune	First Complete Banking District	Palakkad, Kerala
Defence Management Institute	Sikandrabad	First District with 100% e-literacy	Malappuram, Kerala
Defence Services Staff College	Wellington	First District with 100% literacy	Ernakulam, Kerala
Directorate General N.C.C.	New Delhi	First IT district	Palakkad, Kerala
Electrical and Mechanical Engineering School	Baroda	First Inter-linked Rivers	Ken-Betwa (UP-MP)
Hindustan Aeronautic Limited	Bengaluru	First Wireless Internet Connectivity City	Mysore, Karnataka
Indian Air Force Training Centre	Chennai	Highest Airport	Kushok Bakula Rimpochhe Airport, Leh Airport in Ladakh (3256m/16080ft high)
Indian Military Academy	Dehradun	Highest Battle Field	Siachen Glacier
Institute of Armament Technology	Pune	Highest Civilian Award	Bharat Ratna
Military College of Electrical and Mechanical Engineering	Sikanderabad	Highest Dam	Tehri Dam on Bhagirathi River, near Tehri, Uttarakhand. Height: 260.5 m (855 ft); Length: 575 m (1,886 ft)
Directorate of National Cadet Core	New Delhi	Highest Female Literacy Rate	Jain (90.6%)
National Defence Academy	Kharagwasala	Highest Gallantry Award	Param Vir Chakra
Naval College of Engineering	Lonavala	Highest Gateway	Buland Darwaza at Fatehpur Sikri near Agra, Built by Akbar (53.5 m/175ft high)
Officers Training Academy	Chennai	Highest Hydel Power Station	Rongton Hydel Project in Kinnaur District of Himachal Pradesh

### Superlatives (India)

Superlative	Location		
Biggest Cantilever Bridge & Biggest Bridge	Rabindra Sethu (also called Howrah Bridge on Hooghly River in Kolkata (457m/1499ft long)		
Biggest Fort	Red Fort, Delhi		
Biggest Stadium	Salt Lake Stadium, in Bengali called Yuva Bharati (Kolkata, West Bengal); capacity: 120,000		
Busiest Airport	Indira Gandhi International Airport Delhi		
Coldest Place	Dras, Jammu & Kashmir		
Fastest Train	Shatabdi Express between New Delhi and Bhopal (it runs 150 kmph from Delhi to Agra; next Agra to Bhopal runs at 140 kmph)		
		Highest Mountain Peak	Kanchenjunga (Sikkim) (8598 m) (Initially K2 was the highest mountain peak in India. But now it is in POK)
		Highest Population Growth Rate Religion	Muslim (29.3%)

Highest Precipitation	Mawsynram, Meghalaya	Largest Fresh Water Lake	Kolleru in Andhra Pradesh
Highest Road	Road at Khardung in the Leh-Manali Sector	Largest Gurudwara	Golden Temple, Amritsar, Punjab
Highest Tower (Minaret)	Qutub Minar, Delhi	Largest Lake	Wular Lake, Jammu & Kashmir
Highest Waterfall	Jog Waterfalls, (on Sharavathi river, 292 metres) Karnataka	Largest Library	National Library, Kolkata
Largest Auditorium	Sri Shanmukhananda hall, Mumbai	Largest Manmade Lake	Govind Sagar, Bhakra, Haryana
Largest Animal Fair	Sonepur Mela, Patna, Bihar	Largest Mosque	Jama Masjid, Delhi (built by Shahjahan in 1644-58)
Largest Botanical Garden	National Botanical Garden, Kolkata	Largest Museum	Indian Museum, Kolkata
Largest Cave	Amarnath (about 44 km from Pahalgam in Jammu and Kashmir)	Largest Ocean Island	Middle Andaman
Largest Cave Temple	Ellora Temples, Aurangabad, Maharashtra	Largest Planetarium	Birla Planetarium, Kolkata
Largest Church	St. Cathedral at Old Goa, 10 km from Panaji	Largest Plateau	Deccan Plateau
Largest Cinema Hall	Thangam (Madurai)	Largest Prison	Tihar Jail, Delhi
Largest city (Area Wise)	Kolkata	Largest Public Sector Bank	State Bank of India
Largest Concentration of Scheduled Tribes	Madhya Pradesh	Largest Public Sector Employer	Indian Railways
Largest Concentration of Scheduled Caste Population	Uttar Pradesh has the largest Scheduled Caste population	Largest Residence	Rashtrapati Bhavan, New Delhi
Largest Delta	Sunderbans (75,000 sq. km) formed by the Ganga and Brahmaputra rivers in West Bengal and Bangladesh.	Largest River Bridge	Farakka Barrage, Kolkata (7,363.6ft)
Largest Desert	Thar or Great Indian Desert, Rajasthan	Largest River Island	Majuli, Brahmaputra river, Assam
Largest District	Ladakh, Jammu & Kashmir	Largest Scheduled Caste Community	Chamar
Largest District (Population)	Medinipur (West Bengal)	Largest State in Area	Rajasthan (3,42,239 sq.km)
Largest dome	Gol Gumbaz, Bijapur, Karnataka, Diameter: 44.0 m	Largest Tribe (ST)	Gond
		Largest Union Territory in Area	Andaman and Nicobar islands (8,249 sq.km)
		Largest Zoo	Zoological Gardens, Alipore, Kolkata
		Least Densely Populated State	Arunachal Pradesh
		Least Populated State	Sikkim (607,688: 2011 census)
		Least Populated Union Territory	Lakshadweep (64,429)

Longest Beach	Marina Beach, Chennai (13km)	Lowest Female Literacy Rate	Muslim
Longest Canal	Indira Gandhi Canal or Rajasthan Canal (959 km long)	Lowest Literacy Rate Religion	Muslim
Longest Corridor	Corridor in Ramanathaswamy Temple at Rameswaram, Tamil Nadu (1220m/4002 ft)	Lowest Population Growth Rate Religion	Sikh
Longest Dam	Hirakud Dam on Sutlej River in Orissa (24.4 km long and 2.8 km wide)	Maximum Forest Area	Madhya Pradesh
Longest Delta	Sunderbans (75000 sq. km) formed by the Ganga and Brahmaputra in West Bengal and Bangladesh.	Maximum Forest Area in %	Mizoram
Longest Glacier	Siachen Glacier on the Indo-Pak border (75.6 km long and 2.8 km wide)	Most Densely Populated State	West Bengal (904sq.km)
Longest National Highway	NH-7 (Varanasi to Kanyakumari)	Most Populated State	Uttar Pradesh (199,281,477: 2011 census)
Longest Passenger Train Route	Jammu Tawi-Kanyakumari (3730km)	Most Populated Union Territory	Delhi (16,753,235)
Longest Railway Bridge	Dehri-on-Sone Railway bridge over the Sone river near Sasaram on Kolkata-Delhi main line	Most Populous City	Mumbai (nearly 183 lakhs )
Longest Railway Platform	Kharagpur in West Bengal (833m/2733ft) also world's longest	Oldest Refinery	Digboi (Assam). It was discovered in 1835.
Longest River	The Ganga 2640 km long (it runs 2525 km long in India)	Oldest Church	St. Thomas Church at Palayar in Trichur District in Kerala built in 52 AD.
Longest River Bridge	Bandra-Worli Sea Link (5,600m/18,400 ft.), Mahim Bay, Mumbai. Previously it was Mahatma Gandhi Setu over the Ganga at Patna (5575m/18286ft)	Oldest Monastery	Buddhist Monastery situated at an altitude of 3048m/10000 ft at Tawang in Arunachal Pradesh.
Longest Road	Grand Trunk Road from Kolkata to Amritsar	Oldest Observatory	Jantar Mantar, Delhi
Longest Road Bridge	Nehru Sethu on Son river, Bihar (10,044 ft)	Oldest University	University of Calcutta (1857)
Longest Sea Bridge	Anna-Indira Gandhi Bridge, connecting the island of Rameswaram with Mandapam in Tamil Nadu (2.34km long)	Oldest Zoo	Trivandrum Zoological Gardens, Kerala (1859)
		Smallest District	Mahe, Puducherry
		Smallest State in Area	Goa (3,702sq.km)
		Smallest Union Territory in Area	Lakshadweep (32 sq.km)
		State having highest literacy rate	Kerala
		State with highest cattle population	Uttar Pradesh
		Tallest Statue	Statue of Gomateswara at Sravanabelagola, Karnataka

The Largest Hindu Temple Area	Akshardham, Delhi
Union Territory having highest literacy rate	Lakshadweep
Longest Tributary River of India	Yamuna
Largest Lake (Saline Water)	Chilka Lake, Orrisa
Largest Fresh Water Lake	Kolleru Lake (Andhra Pradesh)
Highest Lake	Devta Lake, Gadhwal (Uttarakhand)
Highest Peak	Karakoram-2 or K-2 (8,611 m)
Highest Peak in the world	Mount Everest in Nepal
Highest Waterfall	Nohkalikai Falls (335 meters, 1100 ft high) in Shora
Largest River without Delta	Narmada and Tapti
Longest Cantilever Span Bridge	Howrah Bridge
Longest River Bridge	Mahatma Gandhi Setu, Patna
Longest Road	Grand Trunk Road
Highest Road	Road at Khardungla, (in Leh-Manali Sector)

### Renamed Indian Cities

Old Name	New Name
Aurangabad	Sambhaji Nagar
Banaras	Varanasi
Baroda	Vadodara
Bombay	Mumbai
Calicut	Kozhikode
Cawnpore	Kanpur
Central Provinces	Madhya Pradesh
Cochin	Kochi
Gauhati	Guwahati
Jubbulpore	Jabalpur
Jullundur	Jalandhar
Madras	Chennai

Ooty	Udhagamandalam
Panjim	Panaji
Poona	Pune
Quilon	Kollam
Simla	Shimla
Tanjore	Thanjavur
Trichur	Thrissur
Trivandrum	Thiruvananthapuram
United Provinces	Uttar Pradesh
Vizagapatnam	Vishakhapatnam

### UNESCO WORLD HERITAGE SITES OF INDIA

#### CULTURAL (28)

- Agra Fort (1983)
- Ajanta Caves (1983)
- Archaeological Site of Nalanda Mahavihara (Nalanda University) at Nalanda, Bihar (2016)
- Buddhist Monuments at Sanchi (1989)
- Champaner-Pavagadh Archaeological Park (2004)
- Chhatrapati Shivaji Terminus (formerly Victoria Terminus) (2004)
- Churches and Convents of Goa (1986)
- Elephanta Caves (1987)
- Ellora Caves (1983)
- Fatehpur Sikri (1986)
- Great Living Chola Temples (1987, 2004)
- Group of Monuments at Hampi (1986)
- Group of Monuments at Mahabalipuram (1984)
- Group of Monuments at Pattadakal (1987)
- Hill Forts of Rajasthan (2013)
- Historic City of Ahmedabad (2017)
- Humayun's Tomb, Delhi (1993)
- Khajuraho Group of Monuments (1986)
- Mahabodhi Temple Complex at Bodh Gaya (2002)
- Mountain Railways of India (1999, 2005, 2008)
- Qutub Minar and its Monuments, Delhi (1993)
- Rani-ki-Vav (the Queen's Stepwell) at Patan, Gujarat (2014)
- Red Fort Complex (2007)
- Rock Shelters of Bhimbetka (2003)
- Sun Temple, Konârak (1984)
- Taj Mahal (1983)

- The Architectural Work of Le Corbusier, an Outstanding Contribution to the Modern Movement (2016)
- The Jantar Mantar, Jaipur (2010)

### **NATURAL (7)**

- Great Himalayan National Park Conservation Area (2014)
- Kaziranga National Park (1985)
- Keoladeo National Park (1985)
- Manas Wildlife Sanctuary (1985)
- Nanda Devi and Valley of Flowers National Parks (1988, 2005)
- Sundarbans National Park (1987)
- Western Ghats (2012)

### **MIXED (1)**

- Khangchendzonga National Park (2016)

## FAMOUS TOURIST PLACES IN INDIA

**Taj Mahal-** This mausoleum built in Agra by Mughal Emperor Shah Jahan is one of the Seven Wonders of the World and a UNESCO listed World Heritage Site. You cannot miss this magnificent work of marble during your travel to India.

**Ajanta and Ellora Caves-** Situated in the Aurangabad district of Maharashtra, Ellora has around 34 caves and Ajanta 29. They depict extraordinary work of sculpture, painting and architecture.

**Khajuraho Temples-** The 20 temples at Khajuraho built of sandstone depict erotic sculptures and wall frescoes. This is also among the World Heritage Sites in India and a popular tourist destination. It is situated in Madhya Pradesh.

**Kashmir-** Popular as the paradise of India, Kashmir Valley is one of the beautiful places to visit in the world that is surrounded by the Pir Panjal and the Himalayan range.

**Goa-** This small state in India has plenty to offer to tourists such as the beaches, cruise on the Mandovi River, a vibrant nightlife, tour of churches and monuments and the glimpse of the erstwhile Portuguese culture.

**Kerala Backwaters-** The beauty of the Malabar Coast is best experienced with a tour of the Kerala backwaters. This southern state of

India has the largest chain of interlocking canals, rivers and lakes forming the beautiful stretch of the backwaters.

**Jaipur-** The Pink City of India and the capital of Rajasthan, Jaipur is popular for its majestic Mughal and Rajput era monuments, havelis and forts. The Hawa Mahal, Amer Fort, Amber Palace, Jal Mahal and the Nahargarh Fort stand reminiscent to the city's glorious past.

**Munnar-** Acres of tea plantations, beautiful valleys and the serenity of the hills make this place a tourist hot spot. Munnar is the only hill station of Kerala with opportunities for paragliding and trekking to Anaimudi.

**Udaipur-** Known as the Lake City of India, Udaipur is a historical city in Rajasthan. A number of lakes, the Aravalli Hills, islands of Fateh Sagar Lake and the beautiful Lake Palace are among the top tourist attractions.

**Jaisalmer-** The Golden Fort, camel safari and Rajputana havelis make this city a prominent place of visit in Rajasthan.

**Leh and Ladakh-** A prominent Buddhist pilgrimage place, known for its century old monasteries and gompas, Leh and Ladakh is also a haven for adventure tourists.

**Kullu and Manali-** Manali is a small hill station around 53 km from the town of Kullu in Himachal Pradesh. Apart from the breathtaking view, the Manikaran Gurudwara and Hadimba Devi Temple are popular attractions.

**Shimla-** Shimla is the capital city of Himachal Pradesh. The sight of the snow capped Himalayas, the Victorian era buildings and churches and the Shimla Mall are worth visiting.

**Gangtok-** Capital of Sikkim and home to a number of monasteries, Gangtok is a major gateway to the Nathula Pass.

**Darjeeling-** Well known as the Queen of Hills, Darjeeling is located in West Bengal. Tea estates, parks, zoos, and the view of Mount Everest are things to enjoy here.

**Kovalam Beach-** Kovalam is a beach town in Thiruvananthapuram, Kerala drawing a large crowd of international tourists throughout the year. There are three beaches, resorts and a light house here.

**Ooty-** The Nilgiri Hills or the Blue Mountains, Ooty is worth a visit during the winters in India. Places to visit include Government Rose Garden, Ooty Botanical Gardens and the lake.

**Kanyakumari-** Kanyakumari is the confluence point of the Indian Ocean, Bay of Bengal and the Arabian Sea. The ferry ride to the Vivekananda Rock will be a memorable journey.

**Haridwar-** The Hindu pilgrimage site that brings in thousands of tourists and devotees during the Kumbh Mela held once in every 12 years. They also visit the temples, Har Ki Pauri and the Brahma Kund.

**Nainital-** Situated in the foothills of the Kumaon range, it is among the top tourist places in India for its serenity and attractions such as the Naina Devi Temple, Naina Peak and the Bhimtal Lake.

**Dehradun-** The beauty of the Doon Valley is what makes Dehradun a popular place of visit in Uttarakhand. You can tour the Malsi Deer Park, Kalanga Monument and the Tapkeshwar Temple.

**Hampi-** Hampi is a historical place and the erstwhile capital of the Vijayanagar. The 14th century ruins features around 500 monuments, their planning, public baths and other advancements of the era.

**Fatehpur Sikri-** The 16th century capital of the Mughal Empire, Fatehpur Sikri today is known for its royal palaces, courts and the Jama Masjid. It is a World Heritage Site as well.

**Golden Temple of Amritsar-** The Holy shrine of the Sikhs, the Golden Temple complex includes the Hari Mandir, the Amrit Sarovar, the large dining hall and the Central Sikh Museum.

**Mysore-** You have quite a number of reasons to visit this place. The Mysore Palace, Mysore paintings, Mysore Pak (sweet) and the silk sarees draw tourists to this city.

**Bangaluru-** Though a prominent commercial and educational hub, Bangaluru is also home to the Bannerghatta National Park, Lal Bagh Garden, Bangaluru Palace and the Tipu Sultan Summer Palace.

**Mahabalipuram-** The port city dating to the 7th century, Mahabalipuram has rock cut monuments reflecting the Dravidian architecture. Thirukadalmallai Temple and the Pancha Rathas are important structures here.

**Chennai-** The metropolitan of Chennai has beaches such as the Marina Beach and Cavelong Beach among its main attractions. You can also visit the Guindy National Park and the Parthasarathy Temple.

**Hyderabad-** The capital of Andhra Pradesh, Hyderabad is a tourist hot spot for its trade in pearls, the authentic Mughal and Arabic cuisine, Char Minar, Chowmalla Palace and the Golconda Fort.

**Andaman and Nicobar Islands-** these two groups of islands has around 300 smaller islands part of its territory. With world-class resorts and adventure spots, these islands are ultimate place for honeymoon couples.

**Havelock Islands-** Part of the Nicobar Islands, Havelock is a popular spot for adventure tourists who indulge in snorkeling and scuba diving.

**Lakshadweep Islands-** Water sports is integral to the tourism of Lakshadweep. There are small tourist huts on the islands of Kalpeni, Kavaratti, Minicoy and Kadmat.

**Assam-** A major gateway to northeast India, Assam features beautiful landscape, hills, the Brahmaputra River and the Kamakhya Temple.

**Meghalaya-** A hilly strip in north east India, Meghalaya tour is incomplete without touring Shillong.

**Coorg-** Called the Scotland of India for the large sandalwood forests and tea and coffee plantations, Coorg is a picture-perfect place for holiday. The Iruppu Falls and the Brahmagiri Hill are two other places of interest.

**Visakhapatnam-** The largest city in Andhra Pradesh, Visakhapatnam is popular for its virgin beaches, small hills and the Araku valley tour.

**Kedarnath and Badrinath-** Visit to Kedarnath and Badrinath can be part of the Do Dham yatra or pilgrimage in India. These two towns have two Hindu shrines.

**Tirupati-** Another Hindu pilgrimage site in Andhra Pradesh and the Sri Venkateshwara Temple here is dedicated to Lord Balaji.

**Kodaikanal-** Known as the Princess of the Hill Stations, Kodaikanal is situated in Tamil Nadu. The Kodaikanal Lake, Bryant Park and the Bear Shola Falls are top places of interest.

**Kolkata-** The capital of West Bengal, Kolkata is truly the City of Joy with several avenues of entertainment, multi cuisine restaurants, the Victoria Memorial, Alipore Zoo and the Kali Ghat Temple.

**Varanasi-** On the banks of River Ganga is the city of Varanasi where the popular classical form of Benaras Gharana had evolved. It is home to the Vishwanath Temple and several other places of worship and culture.

**Mantheran-** The ideal place for a weekend getaway, Mantheran is a drive of around 90 km from Mumbai. You can opt for trekking and mountaineering here.

**Mahabaleshwar-** A drive of 125 km from Pune, Mahabaleshwar is a beautiful plateau. A popular honeymoon spot, the Mahabaleshwar Temple is the prime attraction here.

**Bodh Gaya-** A pilgrimage site for the Buddhist, Bodh Gaya is a World Heritage Site famous for the Bodh Gaya Temple complex.

**Jim Corbett National Park-** The oldest park of its kind in the country, Jim Corbett is the ultimate place for wildlife and safari lovers. It has a protected area for the endangered species of Royal Bengal Tiger.

**Dilwara Temples, Mount Abu-** Dedicated to the Jain tirthankaras, Dilwara Temples (five in number) are magnificent work of marble architecture. Each of the temples is unique work of art.

**Jabalpur, Madhya Pradesh-** The Bhedaghat-Marble Rocks is the prime attraction of this city. The Duanjharp Falls and the marble gorge offer extraordinary sight.

**Madurai-** A city in the state of Tamil Nadu, Madurai has temples that feature the Dravidian style of architecture. The most famous one is the Meenakshi-Sundareswar Temple.

## IMPORTANT NATIONAL AND INTERNATIONAL DAYS AND DATES

### JANUARY

- **January 9** : NRI Day
- **January 12** : National Youth Day
- **January 15** : Army day
- **January 25** : National Voters day
- **January 26** : India's Republic Day, International Customs Day
- **January 30** : Martyrs' Day; World Leprosy Eradication Day

### FEBRUARY

- **February 4** : World Cancer Day
- **February 14** : Valentine Day
- **February 24** : Central Excise Day
- **February 28** : National Science Day

### MARCH

- **March 8** : International Women's Day
- **March 15** : World Disabled Day; World Consumer Rights Day
- **March 18** : Ordnance Factories Day (India)
- **March 21** : World Forestry Day
- **March 22** : World Day for Water
- **March 23** : World Meteorological Day
- **March 24** : World TB Day

### APRIL

- **April 5** : International Day for Mine Awareness; National Maritime Day
- **April 7** : World Health Day
- **April 17** : World Haemophilia Day
- **April 18** : World Heritage Day
- **April 21** : Secretaries' Day
- **April 22** : Earth Day
- **April 23** : World Book and Copyright Day

### MAY

- **May 1** : Workers' Day  
(International Labour Day)
- **May 3** : Press Freedom Day
- **May** (1st Sunday) : World Laughter Day
- **May** (1st Tuesday) : World Asthma Day
- **May** (2nd Sunday) : Mother's Day

- **May 4** : Coal Miners' Day
- **May 8** : World Red Cross Day
- **May 9** : World Thalassaemia Day
- **May 11** : National Technology Day
- **May 12** : World Hypertension Day; International Nurses Day
- **May 15** : International Day of the Family
- **May 17** : World Telecommunication Day
- **May 24** : Commonwealth Day
- **May 31** : Anti-tobacco Day

### JUNE

- **June 4** : International Day of Innocent Children Victims of Aggression
- **June 5** : World Environment Day
- **June** (3rd Sunday) : Father's Day
- **June 14** : World Blood Donor Day
- **June 21** : International Day of Yoga
- **June 26** : International Day against Drug Abuse and Illicit Trafficking

### JULY

- **July 1** : Doctor's Day
- **July 6** : World Zoonoses Day
- **July 11** : World Population Day

### AUGUST

- **August** (1st Sunday) : International Friendship Day
- **August 6** : Hiroshima Day
- **August 8** : World Senior Citizen's Day
- **August 9** : Quit India Day, Nagasaki Day
- **August 15** : Indian Independence Day
- **August 18** : Int'l. Day of the World's Indigenous Peoples
- **August 19** : Photography Day
- **August 29** : National Sports Day

### SEPTEMBER

- **September 2** : Coconut Day
- **September 5** : Teachers' Day; Sanskrit Day
- **September 8** : International Literacy Day
- **September 15** : Engineers' Day
- **September 16** : World Ozone Day
- **September 21** : Alzheimer's Day; Day for Peace & Non-violence (UN)
- **September 22** : Rose Day (Welfare of cancer patients)
- **September 26** : Day of the Deaf
- **September 27** : World Tourism Day

### OCTOBER

- **October 1** : International Day for the Elderly
- **October 2** : Gandhi Jayanthi
- **October** (first monday) : World Habitat Day
- **October 4** : World Animal Welfare Day
- **October 8** : Indian Air Force Day
- **October 9** : World Post Office Day
- **October 10** : National Post Day
- **October** (2nd Thursday) : World Sight Day
- **October 13** : UN International Day for Natural Disaster Reduction
- **October 14** : World Standards Day
- **October 15** : World White Cane Day (guiding the blind)
- **October 16** : World Food Day
- **October 24** : UN Day; World Development Information Day
- **October 30** : World Thrift Day

### NOVEMBER

- **November 5** : World tsunami day
- **November 9** : Legal Services Day
- **November 14** : Children's Day; Diabetes Day
- **November 17** : National Epilepsy Day
- **November 20** : Africa Industrialization Day
- **November 29** : International Day of Solidarity with Palestinian People

## ■ DECEMBER

- **December 1** : World AIDS Day
- **December 3** : World Day of the Handicapped
- **December 4** : Indian Navy Day
- **December 7** : Indian Armed Forces Flag Day

- **December 10** : Human Rights Day; IntI. Children's Day of Broadcasting
- **December 18** : Minorities Rights Day (India)
- **December 22** : National Mathematics Day
- **December 23** : Kisan Divas (Farmer's Day) (India)
- **December 25** : Christmas Day



## FAMOUS AUTHORS



## BOOKS AND AUTHORS

## ALPHABETICAL LISTING OF BOOKS

### A

A Backward Place: Ruth Prawer Jhabwala  
A Bend in the Ganges: Manohar Malgonkar  
A Bend in the River: V.S. Naipaul  
A Billion is Enough: Ashok Gupta  
A Bride for the Sahib and Other Stories:  
Khushwant Singh  
A Brief History of Time: Stephen Hawking  
A Brush with Life: Satish Gujral  
A Bunch of Old Letters: Jawaharlal Nehru  
A Cabinet Secretary Looks Back: B.G.  
Deshmukh  
A Call To Honour-In Service of Emergent  
India: Jaswant Singh  
A Captain's Diary: Alec Stewart  
A China Passage: John Kenneth Galbraith  
A Conceptual Encyclopaedia of Guru Granth  
Sahib: S.S. Kohli  
A Contribution to the Critique of Political  
Economy: Karl Marx  
A Critique of Pure Reason: Immanuel Kant  
A Dangerous Place: Daniel Patrick Moynihan  
A Doctor's Story of Life and Death:  
Dr. Kakkana Subbarao and Arun K. Tiwari  
A Doll's House: Henrik Ibsen  
A Dream in Hawaii: Bhabani Bhattacharya  
A Farewell to Arms: Ernest Hemingway  
A Fine Balance: Rohinton Mistry  
A Foreign Policy for India: I.K. Gujral  
A Gift of Wings: Shanthi Gopalan  
A Handful of Dust: Evelyn Waugh  
A Himalayan Love Story: Namita Gokhale  
A House Divided: Pearl S. Buck  
A Judge's Miscellany: M. Hidayatullah  
A Last Leap South: Vladimir Zhirinovsky  
A Long Way: P.V. Narasimha Rao  
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A Midsummer Night's Dream: William  
Shakespeare  
A Million Mutinies Now: V.S. Naipaul  
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A Peep into the Past: Vasant Navrekar  
A Personal Adventure: Theodore H. White  
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A River Sutra: Gita Mehta  
A Royal Duty: Paul Burrel  
A Search for Home: Sasthi Brata  
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A Sense of Time: S.H. Vatsyayan  
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A Sudden Change of Hearts: Barbara Taylor  
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A Village by the Sea: Anita Desai  
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Age of Reason: Jean Paul Sartre  
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Agni Pariksha: Acharya Tulsi  
Agni Veena: Kazi Nazrul Islam  
Ain-i-Akbari: Abul Fazal  
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All Is Well That Ends Well: William Shakespeare  
All Quiet on the Western Front: Erich Maria Remarque  
All the King's Men: Robert Penn Warren  
All the President's Men: Carl Bernstein and Bob Woodward  
All the Prime Minister's Men: Janardhan Thakur  
All Things Bright and Beautiful: James Herriot  
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Amelia: Henry Fielding  
American Capitalism: J.K. Galbraith  
An Admiral's Fall: Wilson John  
An American Dilemma: Gunnar Myrdal  
An American in Khadi: Asha Sharma  
An American Tragedy: Theodore Dreiser

An Area of Darkness: V.S. Naipaul  
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An Enquiry Concerning Human Understanding: David Hume  
An Equal Music: Vikram Seth  
An Eye to China: David Selbourne  
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Author's Farce: Henry Fielding  
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## B

Back to Methuselah: George Bernard Shaw  
Bandicoot Run: Manohar Malgonkar

Bang-i-Dara: Mohammad Iqbal  
 Beach Boy: Ardesher Vakil  
 Bearders—My Life in Cricket: Bill Frindall  
 Beast and Man: Murry Nlidgeley  
 Beginning of the Beginning: Acharya Rajneesh  
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 Being Freddie: Andrew Flintoff  
 Being Indian: Pawan Varma  
 Believe-Achieve: Paul Hanna  
 Beloved: Toni Morrison  
 Ben Hur: Lewis Wallace  
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 Blind Beauty: Boris Pasternak  
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 Burial At Sea: Khushwant Singh  
 Business at the Speed of Thought: Bill Gates  
 Business Legends: Gita Piramal  
 By God's Decree: Kapil Dev

## C

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 Can India Grow Without Bharat: Shankar Acharya  
 Cancer Ward: Alexander Solzhenitsyn  
 Candida: George Bernard Shaw  
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 Canvas of Life: Sheila Gujral  
 Caravans: James A. Michener  
 Carnage By Angels: Y.P. Singh  
 CBK: Graeme Wilson  
 Cell: Stephen King  
 Centennial: James Ivllichener  
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 Chakori: Chandrasekhar Kamba  
 Chance: Joseph Conrad  
 Chandalika: Rabindranath Tagore  
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Chikaveera Rajendra: Masci Venkatesh Iyengar  
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 Christabel: Samuel Taylor Coleridge  
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 Circle of Reason: Amitav Ghosh  
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 City of the Yellow Devil: Maxim Gorky  
 Clear Light of Day: Anita Desai  
 Climate of Treason: Andrew Boyle  
 Clockwork Orange: Anthony Burgess  
 Cold Street: Paul Carson  
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Conquest of Self: M.K. Gandhi  
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 Continent of Circe: Nirad C. Chaudhuri  
 Corporate Governance, Economic Reforms & Development: Darryl Reed and Sanjoy Mukherjee  
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 Coverly Papers: Joseph Addison  
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 Crescent Moon: Rabindranath Tagore  
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 Cricket on the Hearth: Charles Dickens  
 Crime & Money Laundering: Jyoti Trehan  
 Crime and Punishment: Fyodor M. Dostoevsky  
 Crisis into Chaos: E.M.S. Narnoodiripad  
 Critical Mass: William E. Burrows  
 Crossing the River: Caryl Phillips  
 Crossing the Rubicon: C. Raja Mohan  
 Crossing the Threshold of Hope: Pope John Paul II  
 Cry, My Beloved Country: Alan Paton  
 Cuckold: Kiran Nagar Kar  
 Culture and Anarchy: Matthew Arnold  
 Culture in the Vanity Bag: Nirad C. Chaudhuri  
 Curtain Raisers: K. Natwar Singh

## D

Damsel in Distress: P.G. Wodehouse  
 Dancing with the Devil: Rod Barker  
 Dangling Man: Saul Bellow  
 Daniel Deronda: George Eliot  
 Dark Debts: Karen Hall  
 Dark Home Coming: Eric Lustbader  
 Dark Side of Camelot: Seymour Hersh  
 Darkness at Noon: Arthur Koestler  
 Das Kapital: Karl Marx  
 Dashkumar Charitam: Dandi  
 Dateline Kargil: Gaurav C. Samant  
 Daughter of the East: Benazir Bhutto  
 David Copperfield: Charles Dickens  
 Days of Grace: Arthur Ashe & Arnold Rampersad  
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 Midnight in the Garden of Good and Evil: John Berendt  
 Miguel Street: V.S. Naipaul  
 Mill on the Floss: George Eliot  
 MirrorImage: Danielle Steel  
 Mirror of the Sea: Joseph Conrad  
 Missed Opportunities: Indo-Pak War 1965  
 Mistaken Identity: Nayantara Sehgal  
 Moby Dick: Herman Melville  
 Mod Classics: Joseph Conrad  
 Modern Jihad: Loretta Napuleoni  
 Modern Painters: John Ruskin  
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Modernity, Morality And The Mahatma: MadhuriSanthanam Sondhi  
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 Mondays on Dark Night of Moon: Kirin Narayan  
 Monsoon: Wilbur Smith  
 Mookhajjiva Kanasugalu: K. Shivram Karanth  
 Moon and Six Pence: W. Somerset Maugham  
 Moonlight Sonata: L. Beethoven  
 Moonwalk: Michael Jackson  
 Mother: Maxim Gorky  
 Mother India: Katherine Mayo  
 Mountbatten and Independent India: Larry Collirs and Dominique Lapierre  
 Mountbatten and the Partition of India: Larry Collins and Dominique Lapierre  
 Mrichchhakatikam: Shudraka  
 Mrinalini: Bankim Chandra Chatterjee  
 Mrityunjaya: Shivaji Sawant  
 Mrs. De Winter: Susan Hill  
 Mrs. Gandhi's Second Reign: Arun Shourie  
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 Mudrarakshasa: Vishakhadatta  
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 Murder on the Orient Express: Agatha Christie  
 Murky Business: Honore de Balzac  
 Muslim Law and the Constitution: A.M. Bhattacharjea  
 My Days: R.K. Narayan  
 My Early Life: M.K. Gandhi  
 My Experiments with Truth: M.K. Gandhi  
 My Father, Deng Xiaoping: Xiao Rong  
 My God Died Young: Sasthi Brata  
 My India: S. Nihal Singh  
 My Life: Bill Clinton  
 My Life and Times: V.V. Giri  
 My Music, My Love: Ravi Shankar  
 My Own Boswell: M. Hidayatullah  
 My Own Witness: Mrinal Pande  
 My Presidential Years: Ramaswamy Venkataraman  
 My Several Worlds: Pearl S. Buck  
 My Side: David Beckham  
 My Son's Father: Dom Moraes  
 My South Block Years: J.N. Dixit  
 My Struggles: E.K. Nayanar

My Truth: Indira Gandhi  
 Mysterious Universe: James Jeans  
 Myth of Sisyphus: Albert Camus  
 My country My life: L.K. Advani  
 My unforgettable Memories: Mamta Banerjee

**N**

9-11: Noam Chomsky  
 Naari: Humavun Azad  
 Nai Duniya Ko Salam & Path or Ki Dewar: Ali Sardar Jafri  
 Naivedyam (The Offering): N. Balamai Amma  
 Naked Came the Stranger: Penelope Ashe  
 Naku Thanthi: D.R. Bendre  
 Nana: Emile Zola  
 Natya Shastra: Bharat Muni  
 Neela Chand: Shiv Prasad Singh  
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 Nehru-A Political Life: Prof. Judith Brown  
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 Netaji-Dead or Alive: Samar Guha  
 Never At Home: Dom Moraes  
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 Nice Guys Finish Second: B.K. Nehru  
 Nicholas Nickelby: Charles Dickens  
 Nile Basin: Sir Richard Burton  
 Nine Days' Wonder: John Mansfield  
 Nineteen Eighty-Four (1984): George Orwell 1999-Victory Without War: Richard Nixon  
 Nirbashita Narir Kabita: Taslima Nasreen  
 Nirmala: Prem Chand  
 Nisheeth: Uma Shankar Joshi  
 Niti-Sataka: Bhartrihari  
 Nixon and Kissinger-Partners in Power: Robert Dallek  
 No Full Stops in India: Mark Tully  
 Non-Violence in Peace and War: M.K. Gandhi  
 North: Seamus Heaney  
 Northanger Abbey: Jane Austen  
 Nostromo: Joseph Conrad  
 Notebook of a Foot Soldier: Randhir Khare  
 Notes from a Big Country: Bill Bryson

Notes from a Small Island: Bill Bryson  
 Nothing Like The Sun: Anthony Bugess  
 Nuclear Deterrence in Southern Asia-China, India & Pakistan: Arpit Rajan  
 Nuclear India: G.G. Mirchandani and P.K.S. Namboodari  
 Numbered Account: Christopher Reich  
 Nursery Alice: Lewis Carroll  
 Nurturing Development: Ismail Serageldin

**O**

173 Hours in Captivity: Neelesh Mishra  
 O is for Outlaw: Sue Grafton  
 O'Jerusalem: Larry Collins and Dominique Lapierre  
 Occasion for Loving: Nadine Gordimer  
 Oddakkuzal: G. Shankara Kurup  
 Odyssey: Homer  
 Of Human Bondage: W Somerset Maugham  
 Of Some Consequence-A Soldier Remembers: General K. Sundarji  
 Old Curiosity Shop: Charles Dickens  
 Old Goriot: Honore de Balzac  
 Old Path-White Clouds: Thich Nht Hanh  
 Oliver Twist: Charles Dickens  
 Oliver's Story: Erich Segal  
 Omeros: Derek Walcott  
 On History: Eric Hobsbawm  
 On the Edge of a Century: Amlan Datta  
 One Day Cricket-The Indian Challenge: Ashis Roy  
 Once was Bombay: Pinki Virani One Day in the Life of Ivan Denisovich  
 One Hundred Years of Solitude: Gabriel Marquez  
 One World: Wendell Wilkie  
 One World and India: Arnold Toynbee  
 One World to Share: Sridath Ramphal  
 One-eyed Uncle: Laxmikant Mahapatra  
 Open Secrets-Indian Intelligence Unveiled: M.K. Dhar  
 Operation Black Thunder: Sarbjit Singh  
 Operation Bluestar-The True Story: Lt. Gen. K.S. Brar  
 Operation Parakaram-The War Unfinished: Lt. Gen. V.K. Sood and Pravin Sawhney  
 Operation Shylock: Philip Roth  
 Origin of Species: Charles Darwin  
 Oru Desathinte Katha: S.K. Pottekatt  
 Oscar and Lucinda: Peter Carey

Othello: William Shakespeare  
 Other People's Children: Joanna Trollope  
 Our Fathers: Andrew O'Hagan  
 Our Films, Their Films: Satyajit Ray  
 One life on not enough: Natwar Singh  
 Out of My Comfort Zone: Steve Waugh

**P**

Paddy Clarke Ha, Ha, Ha: Roddy Doyle  
 Painted Veil: W Somerset Maugham  
 Painter of Signs: R.K. Narayan  
 Pak Proxy War: Vijay Karan  
 Pakistan Between Mosque and Military:  
     Hussain Haqqani  
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     History: Lawrence Ziring  
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     (Rtd.) Jahan Dad Khan  
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     (Retd.) Anil Shourie  
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 Paradise Lost: John Milton  
 Paradise Regained: John Milton  
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     Gen. Ian Cardozo  
 Past and Present: Thomas Carlyle  
 Past Forward: G.R. Narayanan  
 Path to Power: Margaret Thatcher  
 Pavilion of Women: Pearl S. Buck  
 Pay the Devil: Jack Higgins  
 Peculiar Music: Emily Bronte  
 People Like Us: Pawan Kumar Verma  
 Perceptions, Emotions Sensibilities:  
     Tapan Raychaudhuri  
 Perfect Hostage—A Life of Aung San Suu  
     Kyi: Justin Wintle  
 Perils of Democracy: P.C. Alexander  
 Personal Injuries: Scot Turow  
 Perspectives on Indian National Movement;  
     Selected Correspondence of Lala  
     Lajpat Rai: Dr. Joginder Singh Dhanki  
 Persuasion: Jane Austen  
 Peter Pan: J.M. Barrie  
 Philosophical Investigations: Ludwig  
     Wittgenstein

Pickwick Papers: Charles Dickens  
 Pillow Problems and the Tangled Tale: Lewis  
     Carroll  
 Pinjar: Amrita Pritam  
 Plans for Departure: Nayantara Sehgal  
 Platform: Michael Houellebecq  
 Platform No. Chaar: Dr. Himanshi Shelat  
 Pleading Guilty: Scott Turow  
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 Point of Origin: Patricia Cornwell  
 Poison Belt: Sir Arthur Conan Doyle  
 Politics: Aristotle  
 Portrait of India: Ved Mehta  
 Post Office: Rabindranath Tagore  
 Power and Glory: Graham Greene  
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 Power That Be: David Halberstam  
 Prateeksha: Harivansh Rai Bachchan  
 Pratham Pratishruti: Ashapurna Devi  
 Prelude: William Wordsworth  
 Prem Pachisi: Munshi Prem Chand  
 Premonitions: P.N. Haksar  
 Preparing for the Twentieth Century: Paul  
     Kennedy  
 Press Freedom—The Indian Story: K.G. Joglekar  
 Price of Partition: Rafiq Zakaria  
 Price of Power—Kissinger in the Nixon White  
     House: Seymour M. Hersh  
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 Princess in Love: Ann Pasternak  
 Principia: Isaac Newton  
 Prison and Chocolate Cake: Nayantara Sehgal  
 Prison Diary: Jayaprakash Narayan  
 Prithviraj Raso: Chandra Bardai  
 Profiles & Letters: K. Natwar Singh  
 Promises to Keep: Chester Bowles'  
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     Vanhainen  
 Pulsating Presence of a Painful Past: Taisha  
     Abraham  
 Punjab, The Knights of Falsehood: K.P.S. Gill  
 Purgatory: Alighieri Dante  
 Pygmalion: George Bernard Shaw  
 Pyramids of Sacrifice: Peter L. Berger

**Q**

QSA: Vikas Swarup  
 Quarantine: Jim Crass  
 Quest for Conscience: Madhu Dandvatne

**R**

Rabbit, Run: John Updike  
 Radharani: Bankim Chandra Chatterjee  
 Raga Mala—Autobiography of Ravi Shankar:  
     George Harrison  
 Rage of Angels: Sydney Sheldon  
 Raghuvamsa: Kalidas  
 Rags to Riches: M.G. Muthu  
 Ragtime: E.L. Doctorow  
 Rahul Dravid—A Biography: Vedam  
     Jaishankar  
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 Raj Kapoor Speaks: Ritu Nanda  
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     India: Lawrence James  
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     Gorakhpuri  
 Rape of Bangladesh: Anthony Mascarenhas  
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     History of Photographs: Sill Young  
 Ratnavali: Harsha Vardhan  
 Ravi Paar (Across the Ravi): Gulzar  
 Razor's Edge: W Somerset Maugham  
 Real Time: Amit Chaudhuri  
 Rebirth: Leonid Brezhnev  
 Red and Black: Stendhal  
 Red Star Over China: Edgar Snow  
 Rediscovering Asia: Prakash Nanda  
 Rediscovering Dharavi: Kalpana Sharma  
 Rediscovering Gandhi: Yogesh Chadha  
 Reflections on the French Revolution:  
     Edmund Burke  
 Regional Security in South Asia—The Ethno-  
     Sectarian Dimensions: Muchkund  
     Dubey & Nancy Jetly  
 Remembering Babylon: David Malouf  
 Reminiscences: Thomas Carlyle  
 Reminiscences of the Nehru Age: M.O. Mathai  
 Remorseful Day: Colin Dexter  
 Rendezvous with Rama: Arthur C. Clark  
 Reprieve: Jean Paul Sartre  
 Republic: Plato  
 Resurrection: Leo Tolstoy  
 Rethinking Early Modern India: Richard  
     B. Barnett (Ed.)

Return of the Aryans: Bhagwan S. Gidwani  
 Returning to the Source: Acharya Rajneesh  
 Revenge and Reconciliation—Understanding  
     South Asian History: Rajmohan Gandhi  
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     Junkie: Gautam Bhimani  
 Revolutionary Wealth: Alvin and Heidi Toffler  
 Rich Like Us: Nayantara Sehgal  
 Riding the Nuclear Tiger: N. Ram  
 Riding the Storm: Harold MacMillan  
 Rights of Man: Thomas Paine  
 Rise and Fall of the Great Powers: Paul Kennedy  
 Ritu Ka Pehla Phool: Vijendra  
 Ritu Samhara: Kalidas  
 Road to Folly: Leslie Ford  
 Road to Freedom: K.K. Khullar  
 Romantics: Pankaj Mishra  
 Romeo and Juliet: William Shakespeare  
 Room at the Top: John Braine Roots  
 Routine Violence: Gyanendra Pandey  
 Rubaiyat: Omar Khayyam  
 Rubaiyat-i-Omar Khayyam: Edward  
     Fitzgerald  
 Rukh Te Rishi: Harbhajan Singh  
 Runaway Jury: John Grisham

**S**

Saaket: Maithili Sharan Gupt  
 Sacked or Sunk? Admiral Vishnu Bhagwat:  
     Brigadier R.P. Singh & Comdre  
     Ranjit B. Rao  
 Sacred Games: Vikram Chandra  
 Sadar-i-Riyasat: Karan Singh  
 Saddam's Bomb: Shyam Bhatia and Daniel  
     McGroarty  
 Saket: Maithili Sharan Gupt  
 Sakharam Binder: Vijay Tendulkar  
 Samler's Planet: Saul Bellow  
 Sanctuary: William Faulkner  
 Sands of Time: Sidney Sheldon  
 Santa Evita: Tomas Eloy Martinez  
 Sardar Patel and Indian Muslims: Rafiq Zakaria  
 Satanic Verses: Salman Rushdie  
 Satyarthi Prakash: Swami Dayanand  
 Saving Capitalism From The Capitalists:  
     Raghuram G. Rajan and Luigi Zingales  
 Saving Faith: David Baldacci  
 Savitri: Aurobindo Ghosh  
 Scarred—Experiments with Violence in  
     Gujarat: Dionne Bunsha

Scenes from a Writer's Life: Ruskin Bond  
 Sceptred Flute: Sarojini Naidu  
 Schindler's List: Thomas Keneally  
 Scholar Extraordinary: Nirad C. Chaudhuri  
 Second Wind: Dick Francis  
 Secret Agent: Joseph Conrad  
 Sense and Sensibility: Jane Austen  
 Sesame and Lilies: John Ruskin  
 Seshan—An Intimate Story: K. Govindan Kutty  
 Seven Lamps of Architecture: John Ruskin  
 Seven Summers: Mulk Raj Anand  
 Sex, Art and American Culture: Camille Paglia  
 Shadow from Ladakh: Bhabani Bhattacharya  
 Shadow Line: Joseph Conrad  
 Shadow of a Princess: Patrick Jephson  
 Shahnama: Firdausi  
 Shakuntala: Kalidas  
 Shalimar: Manohar Malgonkar  
 Shalimar The Clown: Salman Rushdie  
 Shall We Tell the President?: Jeffrey Archer  
 Shame: Salman Rushdie  
 Shape of Things to Come: H.G. Wells  
 She Stoops to Conquer: Oliver Goldsmith  
 Sher-e-Shor Angez: Shamsur Rahman Faruqi  
 Ship of Fools: Katherine Anne Porter  
 Shivaji, The Great Patriot: Lala Lajpat Rai  
 Shivaji—Hindu King of Islamic India:  
     James Laine  
 Siddharta: Hermann Hesse  
 Silas Marner: George Eliot  
 Silent Spring: Rachel Carson  
 Single & Single: John Le Carre  
 Single in the City—The Independent Woman's  
     Handbook: Sunny Singh  
 Six Characters in Search of an Author:  
     Luigi Pirandello  
 Slaughter House Five: Kurt Vaneugut  
 Slumming India: Gita Dewan Verma  
 Small Island: Andrea Levy  
 Small Land: Leonid Brezhnev  
 Small Remedies: Shashi Deshpande  
 Smell: Radhika Jha  
 Snakes & Ladders—A View of Modern India:  
     Gita Mehta  
 Snow Country: Yasunari Kawabata  
 Social Justice & the Constitution:  
     Ajit Bhattacharjea  
 Socialite Evenings: Shobhaa De  
 Sohrab and Rustam: Matthew Arnold  
 Sole Survivor: Derek Hansen

Something Barely Remembered: Susan Visvanathan  
 Song of Solomon: Toni Morrison  
 Sons and Lovers: D.H. Lawrence  
 Soul And Structure of Governance in India: Jagmohan  
 Soul Mountain: Gao Xingjian Mabel Lee  
 South Asia on a Nuclear Fuse: Praful Bidwai & Achin Vanaik  
 South from the Limpopo; Travels Through South Africa: Dervla Murphy  
 South-East Asia on a Shoestring: Hugh Finlay  
 Soz-i-Watan: Munshi Prem Chand  
 Special Tests—The Memoirs of an Unwanted Witness—A Soviet Spymaster: Pavel Anatolievich Sudoplatov  
 Speed Post: Shobhaa De  
 Spirit of the Age: William Hazlitt  
 Spouse: Shobhaa De  
 Spy Catcher: Peter Wright  
 St. Cyril Road: Amit Chaudhuri  
 St. Joan: George Bernard Shaw  
 Stability in South Asia: Ashley J. Tellis  
 Stalin: Edvard Radzinsky  
 Starry Nights: Shobhaa De  
 Stars of New Curfew: Ben Okri  
 Stolen Harvest: Vandana Shiva  
 Stopping by Woods: Robert Frost  
 Storm in the Sea Wind—Ambani Vs Ambani: Alam Srinivas  
 Story of My Life: Moshe Dayan  
 Story of Real Man: Nikolayev Polevoi  
 Straight From Heart: Kapil Dev  
 Strangers and Brothers Omnibus: C.P. Snow  
 Street Lawyer: John Grisham  
 Strife: John Galsworthy  
 Stripped Steel: N.K. Singh  
 Struggles of Indian Federalism: Bonica Aleaz  
 Studies in the Psychology of Sex: Havelock Ellis  
 Subsidies—A Bottomless Bucket: K.S. Ramachandran  
 Sula: Toni Morrison  
 Sultry Days: Shobhaa De  
 Summa Theologica: Thomas Aquinas  
 Summer Sisters: Judy Bloom  
 Sun Stone: Octavio Paz  
 Sunny Days: Sunil Gavaskar  
 Surrender at Dacca: Lt. Gen. J.F.R. Jacob  
 Surviving Men: Shobhaa De  
 Surviving Women: Jerry Pinto  
 Swapnavasvadatta: Bhasa

**T**

2003 World Cup Cricket—Action Replay 1983:  
Rahul Sehgal  
Tahqiq-i-Hind: Alberuni  
Tales from Shakespeare: Charles Lamb  
Tales of Sherlock Holmes: Sir Arthur Conan Doyle  
Taliban-Islam-Oil and the New Great Game in Central Asia: Ahmed Rashid  
Talisman: Sir Walter Scott  
Tar Baby: Toni Morrison  
Tarkash: Javed Akhtar  
Tarzan of the Apes: Edgar Rice Burroughs  
Tears of Renewal: Henry Kissinger  
Tehriq-e-Mujahideen: Dr. Sadiq Hussain  
Temple Tiger: Jim Corbett  
Temptations of the West—How to be Modern in India, Pakistan and Beyond: Pankaj Mishra  
Tess of D'Urbervilles: Thomas Hardy  
Thank You, Jeeves: P.G. Wodehouse  
The 21st Century Ambassador: Kishan S. Rana  
The Adventures of Tom Sawyer: Mark Twain  
The Affairs: C.P. Snow  
The Affluent Society: J. K. Galbraith  
The Afghan Turmoil—Changing Equations: Sreedhar & Mahendra Dev  
The Age of Extremes: Eric Hobsbawm  
The Agenda—Inside the Clinton White House: Bob Woodward  
The Agony and the Ecstasy: Irving Stone  
The Alchemy of Desire: Tarun J. Tejpal  
The Animal Farm: George Orwell  
The Argumentative Indian: Dr. Amartya Sen  
The Asian Elephant—A Natural History: J.C. Daniel  
The Assassination: K. Mohandas  
The August Coup: Mikhail S. Gorbachev  
The Autobiography of an Unknown Indian: Nirad C. Chaudhuri  
The A-Z of Bradman: Alan Eason  
The Banyan Tree: Hugh Tinker  
The Beach Tree: Pearl S. Buck  
The Beauty of These Present Things: Avtar Singh.  
The Believers: Abdul Sultan P.P.  
The Betrayal of East Pakistan: Lt. General A.A.K. Niazi  
The Big Fisherman: Lloyd C. Douglas

The Big Idea: Robert Jones  
The Birth of Europe: Robert S. Lopez  
The Black Arrow: Robert Louis Stevenson  
The Black Economy in India: Arun Kumar  
The Black Pharaoh: Christian Jacq  
The Blackwater Lightship: Colm Toibin  
The Blessing: Jude Deveraux  
The Blind Assassin: Margaret Atwood  
The Blue Bedspread: Raj Kamal Jha  
The Book I Won't Be Writing and Other Essays: H.Y. Sharda Prasad  
The Book of Shadows: Namita Gokhale  
The Brethren: John Grisham  
The Bride's Book of Beauty: Mulk Raj Anand  
The British Conquest and Dominion of India: Penderel Moon  
The Bubble: Mulk Raj Anand  
The Buddha & The Terrorist: Satish Kumar  
The Butcher of Amritsar: Nigel Collett  
The Calcutta Chromosome: Amitav Ghosh  
The Canterbury Tales: Geoffrey Chaucer  
The Cardinal: Henry Morton Robinson  
The Career & Legend of Vasco de Gama: Sanjay Subramanyam  
The Castle: Franz Kafka  
The Changing Global Order: World Leaders Reflect  
The Changing World of the Executive: Peter Drucker  
The Cinemas of India: Yves Thoraval  
The Clash of Civilisations and the Remaking of World Order: Samuel Huntington  
The Class: Erich Segal  
The Clown: Heinrich Böll  
The Cocktail Party: T.S. Eliot  
The Commitments: Roddy Doyle  
The Company of Women: Khushwant Singh  
The Confessions of an English Opium Eater: Thomas De Quincy  
The Confidential Clerk: T.S. Eliot  
The Conservationist: Nadine Gordimer  
The Contemporary Conservative: Dhiren Bhagat  
The Corrupt Society: Chandan Mitra  
The Count of Monte Cristo: Alexandre Dumas  
The Coup: John Updike  
The Crisis in India: Ronald Segal  
The Critique of Pure Reason: Immanuel Kant  
The Crown and the Loincloth: Chaman Nahal  
The Crown of Wild Olive: John Ruskin

The Cutting Edge: Javed Miandad  
 The Dangerous Summer: Ernest Hemingway  
 The Dark Room: R.K. Narayan  
 The Dark Side of Camelot: Seymore Hersh  
 The Day in Shadow: Nayantara Sehgal  
 The Day of the Jackal: Frederick Forsyth  
 The Discovery of India:  
 The God of Small Things: Arundhuti Roy  
 The Harry Potter Series: J.K. Rowling  
 The Indian Struggle: Subash Chandra Bose  
 The Indian War of Independence:  
 V.D. Savarkar  
 The Inheritance of Loss: Kiran Desai  
 The Judgement: Kuldip Nayar  
 The Masque of Africa: V.S. Naipaul  
 The Miracle of Democracy: India's Amazing Journey  
 The Nadars of Tamil Nadu: DN Dhanagre  
 The Nehrus; Motilal and Jawaharlal: BR Nanda  
 The Prince: Machiavali  
 The Rediscovery of India: Meghnad Desai  
 The Satanic Verse: Salman Rushdi  
 The Science of Bharat Natyam: Saroja Vaidyanathan  
 The Sense of an Ending: Julian Barnes  
 The Silent Cry: Kenjaburo Ue  
 The Spirit of Islam: Syyed Amir Ali  
 The Village by the Sea: Anita Desai  
 The White Tiger: Aravind Adiga  
 Theory of Relativity: Alexander Doma  
 Three Marketiars: Einstein  
 To all fighters of freedom, Why Socialism?: J.P. Narayan  
 Truth, Love and A Little Malice: Khushwant Singh  
 Two Leaves and a Bud: Mulkraj Anand  
 Two Lives: Vikram Seth  
 The Discovery of India: Jawahar Lal Nehru  
 The God of Small Things: Arundhuti Roy  
 The Harry Potter Series: J.K. Rowling  
 The Indian Struggle: Subash Chandra Bose  
 The Judgement: Kuldip Nayar  
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 The Nadars of Tamil Nadu: D.N. Dhanagre  
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 The Prince: Maciaval  
 The Rediscovery of India: Meghnad Desai  
 The Satanic Verse: Salman Rushdi

The Science of Bharat Natyam: Saroja Vaidyanathan  
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 To all fighters of freedom, Why Socialism?: J.P. Narayan  
 Truth, Love and a Little Malice: Khushwant Singh  
 Two Leaves and a Bud: Mulkraj Anand  
 Two Lives: Vikram Seth

## U

Unbreakable: Mary Kom  
 Ulysses: James Joyce  
 Uncle Tom's Cabin: Mrs. Hriet Stowe  
 Unconsoled: Kazuo Ishiguro  
 Under Western Eye: Joseph Conrad  
 Unhappy India: Lala Lajpat Rai  
 Universe Around Us: James Jeans  
 Until Darkness: Parvin Ghaffari  
 Utouchable: Mulk Raj Anand  
 Upturned Soil: Mikhail Sholokov  
 Urvashi: Ramdhari Singh 'Dinkar'  
 Uttar Ramcharita: Bhava Bhuti  
 Utopia: Thomas More  
 Unto This Last: John Ruskin  
 Untold Story: Gen. BM Kaul

## V

Valley of Dolls: Jacqueline Susanne  
 Vanity Fair: Thackeray  
 Vendor of Sweets: R.K. Narayan  
 Venisamhara: Narayana Bhatt  
 Very Old Bones: William Kennedy  
 Victim: Saul Bellow  
 Victory: Joseph Conrad  
 Video Nights in Kathmandu: Pico Lyer  
 View from Delhi: Chester Bowles  
 View from the UN: U Thant  
 Village by the Sea: Anita Desai  
 Village: Mulk Raj Anand  
 Vinay Patrika: Tulsidas  
 Virangana: Maithili Sharan Gupta  
 Virginians: William Thackeray  
 Vish Vriksha: Bankim Chandra Chatterjee

Voice of Conscience: V.V. Giri  
 Voice of Freedom: Nayantara Sehgal  
 Voice of the Voiceless: Rutsh Harring

**W**

Waiting for Godot: Samuel Becket  
 Waiting for the Mahatma: R.K. Narayan  
 Waiting to Exhale: Terry McMillan  
 Wake up India: Annie Besant  
 Walls of Glass: KA Abbas  
 War and Peace: Tolstoy  
 War and No Peace Over Kashmir: Maroof Raza  
 War Minus the Shooting: Mike Marquesee  
 War of Indian Independence: Vir Savarkar  
 War of the Worlds: H.G. Wells  
 Waste Land: T.S. Eliot  
 Way of the World: William Congreve  
 We, Indians: Khushwant Singh  
 We, the People:  
 Wealth of Nations: Adam Smith  
 Week with Gandhi: Louis Fischer  
 West Wind: Pearl S. Buck  
 Westward Ho: Charles Kingsley  
 Where the Grass is Greener: David M. Smith  
 While England Sleeps: David Leavitt  
 Whispers of the Desert: Fatima Bhutto  
 White House Years: Henry Kissinger  
 Widening Divide: Rafiq Zakaria  
 Wild Ass's Skin: Honore de Balzac  
 Wings of fire, an Autobiography: Dr. A.P.J.  
     Abdul Kalam & A. Tiwari  
 Winston Churchill: Clive Ponting

Witness to History: Prem Bhatia  
 Without Fear or Favour: Neelam Sanjiva Reddy  
 Witness to an Era: Frank Moraes  
 Woman's Life: Guy de Maupassant  
 Women and Men in My Life: Khushwant Singh  
 Wonder That Was India: A.L. Basham  
 World According to Garp: John Irving  
 World Within Words: Stephen Spender  
 Worthy It is: Odysseus Elytis  
 Worshipping False Gods: Arun Shourie  
 Wreck: Rabindra Nath Tagore  
 Wuthering Heights: Emily Bronte

**Y**

Yajnaseni: Dr. Pratibha Roy  
 Yama: Mahadevi Verma  
 Yashodhara: Maithili Sharan Gupta  
 Yayati: V.S. Khandekar  
 Year of the Upheaval: Henry Kissinger  
 Year of the Vulture: Amita Malik  
 Years of Pilgrimage: Dr. Raja Ramanna  
 Yesterday and Today: KPS Menon

**Z**

Zool: The Final Odyssey  
 Zhivago, Dr: Boris Pasternak  
 Zlata's Diary—A Child's: Zlata Filipovic  
     Life in Sarajevo  
 Zulfi, My Friend: Piloo Mody  
 Zulfikar Ali Bhutto & Pakistan: Rafi Raza





## AWARDS AND HONOURS

## INTERNATIONAL AWARDS

### NOBEL PRIZE

- The Nobel Prizes are given under the will of Alfred Bernhard Nobel, who died in 1896.
- Nobel Prizes are given each year in the six fields. The Nobel Prizes for Peace, Physics, Chemistry, Medicine, and Literature were started in 1901. The Nobel Prize for Economics was started in 1968.
- The prize awarding bodies are the Swedish Academy of literature awards the prize in **Literature**.
- The Royal Swedish Academy of Sciences awards the prize in **Physics** and **Chemistry**.
- The Nobel Assembly of Karolinska Chirurgical (Sweden) awards the prize in **Medicine** (Physiology).
- The Bank of Sweden awards the prize in **Economics**.
- The Committee of the Norwegian Parliament awards the prize for **Peace**.

#### Indian Nobel Laureates

Rabindranath Tagore	Literature	1913
C.V. Raman	Physics	1930
Hargobind Khorana	Medicine	1968
Mother Teresa	Peace	1979
S. Chandrasekhar	Physics	1983
Amartya Sen	Economics	1998
V.S. Naipaul	Literature	2001
Ramakrishnan	Chemistry	2009
Kailash Satyarthi	Peace	2014

### OSCAR AWARD

- Oscar Award was instituted in 1929 and is conferred annually by the Academy of Motion Pictures in the United States.

- The awards ceremony was first televised in 1953 and is now seen live in more than 200 countries.
- Mahboob Khan's Mother India was the first Indian film to be nominated in the best foreign film category in 1958.
- The first Indian to share the Oscar was Bhanu Athaiya for the film 'Gandhi'.
- Satyajeet Ray was the first Indian who was awarded Oscar for lifetime achievement in cinema in the 1992.

### PULITZER PRIZE

- This prize was instituted in 1917 and named after the U.S. Publisher, Joseph Pulitzer.
- Is conferred annually in the United States for accomplishments in journalism, literature and music
- Prizes are awarded yearly in twenty-one categories. In twenty of the categories, each winner receives a certificate and a US\$ 10,000 cash award.
- The winner in the public service category of the journalism competition is awarded a gold medal.

### MAN BOOKER PRIZE

- The Man Booker Prize for Fiction is a literary prize awarded each year for the best novel originally written in English and published in the UK in the year of the prize, regardless of the nationality of their author.
- The novel must be an original work in English (not a translation) and must not be self-published.
- Prior to 2014, eligibility for the award was restricted to citizens of the Commonwealth of Nations, Ireland, or Zimbabwe.

### MAN BOOKER INTERNATIONAL PRIZE

- The literary prize is awarded to a living author of any nationality who has published fiction either in English or in English translation.

- Unlike the annual Man Booker Prize for Fiction, the Man Booker International Prize, which is awarded once in two years, is in recognition of a writer's body of work and overall contribution to fiction rather than to a single novel.
- The introduction of the International Prize was announced in June 2004.

### **TEMPLETON PRIZE (AFFIRMING LIFE'S SPIRITUAL DIMENSION)**

- The Templeton Prize is an annual award presented by the Templeton Foundation, established in 1972
- It is awarded to a living person who, in the estimation of the judges, 'has made an exceptional contribution to affirming life's spiritual dimension, whether through insight, discovery, or practical works'.
- The inaugural winner of the prize, in 1973, was Mother Teresa.

### **RAMON MAGSAYAY AWARD**

- The Ramon Magsaysay Award is an annual award established to perpetuate former Philippine President Ramon Magsaysay's example of integrity in government, courageous service to the people, and pragmatic idealism within a democratic society.
- The Ramon Magsaysay Award is often considered to be Asia's Nobel Prize.
- The prize was established in April 1957 by the trustees of the Rockefeller Brothers Fund based in New York City with the concurrence of the Philippines government.

### **ORANGE PRIZE**

- The Baileys Women's Prize for Fiction (previously called Women's Prize for Fiction (2013), Orange Prize for Fiction (1996-2006 and 2009-12) and Orange Broadband Prize for Fiction (2007-2008) is one of the United Kingdom's most prestigious literary prizes.
- It is awarded annually to a female author of any nationality for the best original full-length novel written in English and published in the United Kingdom in the preceding year.

### **UNESCO PEACE PRIZE**

- The UNESCO Prize for Peace Education has been awarded annually since 1981.
- The prize is endowed up to 60,000 US dollars and honors extraordinary activities in the spirit of the UNESCO constitution.

### **WORLD FOOD PRIZE**

- The World Food Prize is an international award recognizing the achievements of individuals who have advanced human development by improving the quality, quantity, or availability of food in the world.
- It is notably sponsored by agricultural biotechnology companies. Prof. M.S. Swaminathan was the first recipient of the Prize which was started by Norman Borlaug.

### **FIELDS MEDAL (MATHEMATICS)**

- The Fields Medal, officially known as International Medal for Outstanding Discoveries in Mathematics, is a prize awarded to two, three, or four mathematicians not over 40 years of age at each International Congress of the International Mathematical Union (IMU), a meeting that takes place every four years.
- The Fields Medal is often viewed as the greatest honour a mathematician can receive.
- The Fields Medal and the Abel Prize have often been described as the 'mathematician's Nobel Prize'.
- The medal was first awarded in 1936 to Finnish mathematician Lars Ahlfors and American mathematician Jesse Douglas, and it has been awarded every four years since 1950.

### **ABEL PRIZE (MATHEMATICS)**

- The Abel Prize is an international prize presented by the King of Norway to one or more outstanding mathematicians.
- Named after Norwegian mathematician Niels Henrik Abel (1802-1829), the award was established in 2001 by the Government of Norway. Jean-Pierre Serre of France first received it in 2003.

## INTERNATIONAL BEAUTY CONTEST

### MISS UNIVERSE

- It is an annual international beauty contest that is run by the Miss Universe Organisation.
- The Pegeant was founded in 1952 by the California Clothing Company Pacific Mills.
- Sushmita Sen** is the first Indian woman to win the Miss Universe contest in 1994.

### MISS WORLD

- The Miss World pageant is the oldest surviving international beauty pageant.
- Reita Faria Powell** (born in Bombay) became the first Indian to win the Miss World title in 1966.

### MISS EARTH

- Miss Earth is an annual international beauty pageant promoting environmental awareness.

## INDIA'S INTERNATIONAL AWARDS

### MAHATMA GANDHI PEACE PRIZE

- It was instituted in 1995 and awarded by Government of India to encourage and promote Gandhian values worldwide.
- This is an annual award given to individual and institution for their contribution.

### INDIRA GANDHI PRIZE

- It was instituted in 1986 and awarded by Indira Memorial Trust.
- It is awarded for peace, disarmament and development.

### JAWAHARLAL NEHRU AWARD

- It was instituted in 1965 at awarded by Government of India's international understanding of goodwill and friendship.

## NATIONAL AWARDS

### 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.

- Khan Abdul Ghaffar Khan was the first foreigner to be honoured with this award in 1987.

**Note:** Lal Bahadur Shastri was the first person to be honoured with Bharat Ratna posthumously and Indira Gandhi was the first woman recipient of Bharat Ratna.

### PADMA VIBHUSHAN

- The award is given for exceptional and distinguished services in any field including service rendered by government servants.

### PADMA BHUSHAN

- The award is given for distinguished service of a high order in any field, including service rendered by government servants.

### PADMA SHRI

- The award is given for distinguished service in any field including service rendered by government servants.

## OTHER NATIONAL AWARDS

### APPAN MENON MEMORIAL AWARD

The award which carries a cash prices of ₹1 lakh aims at providing financial assistance to journalists interested in undertaking projects related to international affairs and development issues relevant to India and South Asia.

### ADITYA VIKRAM BIRLA KALASHIKHAR PURASKAR

The award is conferred on in artiste in the field of visual and performing arts for lifetime achievement carries ₹1.5 lakh is cash, a memento and scroll of honour.

## GALLANTRY AWARDS

### PARAM VIR CHAKRA

The highest decoration for valour is the Param Vir Chakra which is awarded for the most conspicuous bravery or some daring or pre-eminent act of valour or self-sacrifice in the presence of the enemy, whether on land, at sea or in the air.

### MAHAVIR CHAKRA

Mahavir Chakra is the second highest decoration and is awarded for acts of conspicuous gallantry in the presence of enemy, whether on land, at sea or in the air.

### VIR CHAKRA

Vir Chakra is third in the order of awards given for act of gallantry in the presence of the enemy, whether on land, at sea or in the air.

### ASHOK CHAKRA

Ashok Chakra is the country's **highest peacetime gallantry award** equivalent to Param Vir Chakra.

### KIRTI CHAKRA

The decoration is awarded for conspicuous gallantry.

### SHAURYA CHAKRA

The decoration is awarded for an act of gallantry.

## LITERARY AND CULTURAL AWARDS IN INDIA

### SAHITYA AKADEMI AWARD

It is a literary honour in India instituted in 1954, by which Sahitya Akademi, India's National Academy of Letters, Annually confers on writers of outstanding works in twenty-four major Indian languages.

### JNANPITH AWARD

The Jnanpith Award is a literary award in India. The award was instituted in 1961.

### SANGEET NATAK AKADEMI PURASKAR (AKADEMI AWARD)

Awarded by the **Sangeet Natak Akademi, India's National Academy of Music and Dance and Drama**. It is the highest Indian recognition given to practising dance, theatre other additional/folk/tribal/dance/music/theatre and puppetry and contribution/scholarship in performing arts.

### LALIT KALA AKADEMI RATNA

Instituted in 1955 by the Government of India, is an honour for the fine arts given to eminent artists for their time achievements in the field of arts.

### SARASWATI SAMMAN

The Saraswati Samman is an annual award for outstanding prose or poetry literacy works in any Indian Language listed in Scheduled VII of the Constitution of India. The Saraswati Samman was instituted in 1991 by the K.K. Birla foundation.

### TANSEN AWARD

These awards are given by the Government of Madhya Pradesh for the outstanding contribution in the field of music.

### VYAS SAMMAN

The Vyas Samman is a literary award in India, first awarded in 1991.

## SCIENCE AWARDS

### JAMNALAL BAJAJ AWARD

It is a prestigious Indian award, for promoting Gandhian values, social work and social development.

### SHANTI SWARUP BHATNAGAR AWARD

This prize for science and technology is awarded annually by the Council of Scientific and Industrial Research (CSIR) for notable and outstanding research, applied or fundamental, in biology chemistry, environmental science, engineering, mathematics, medicine and physics under the age of 45 years.

It is the highest award for science in India. It was first awarded in 1958.

### BORLAUG AWARD

Instituted in 1971 and given for Agricultural field.

### NATIONAL FILM AWARDS

The National Film Awards are the most prominent film award ceremony in India,

established in 1954 and it is administered, along with the international film festival of India and the Indian Panorama, by the Indian Government's Directorate of Film Festivals since 1973.

#### DADA SAHEB PHALKE AWARD

The Dada Saheb Phalke Award is India's highest award in cinema given annually by the Government of India for lifetime contribution to Indian Cinema. It was instituted in 1969.

### SPORTS AWARDS

#### RAJIV GANDHI KHEL RATNA AWARD

- The Rajiv Gandhi Khel Ratna Award is India's highest honour given for achievement in sports.

- The award was instituted in the year 1991-92 and was awarded by Government of India.

#### ARJUNA AWARD

- The Arjuna Awards were instituted in 1961 by the Government of India to recognize outstanding achievement in National Sports.

#### DRONACHARYA AWARD

- Dronacharya Award is an award presented by the Government of India for excellence in sports coaching.

#### DHYANCHAND AWARD

- Dhyanchand Award is India's highest award for lifetime achievement in sports and games, given by the Government of India.





## GAMES AND SPORTS

## OLYMPIC GAMES

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.

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 Games came to a sudden end when the **Roman Emperor Theodosius** banned the competitions and their attendant sacrificial offerings as pagan manifestations.

## MODERN OLYMPIC GAMES

The revival work of the Games was undertaken by Baron Pierre de Coubertin nearly 1,500 years after the last of the ancient Games.

Athena was, therefore, the venue for the 1896 Games. Since then 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, Africa, Australia, and America. Each ring is of a different colour, i.e. blue(Europe), yellow(Asia), black(Africa), red(America) and green(Oceania).

## 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.

## OLYMPIC FLAME

It was at the Amsterdam Games in 1928 that 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. 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).

- 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 6 April 1896 with great efforts made by Pierre de Coubertin of France.
- The Olympic Games are organised after every four years.
- The Head Office of International Olympic Committee is in Lausanne (Switzerland).
- Participation of women in the Olympic Games started in the second Olympic Games in 1900.
- The first Indian player who participated in the Olympic Games was an Anglo-Indian ‘Norman Pritchard’, who took part in the Second Olympic Games in 1900 and won two Silver medals in Athletics.
- Married Lila Ro is 1st Indian woman participant in the Olympic Games.
- International Olympic Committee was founded in 1894 at ‘Chakhon’.
- The maximum gold medal winning sportswoman is Christina Otty. She got six gold medals in swimming in Seoul Olympic of 1986.

- The maximum gold medal winner male player in an Olympic is Michael Phelps of USA. He won eight gold medals in swimming in the Beijing Olympics 2008.

### SUMMER OLYMPIC GAMES SITES

1896—Athens, Greece  
 1900—Paris, France  
 1904—St. Louis, United States  
 1908—London, United Kingdom  
 1912—Stockholm, Sweden  
 1916—Scheduled for Berlin, Germany  
 1920—Antwerp, Belgium  
 1924—Paris, France  
 1928—Amsterdam, Netherlands  
 1932—Los Angeles, United States  
 1936—Berlin, Germany  
 1940—Scheduled for Tokyo, Japan  
 1944—Scheduled for London, United Kingdom  
 1948—London, United Kingdom  
 1952—Helsinki, Finland  
 1956—Melbourne, Australia  
 1960—Rome, Italy  
 1964—Tokyo, Japan  
 1968—Mexico City, Mexico  
 1972—Munich, West Germany (now Germany)  
 1976—Montreal, Canada  
 1980—Moscow, U.S.S.R. (now Russia)  
 1984—Los Angeles, United States  
 1988—Seoul, South Korea  
 1992—Barcelona, Spain  
 1996—Atlanta, United States  
 2000—Sydney, Australia  
 2004—Athens, Greece  
 2008—Beijing, China  
 2012—London, United Kingdom

2016—Rio de Janeiro, Brazil  
 2020—Tokyo, Japan

### PARALYMPICS AND WINTER OLYMPICS

- London Paralympics 2012 (Aug. 29–Sept. 09, 2012):** London, the host city welcomed the 14th Paralympic Games with a spectacular Opening Ceremony, held in the Olympic Stadium.
- In London, Paralympic 2012:** Girisha H. Nagarajegowda (Karnataka) clinched the only medal after bagging the Silver in the Men's High Jump F42 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.
- Olympic style Games for athletic with disability were organized for the first time in Rome in 1960, immediately after the Olympic Games. They are considered the **first Paralympic Games**.

### 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 1st Commonwealth Games were held in 1930 at Hamilton, Canada.
- India, for the first time, participated in the second Commonwealth games held in London in 1934.
- The Commonwealth Games are a festival of sports of the Commonwealth countries.
- Since 1930, the games have been conducted every four years except for 1940 and 1946.

#### Commonwealth Games

Edition	Year	Host City	Host Nation
Inter-Empire Games	1911	London	England
I	1930	Hamilton	Canada
II	1934	London	England
III	1938	Sydney	Australia
IV	1950	Auckland	New Zealand
V	1954	Vancouver	Canada

VI	1958	Cardiff	Wales
VII	1962	Perth	Australia
VIII	1966	Kingston	Jamaica
IX	1970	Edinburgh	Scotland
X	1974	Christchurch	New Zealand
XI	1978	Edmonton	Canada
XII	1982	Brisbane	Australia
XIII	1986	Edinburgh	Scotland
XIV	1990	Auckland	New Zealand
XV	1994	Victoria	Canada
XVI	1998	Kuala Lumpur	Malaysia
XVII	2002	Manchester	England
XVIII	2006	Melbourne	Australia
XIX	2010	Delhi	India
XX	2014	Glasgow	Scotland
XXI	2018	Gold Coast	Australia

## ASIAN GAMES

- The Asian Games, also called the Asiad, are a multi-sport event held every four years among athletes from all over Asia.
- The first Asian Games began on March 4, 1951 in New Delhi.
- 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.
- 16th (2010) Asian Games were held in Guangzhou, China.
- In the 16th Asian Games, Twenty-20 Cricket was one of the debut sports.
- 17th Asian Games held in Incheon, South Korea in 2014.

### Asian Games

Year	Venue	Country
1951	New Delhi	India
1954	Manila	Philippines
1958	Tokyo	Japan
1962	Jakarta	Indonesia
1966	Bangkok	Thailand

1970	Bangkok	Thailand
1974	Tehran	Iran
1978	Bangkok	Thailand
1982	New Delhi	India
1986	Seoul	South Korea
1990	Beijing	China
1994	Hiroshima	Japan
1998	Bangkok	Thailand
2002	Busan	South Korea
2006	Doha	Qatar
2010	Guangzhou	China
2014	Incheon	South Korea
2018	Jakarta	Indonesia

## SAF GAMES

The South Asian Federation Games (SAF Games) is a sports festival of South Asian Sports Federation comprising India, Pakistan, Sri Lanka, Bangladesh, Nepal, Bhutan and Maldives. It was formed in New Delhi on November 26, 1982.

- The first SAF Games were held in Kathmandu in 1984.

**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.

## CRICKET

- 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 first World Cup of one day matches was played in 1975 in London. West Indies won the World Cup beating Australia by 17 runs.
- The apex institution of world cricket is the 'International Cricket Council' (ICC) and its headquarters are now in Dubai from August 1, 2005. Earlier it was in Lords (England).
- In India cricket was introduced by British royalty. Parsee community of India was the first to take part in Cricket in 1848.
- The ICC was founded in 1909.
- The Board of Control for Cricket in India (BCCI) was formed in 1927.

### Cricket World Cup Winners

Year	Winners	Runners-up	Venue
1975	West Indies	Australia	England
1979	West Indies	Australia	England
1983	India	West Indies	England
1987	Australia	England	India and Pakistan
1992	Pakistan	England	Australia and New Zealand

1996	Sri Lanka	Australia	Pakistan and India
1999	Australia	Pakistan	England
2003	Australia	India	South Africa
2007	Australia	Sri Lanka	West Indies
2011	India	Sri Lanka	India and Bangladesh
2015	Australia	New Zealand	Australia and New Zealand
2019	-	-	England
2023	-	-	India

## WOMEN'S CRICKET WORLD CUP

- The event is organised by the sport's governing body, the International Cricket Council (ICC).

### 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. Inaugural match was played between the host S. Africa and West Indies.
- The fifth (ICC T-20 World Cup) was hosted by **Bangladesh** in **2014**, while **India** hosted its sixth edition in **2016**.

### ICC TWENTY-20 WOMEN'S CRICKET WORLD CUP

- Australia won ICC Women's World Twenty-20 Championship, defeating England by 4 runs, in the final at Colombo (Sri Lanka) on October 7, 2012.
- Australia cruised to an eight wicket victory over England in the final at Antigua on November 24, 2018.

## FOOTBALL

- It is believed that Football is also of British origin. 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 as the first Football club in India was 'Dalhousie Club'. The apex institution of football is 'Federation of International

Football Association' (FIFA), which was formed by seven countries on May 21, 1904. The headquarters of FIFA is in Paris (France).

- 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.
- The first World Cup was organised at Monte Video (Uruguay) in 1930.
- In India Indian Football Association (IFA) organises National Football Championship.
- The trophy awarded in their competition is called Santosh Trophy.

- 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' (India's) soccer with the launch of the Football Players' Association (FPA) of India in Kolkata on August 13, 2006.
- FIFA World Cup is played after every four years.

### Football World Cup

Year	Host	Winner	Runner-up
1930	Uruguay	Uruguay	Argentina
1934	Italy	Italy	Czechoslovakia
1938	France	Italy	Hungary
1950	Brazil	Uruguay	Brazil
1954	Switzerland	West Germany	Hungary
1958	Sweden	Brazil	Sweden
1962	Chile	Brazil	Czechoslovakia
1966	England	England	West Germany
1970	Mexico	Brazil	Italy
1974	West Germany	West Germany	Netherlands
1978	Argentina	Argentina	Netherlands
1982	Spain	Italy	West Germany
1986	Mexico	Argentina	West Germany
1990	Italy	West Germany	Argentina
1994	United States	Brazil	Italy
1998	France	France	Brazil
2002	South Korea and Japan	Brazil	Germany
2006	Germany	Italy	France
2010	South Africa	Spain	Netherlands
2014	Brazil	Germany	Argentina
2018	Russia	-	-

## HOCKEY

- 'Blackheath Rugby and Hockey Club' is the first hockey club in the world which was set up in the year 1861 in England.

- Hockey was introduced in the Olympic Games for the first time in 1908 in London.
- Indian Hockey Federation (IHF) was formed on the 7 November, 1925 at Gwalior.

- India took part in Olympics for the first time in 1928 (in Amsterdam Olympics).
- In Olympics, India has won the hockey title a maximum of eight times.

### HOCKEY WORLD CUP

- The Hockey World cup is organised by the International Hockey Federation (FIH) once in four years.

#### Hockey World Cup

Year	Host	Winner	Runner-up
1971	Barcelona, Spain	Pakistan	Spain
1973	Amstelveen, Netherlands	Netherlands	India
1975	Kuala Lumpur, Malaysia	India	Pakistan
1978	Buenos Aires, Argentina	Pakistan	Netherlands
1982	Mumbai (Bombay), India	Pakistan	West Germany
1986	London, England	Australia	England
1990	Lahore, Pakistan	Netherlands	Pakistan
1994	Sydney, Australia	Pakistan	Netherlands
1998	Utrecht, Netherlands	Netherlands	Spain
2002	Kuala Lumpur, Malaysia	Germany	Australia
2006	Mönchengladbach, Germany	Germany	Australia
2010	New Delhi, India	Australia	Germany
2014	The Hague, Netherlands	Australia	Netherlands
2018	Bhubaneswar, India	—	—

### VOLLEYBALL

- 'International Volleyball Association' was formed in 1947 with its headquarters in Paris (France).
- The Volleyball Federation of India was formed in 1950.

### TABLE TENNIS

- The first match of The Table Tennis World Championship was played in 1927.
- Table Tennis Association of India was formed in 1938.

### BASKETBALL

- International Basketball Federation was set up in 1932.
- Basketball Federation of India was formed in 1950.

- The headquarters of FIH is located in Lausanne, Switzerland.
- The first Hockey World Cup was organised in Barcelona (Spain) in 1971 and winner was Pakistan.

### BADMINTON

- The International Badminton Federation (IBF) was established in 1934.
- Badminton Association of India was formed in 1934.
- The trophy for the international matches was named Thomas Cup after the name of the first president of the IBF Sir George Thomas. Thomas Cup competition (for men) started in 1948-1949. Uber Cup Championship (for women) was started in 1956.

### LAWN TENNIS

- All England Championship (popularly known as Wimbledon Championship) started in 1877 for man only. Tennis competitions for women (in Wimbledon Championship) were introduced in 1884.

## National Sports and Their Countries

Country	Sport
Colombia	Tejo
Iran	Varzesh-e Bastani, Wrestling
Mexico	Charreria
Philippines	Arnis
Sri Lanka	Volleyball
Afghanistan	Buzkashi
Australia	Australian Football
Barbados	Cricket
Bermuda	Cricket
Bhutan	Archery
Cuba	Baseball
Dominican Republic	Baseball
Argentina	Pato
Bahamas	Sloop sailing
Bangladesh	Kabaddi
Brazil	Capoeira
Canada	Lacrosse (summer), Ice hockey (winter)
Chile	Chilean rodeo
Finland	Pesäpallo
Grenada	Cricket
Guyana	Cricket
India	Field hockey
Israel	Football
Ireland	Gaelic games
Jamaica	Cricket
Japan	Sumo
Madagascar	Rugby union
New Zealand	Rugby union
Norway	Cross-country skiing
Papua New Guinea	Rugby league
Peru	Paleta Frontón
Russia	Bandy
Scotland	Golf
Slovenia	Alpine skiing
Turkey	Wrestling and Cirit
United States	Baseball
Wales	Rugby union

## SPORTS TERMS

**Atheletics:** Relay, Photofinish, Track, Lane, Hurdles, Shotput, Discus Throw, Hammer Throw, Triple Jump, High Jump, Cross Country, etc.

**Badminton:** Shuttle Cock, Service Court, Fore Hand, Back Hand, Smash, Hit, Drop, Net, Love, Double Fault, etc.

**Baseball:** Pinching, Home Run, Base Runner, Throw, Perfect Game, Strike, Putout, etc.

**Basketball:** Free Throw, Technical Foul, Common Foul, Under Head, Overhead, etc.

**Bridge:** Master Point, Perfect Deals, Gland Slam, Dummy, Trump, etc.

**Billiards & Snooker:** Pull, Cue, Hit, Object Ball, Break Shot, Scoring, Cushion Billiards, etc.

**Boxing:** Knockout, Round, Ring Stoppage, Punch, Upper-cut, Kidney Punch, Timing, Foot Work, etc.

**Chess:** E.L.O. rating, international Master, Grand Master, Gambit, Kings Indian Defence, etc.

**Cycling:** Sprint, Time Trial, Point Race, Trackrace, etc.

**Cricket:** Toss, Run, Wicket, Pitch, Stump, Bails, Crease, Pavilion, Gloves, Wicket Keeper, Over, Maiden Over, Follow-on, Rubber, Ashes, Catch, Bowled, Stump Out, Run Out, L.B.W. Hit Wicket, Not out, No ball, Wide ball, Dead ball, Overthrow, Bye, Leg bye, Cover drive, Late cut, Hook, Glance, Stroke, Spot, Pull, Sixer, Followthrough, Turn, Googley, Spin, Yorker, Bouncer, Hat trick, Round the wicket, Over the wicket, Seamer, Boundry line, Slip, Square leg, Runner, Cover, Gully, Long on, Silly point, Midwicket, Mid on, Forward short leg, Deep/mid-wicket, etc.

**Horseriding:** Three day Event, Show jumping, Presses, Faults, etc.

**Football:** Goal, Kick, Head, Penalty kick, Dribble, Off side, Hat trick, Foul, Left out, Right out, Stopper, Defender, Move, Sideback, Pass, Baseline, Rebound, Comer bick, etc.

**Gymnastics:** Parellel bar, Horizontal bar, Floor exercise, Uneven bar, Push up, Sit up. etc.

**Judo:** Cocoa, Blue, white, Green belt, etc.

**Hockey:** Bully Sudden death, Short corner, Hat trick, Goal, Penalty Corner, Penalty

stroke, pushin, Cut, Dribble, Scoop, Centre forward, Half back, Astroturf, Left in, Left out, Off-side, Tie breaker, Carried, Stick, Striking circle, Undercutting, etc.

**Swimming:** Freestyle, Breast stroke, Back stroke, Butterfly, Lane, Pool, Crawl, etc.

**Polo:** Polo-Bunker, Chukker, Mallet, etc.

**Tennis:** Service, Grandslam, Advantage, Deuce, Game Point, Breakpoint; Smash, Shot, Grass Court. Break, Drop shot, Netplay, Baseline, etc.

**Shooting:** Rapidfire Pistol, Standard rifle, Air rifle, Free pistol, Range, Bull's eye, etc.

**Table Tennis:** Volley, Late service, Half volley, Back hand, Drive spin, Chop, etc.

**Weightlifting:** Snatch, Jerk, etc.

**Volleyball:** Deuce, Spikers, Booster, Smash, Sidearm, Penetration, etc.

**Wrestling:** Free style, Hal Nelson, Point, Heave, etc.

## CUPS AND TROPHIES ASSOCIATED WITH SPORTS

### INTERNATIONAL

- Swaythling Cup: Table Tennis (Men)
- Thomas Cup: Badminton
- U. Thant Cup: Tennis
- Uber Cup: Badminton (Women)
- Walker Cup: Golf
- Westchester Cup: Polo
- Wightman Cup: Lawn Tennis
- World Cup: Cricket
- World Cup: Hockey
- Reliance Cup: Cricket
- Rothman's Trophy: Cricket
- William's Cup: Basketball
- European Champions Cup: Football
- Eisenhower Cup: Golf
- American Cup: Yacht Racing
- Ashes: Cricket
- Benson and Hedges: Cricket
- Canada Cup: Golf
- Colombo Cup: Football
- Corbitton Cup: Table Tennis (Women)
- Davis Cup: Lawn Tennis
- Derby: Horse Race
- Grand National: Horse Streple Chase Race
- Jules Rimet Trophy: World Soccer Cup

- King's Cup: Air Races
- Merdeka Cup: Football
- Rydet Cup: Golf
- Essande Champions Cup: Hockey
- Rene Frank Trophy: Hockey
- Grand Prix: Table Tennis
- Edgbaston Cup: Lawn Tennis
- Grand Prix: Lawn Tennis
- World Cup: Weightlifting

### NATIONAL

- Lady Rattan Tata Trophy: Hockey
- MCC Trophy: Hockey
- Moinuddaula Gold Cup: Cricket
- Murugappa Gold Cup: Hockey
- Modi Gold Cup: Hockey
- Narang Cup: Badminton
- Nehru Trophy: Hockey
- Nixan Gold Cup: Football
- Obaid Ullah Gold Cup: Hockey
- Charminar Trophy: Athletics
- Chadha Cup: Badminton
- C.K. Naydu Trophy: Cricket
- Chakoria Gold Trophy: Football
- Divan Cup: Badminton
- Deodhar Trophy: Cricket
- Agarwal Cup: Badminton
- Agha Khan Cup: Hockey
- All-India Women's Guru Nanak Championship: Hockey
- Bandodkar Trophy: Football
- Bangalore Blues Challenge Cup: Basketball
- Barna-Bellack Cup: Table Tennis
- Beighton Cup: Hockey
- Bombay Gold Cup: Hockey
- Burdwan Trophy: Weight-lifting
- Kuppuswamy Naidu Trophy: Hockey
- Duleep Trophy: Cricket
- D.C.M. Cup: Football
- Durand Cup: Football
- Jaswant Singh Trophy: Best Services Sportsman
- Prithi Singh Cup: Polo
- Rani Jhansi Trophy: Cricket
- Ranjit Trophy: Cricket
- Rangaswami Cup: Hockey
- Ranjit Singh Gold Cup: Hockey
- Rajendra Prasad Cup: Tennis
- Ramanujan Trophy: Table Tennis
- Rene Frank Trophy: Hockey

- Dhyan Chand Trophy: Hockey
- Dr. B.C. Roy Trophy: Football (Junior)
- Ezra Cup: Polo
- F.A. Cup: Football
- G.D. Birla Trophy: Cricket
- Ghulam Ahmed Trophy: Cricket
- Gurmeet Trophy: Hockey
- Gura Nanak Cup: Hockey
- Gyanuati Devi Trophy: Hockey
- Holkar Trophy: Bridge
- Irani Trophy: Cricket
- I.F.A. Shield: Football
- Indira Gold Cup: Hockey
- Jawaharlal Challenge: Air Racing
- Radha Mohan Cup: Polo
- Raghbir Singh Memorial: Football
- Rohinton Baria Trophy: Cricket
- Rovers Cup: Football
- Sanjay Gold Cup: Football
- Santosh Trophy: Football
- Sir Ashutosh Mukherjee: Football
- Subroto Cup: Football
- Scindia Gold Cup: Hockey
- Sahni Trophy: Hockey
- Sheesh Mahal Trophy: Cricket
- Todd Memorial Trophy: Football
- Tommy Eman Gold Cup: Hockey
- Vittal Trophy: Football
- Vizzy Trophy: Cricket
- Vijay Merchant Trophy: Cricket
- Wellington Trophy: Rowing
- Wills Trophy: Cricket

### Famous Stadiums, Venues and Related Sports

Stadium	Venue	Sports
Eden Gardens	Kolkata	Cricket
Ranjit Stadium	Kolkata	Football
Green Park	Kanpur	Cricket
Keenan Stadium	Jamshedpur	Cricket
Chepauk Stadium	Chennai	Cricket
Epsom	Britain	Derby
Black heath	London	Rugby Football
National Stadium	Mumbai	Hockey and others
Brabourne Stadium	Mumbai	Cricket

Indraprastha Stadium	Delhi	Indoor games
Jawaharlal Nehru Stadium	Delhi	Athletics
Firoz Shah Kotla	Delhi	Cricket
Ambedkar Stadium	Delhi	Football
Talkatora Stadium	Delhi	Swimming
Heatingly, Manchester	Britain	Cricket
Lords, Oval, Leeds	Britain	Cricket
Wimbledon	Britain	Lawn Tennis
Roland Garros	France	Lawn Tennis
Flushing Meadow	U.S.	Lawn Tennis
Brookland	Britain	Football
Timbukhum	Britain	Rugby
Wembley	Britain	Football

### Places Associated with Sports

Sport	Associated Places
Cricket	<ol style="list-style-type: none"> <li>1. Aden Park (Auckland)</li> <li>2. Brabourne Stadium (Mumbai)</li> <li>3. Chepauk Ground (Chennai)</li> <li>4. Eden Gardens (Kolkata)</li> <li>5. Ferozeshah Kotla Ground (Delhi)</li> <li>6. Green Park (Kanpur)</li> <li>7. Leeds (London, England)</li> <li>8. Lord's (London, England)</li> <li>9. Nehru Stadiums (Chennai and New Delhi)</li> <li>10. Melbourne (Australia)</li> <li>11. Old Trafford (Manchester, England)</li> <li>12. Oval (London, England)</li> <li>13. Wankhede Stadium (Mumbai)</li> </ol>
Football	<ol style="list-style-type: none"> <li>1. Brookland (England)</li> <li>2. Wembley (London)</li> <li>3. Blackheath (London)</li> <li>4. Twickenham (London)</li> <li>5. Corporation Stadium (Kolkata)</li> <li>6. Ambedkar Stadium (New Delhi)</li> <li>7. Nehru Stadium (New Delhi)</li> <li>8. Yuba Bharati Stadium (Kolkata)</li> </ol>

Hockey	<ol style="list-style-type: none"> <li>1. Dhyani Chand Stadium (Lucknow)</li> <li>2. Lal Bahadur Shastri Stadium (Hyderabad)</li> <li>3. Merdeka Stadium (Kuala Lumpur)</li> <li>4. National Stadium (Delhi)</li> <li>5. Nehru Stadium (Delhi)</li> <li>6. Sawai Man Singh Stadium (Jaipur)</li> <li>7. Shivaji Stadium (New Delhi)</li> </ol>	Golf	Sanday Lodge (Scotland)
		Greyhound Race	White City (England)
		Polo	Hurlingham (England)
		Shooting	Bisley (England)
		Skiing	Florence (Chadwick)
		Snooker	Blackpool (England)
		Swimming and Rowing	<ol style="list-style-type: none"> <li>1. Cape Gris Nez (Cross-channel swimming)</li> <li>2. Putney-Mort-Lake (England)</li> </ol>
		Tennis	<ol style="list-style-type: none"> <li>1. Wimbledon (England)</li> <li>2. Forest Hill (U.S.)</li> </ol>





## ABBREVIATIONS

## **ABBREVIATIONS OF ASSOCIATIONS**

<b>AMRA</b>	Automatic Meter Reading Association	<b>IRDA</b>	Insurance Regulatory and Development Authority
<b>AAOU</b>	Asian Association of Open University	<b>ISCA</b>	Indian Science Congress Association
<b>AIBTMF</b>	All India Brick and Tiles Manufacturers' Federation	<b>ISNA</b>	Indian Science News Association
<b>AIDSF</b>	All India Dance Sport Federation	<b>NARUC</b>	National Association of Regulatory Utility Commissioners
<b>AIFWL</b>	All India Federation of Women Lawyers	<b>NASDAQ</b>	National Association of Security Dealer's Active Quotation
<b>AIRF</b>	All India Railwaymen's Federation	<b>NASSCOM</b>	National Association of Software and Service Companies
<b>AIYF</b>	All India Youth Federation	<b>NASUCA</b>	National Association of Utility Consumer Advocates
<b>APEDA</b>	Agricultural and Processed Food Products Export Development Authority	<b>NGSA</b>	Natural Gas Supply Association
<b>ASEAN</b>	Association of South East Asian Nations	<b>NICMAR</b>	National Institute of Construction Management and Research
<b>FICA</b>	Federation of International Cricketer's Association	<b>NID</b>	National Institute of Design
<b>IAS</b>	Indian Administrative Association	<b>NIFT</b>	National Institute of Fashion Technology
<b>IFA</b>	Indian Football Association	<b>NRECA</b>	National Rural Electric Cooperative Association
<b>IACS</b>	Indian Association for Cultivation of Science	<b>SAARC</b>	South Asian Association for Regional Cooperation
<b>IDA</b>	International Development Association	<b>SASMIRA</b>	Synthetic and Art Silk Mills' Research Association
<b>IFA</b>	Indian Football Association	<b>SEIA</b>	Sustainable Energy Industry Association
<b>IIFT</b>	Indian Institute of Foreign Trade	<b>SEWA</b>	Self-Employed Women's Association
<b>ILD</b>	Institute for Labour Development	<b>TRA</b>	Tea Research Association
<b>INSA</b>	Indian National Science Academy	<b>WITT</b>	Waterfalls Institute of Technology Transfer

<b>YMCA</b>	Young Men's Christians Association		Extension and Development
<b>YWCA</b>	Young Women's Christians Association	<b>ICSI</b>	Indian Company Secretaries Institute
<b>INDUSTRIES AND COMPANIES ABBREVIATIONS</b>			
<b>ALMCI</b>	Artificial Limbs Manufacturing Corporation of India	<b>IITA</b>	Indian Coffee Trade Association
<b>ASSOCHAM</b>	Associated Chambers of Commerce and Industry of India	<b>IFCI</b>	Industrial Finance Corporation of India
<b>BEML</b>	Bharat Earth Movers Limited	<b>IISCO</b>	Indian Iron and Steel Company
<b>BIFR</b>	Board for Industrial and Financial Reconstruction	<b>IOF</b>	Indian Ordnance Factories
<b>CCI</b>	Container Corporation of India	<b>IRCON</b>	Indian Railway Construction Company
<b>CII</b>	Confederation of Indian Industry	<b>IRCTC</b>	Indian Railway Catering and Tourism Corporation
<b>COSIDICI</b>	Council of State Industrial Development and Investment Corporations Of India	<b>ITDC</b>	India Tourism Development Corporation
<b>CSIR</b>	Council of Scientific and Industrial Research	<b>KAPS</b>	Kakrapar Atomic Power Station
<b>DIL</b>	Dabur India Limited	<b>KNPP</b>	Kaiga Nuclear Power Plant
<b>EIL</b>	Engineers India Limited	<b>KNPP</b>	Kudankulam Nuclear Power Plant
<b>EPIPs</b>	Export Promotion Industrial Parks	<b>KVIC</b>	Khadi and Village Industries Commission
<b>FICCI</b>	Federation of Indian Chambers of Commerce and Industry	<b>MAPS</b>	Madras Atomic Power Station
<b>FPSBI</b>	Financial Planning Standards Board of India	<b>MMTCI</b>	Minerals and Metals Trading Corporation of India
<b>GAPS</b>	Gorakhpur Atomic Power Station	<b>NAPS</b>	Narora Atomic Power Station
<b>HAL</b>	Hindustan Aeronautics Ltd.	<b>NHDC</b>	National Handloom Development Corporation Limited
<b>HCC</b>	Hindustan Construction Company	<b>NPCIL</b>	Nuclear Power Corporation of India Limited
<b>HCL</b>	Hindustan Copper Limited	<b>NRDC</b>	National Research Development Corporation
<b>IAPTA</b>	India Afghanistan Preferential Trade Agreement	<b>NSDC</b>	National Skill Development Corporation
<b>ICNRED</b>	International Conference on Natural Rubber	<b>PFC</b>	Power Finance Corporation
		<b>RECL</b>	Rural Electrification Corporation Limited
		<b>RLICL</b>	Reliance Life Insurance Company Limited

<b>RPSs</b>	Rubber Producers' Societies	<b>FAMA</b>	Fellow of the American Medical Association
<b>RRII</b>	Rubber Research Institute of India	<b>FIGO</b>	Federation of International of Gynecologists and Obstetricians
<b>SCIL</b>	Shipping Corporation of India Ltd.	<b>HCFA</b>	Health Care Financing Administration
<b>SOTL</b>	Sterlite Optical Technologies Limited	<b>HIPAA</b>	Health Insurance Portability and Accountability Act
<b>SSI</b>	Small Scale Industry	<b>HMO</b>	Health Maintenance Organization
<b>TCSL</b>	Tata Consultancy Services Limited	<b>ICD</b>	International Classification of Diseases of the World Health Organization
<b>TDA</b>	Trade Development Authority	<b>ICDS</b>	Integrated Child Development Services
<b>TFAI</b>	Trade Fair Authority of India	<b>IFMSA</b>	International Federation of Medical Students' Associations
<b>UIICL</b>	United India Insurance Company Limited	<b>IMS</b>	Indian Medical Service
		<b>MBBS</b>	Bachelor of Medicine and Bachelor of Surgery
		<b>NHS</b>	National Health Service
		<b>NICE</b>	National Institute for Health and Clinical Excellence
		<b>NIH</b>	National Institutes of Health
		<b>OSHA</b>	Occupational Safety and Health Administration
		<b>RCP</b>	Royal College of Physicians (England)
		<b>RSBY</b>	Rashtriya Swasthya Bima Yojana
		<b>SMN</b>	Statement of Medical Necessity
		<b>SMS</b>	Senior Medical Student
		<b>SOMA</b>	Student Osteopathic Medical Association
		<b>USPHS</b>	United States Public Health Service
		<b>WHO</b>	World Health Organization
		<b>WMA</b>	World Medical Association

## HEALTH AND MEDICAL ABBREVIATIONS

<b>AAIP</b>	Association of American Indian Physicians	<b>IMS</b>	Indian Medical Service
<b>AAHH</b>	Australian Academy of Herbs and Health	<b>MBBS</b>	Bachelor of Medicine and Bachelor of Surgery
<b>ABMS</b>	American Board of Medical Specialties	<b>NHS</b>	National Health Service
<b>ACGME</b>	Accreditation Council for Graduate Medical Education	<b>NICE</b>	National Institute for Health and Clinical Excellence
<b>AMA</b>	American Medical Association	<b>NIH</b>	National Institutes of Health
<b>AMSA</b>	American Medical Student Association	<b>OSHA</b>	Occupational Safety and Health Administration
<b>BAAPS</b>	British Association of Aesthetic Plastic Surgeons	<b>RCP</b>	Royal College of Physicians (England)
<b>CAEP</b>	Canadian Association of Emergency Physicians	<b>RSBY</b>	Rashtriya Swasthya Bima Yojana
<b>CAMTS</b>	Commission on Accreditation of Medical Transport Systems	<b>SMN</b>	Statement of Medical Necessity
<b>CCOHS</b>	Canadian Centre for Occupational Health and Safety	<b>SMS</b>	Senior Medical Student
<b>CGHS</b>	Central Government Health Scheme	<b>SOMA</b>	Student Osteopathic Medical Association
<b>EMT</b>	Emergency Medical Technician	<b>USPHS</b>	United States Public Health Service
		<b>WHO</b>	World Health Organization
		<b>WMA</b>	World Medical Association

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## FOREIGN BASE ABBREVIATIONS

<b>AAA</b>	Australian Acupuncture Association
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<b>AACA</b>	Australian Association of Consulting Archaeologists	<b>CCF</b>	Cooperative Commonwealth Federation (of Canada)
<b>AACA</b>	Asian American Civic Association	<b>CSCE</b>	Conference on Security and Cooperation in Europe
<b>AACA</b>	Australasian Association of Campus Activities	<b>DSI</b>	Development Services International of Canada
<b>AACB</b>	Australasian Association of Clinical Biochemists	<b>EBRD</b>	European Bank for Reconstruction and Development
<b>AAUN</b>	American Association of the United Nations	<b>EBRDEC</b>	European Bank for Reconstruction and Development European Community
<b>AAUW</b>	American Association of University Women	<b>ECAFE</b>	Economic Commission for Asia and the Far East
<b>ABC</b>	American Broadcasting Company	<b>ECWA</b>	Economic Commission for Western Asia
<b>ABEDA</b>	Arab Bank for Economic Development in Africa	<b>EFTA</b>	European Free Trade Association
<b>AFESD</b>	Arab Fund for Economic and Social Development	<b>ESA</b>	European Space Agency
<b>AFGE</b>	American Federation of Government Employees	<b>ESCAP</b>	Economic and Social Commission for Asia and the Pacific
<b>AFL-CIO</b>	American Federation of Labour and Congress of Industrial Organizations	<b>FAWEZA</b>	Forum for African Women Educationalists of Zambia
<b>AFSCME</b>	American Federation of State, County, and Municipal Employees	<b>FEBS</b>	Federation of European Biochemical Societies
<b>AFT</b>	American Federation of Teachers	<b>FRCP</b>	Fellow of the Royal College of Physicians, London
<b>AIHCA</b>	American Indian Health Care Association	<b>FRCS</b>	Fellow of the Royal College of Surgeons, London
<b>AMCOS</b>	Australasian Mechanical Copyright Owners Society	<b>IAEA</b>	International Atomic Energy Agency
<b>AMFAR</b>	American Foundation for AIDS Research	<b>IASTMP</b>	International Association of Scientific Technical and Medical Publishers
<b>ANZUS</b>	Australia-New Zealand-United States Security Treaty	<b>ICEM</b>	Intergovernmental Committee for European Migration
<b>APEC</b>	Asia Pacific Economic Cooperation	<b>NEA</b>	Nuclear Energy Agency
<b>AUSFTA</b>	Australia-United States Free Trade Agreement	<b>NEJM</b>	New England Journal of Medicine
<b>CAEU</b>	Council of Arab Economic Unity	<b>NERPRC</b>	New England Regional Primate Research Center
<b>CARICOM</b>	Caribbean Community and Common Market	<b>NFSAA</b>	National Film and Sound Archive of Australia
<b>CBC</b>	Canadian Broadcasting Corporation		
<b>CCCB</b>	Canadian Conference of Catholic Bishops		

<b>NIIDS</b>	National and International Institutional Delivery System	<b>UNRWA</b>	United Nations Relief and Works Agency for Palestine Refugees in the Near East
<b>NRL</b>	National Rugby League Limited	<b>UNTSO</b>	United Nations Truce Supervision Organization
<b>OAPEC</b>	Organization of Arab Petroleum Exporting Countries	<b>WCL</b>	World Confederation of Labour
<b>OEEC</b>	Organization for European Economic Cooperation	<b>WEU</b>	Western European Union
<b>OPANAL</b>	Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean	<b>WFC</b>	World Food Council
<b>OPEC</b>	Organization of Petroleum Exporting Countries	<b>WFP</b>	World Food Program
<b>SAARC</b>	South Asian Association for Regional Cooperation	<b>WFTU</b>	World Federation of Trade Unions
<b>SADCC</b>	Southern African Development Coordination Conference	<b>WMO</b>	World Meteorological Organization
<b>UAW</b>	United Auto, Aircraft, and Agricultural Implements Workers of America	<b>WTO</b>	World Tourism Organization
<b>UNCHS</b>	United National Center for Human Settlements	<b>ZACCI</b>	Zambia Association of Chambers of Commerce and Industry
<b>UNCTAD</b>	United Nations Conference on Trade and Development	<b>ZAMWA</b>	Zambia Media Women's Association
<b>UNESCO</b>	United Nations Educational, Scientific, and Cultural Organization	<b>ZANLA</b>	Zimbabwe African National Liberation Army
<b>UNFPA</b>	United Nations Fund for Population Activities	<b>ZANU</b>	Zimbabwe African National Union
<b>UNHCR</b>	United Nations Office of the High Commissioner for Refugees	<b>ZARD</b>	Zambia Association for Research and Development
<b>UNICEF</b>	United Nations International Children's Emergency Fund	<b>ZIMFEP</b>	Zimbabwe Foundation for Education with Production
<b>UNIDO</b>	United Nations Industrial Development Organization	<b>ZNLWVA</b>	Zimbabwe National Liberation War Veterans Association
<b>UNIFIL</b>	United Nations Interim Force in Lebanon	<b>ZPCO</b>	Zimbabwe Producers Cooperative Organization
<b>UNIIMOG</b>	United Nations Iran-Iraq Military Observer Group	<b>ZPTF</b>	Zambia Privatisation Trust Fund
<b>UNMOGIP</b>	United Nations Military Observer Group in India and Pakistan		
<b>BANKING AND BUSINESS ABBREVIATIONS</b>			
<b>AAV</b>	Account-holder Authentication Value		
<b>ABA</b>	American Bankers Association		
<b>ABF</b>	Asset Based Financing		
<b>ACF</b>	Account Credit Facility		

<b>ADB</b>	Agricultural Development Bank	<b>CCIRS</b>	Cross Currency Interest Rate Swap
<b>ADB</b>	Asian Development Bank	<b>CD</b>	Certificate of Deposit
<b>AfDBG</b>	African Development Bank Group	<b>CDBS</b>	Committee of Direction on Banking Statistics
<b>AL</b>	Agreement to Lease	<b>CDL</b>	Credit Discretionary Limit
<b>AMEX</b>	American Stock Exchange	<b>CDM</b>	Cash Deposit Machine
<b>ANBC</b>	Adjusted Net Bank Credit	<b>CDRC</b>	Corporate Debt
<b>ATS</b>	Automatic Transfer Service	<b>CDS</b>	Restructuring Committee
<b>B2B</b>	Business to Business	<b>CIB</b>	Central Depository System
<b>B2C</b>	Business to Consumer	<b>CIB</b>	Corporate and Institutional Banking
<b>BAFIA</b>	Banking and Financial Institutions Act 1989	<b>CIB</b>	Corporate and Investment Banking
<b>BAFT</b>	Bankers' Association for Finance and Trade	<b>CIF</b>	Customer Information File
<b>BBB</b>	Better Business Bureau	<b>CIP</b>	Customer Identification Program
<b>BC</b>	Banker's Cheque	<b>CPSS</b>	Committee on Payment and Settlement Systems
<b>BCBS</b>	Basel Committee on Banking Supervision	<b>CTR</b>	Currency Transaction Report
<b>BCSBI</b>	Banking Codes and Standards Board of India	<b>DBEP/AP</b>	Domestic Bills Exchange Purchased/Authority to Purchase
<b>BDS</b>	Branch Delivery System	<b>DBEP</b>	Domestic Bills Exchange Purchased
<b>BFSI</b>	Banking Financial Services and Insurance	<b>DBOD</b>	Department of Banking Operations and Development
<b>BGB</b>	Bank Guaranteed Bonds	<b>DCCB</b>	District Central Cooperative Bank
<b>BHC</b>	Bank Holding Company	<b>DEIO</b>	Department of External Investments and Operations
<b>BIA</b>	Basic Indicator Approach	<b>DFI</b>	Development Financial Institutions
<b>BIA</b>	Business Impact Analysis	<b>DGBA</b>	Department of Government and Bank Accounts
<b>BIC</b>	Bank Identifier Code	<b>DOBI</b>	Department of Banking and Insurance
<b>BIMST-EC</b>	Bangladesh India Myanmar Sri Lanka Thailand-Economic Council	<b>EACB</b>	European Association of Cooperative Banks
<b>BIS</b>	Bank for International Settlements	<b>ECBS</b>	European Committee for Banking Standards
<b>BRBNMPL</b>	Bharatiya Reserve Bank Note Mudran Private Limited	<b>ESCB</b>	European System of Central Banks
<b>CAG</b>	Comptroller and Auditor General of India		
<b>CAS</b>	Capital Adequacy Standard		
<b>CASA</b>	Current Account and Savings Account		
<b>CBL</b>	Common Business Language		
<b>CBS</b>	Consolidated Banking Statistics		

<b>EXIM Bank</b>	Export Import Bank of India	<b>IRBI</b>	Industrial Reconstruction Bank of India
<b>FBEP/AP</b>	Foreign Bills Exchange Purchased/Authority to Purchase	<b>ISDA</b>	International Swaps and Derivative Association
<b>FBEP</b>	Foreign Bills Exchange Purchased	<b>MECD</b>	Ministry of Entrepreneur and Coorperative Development
<b>FCA</b>	Foreign Currency Accounts	<b>NABARD</b>	National Bank for Agriculture and Rural Development
<b>FCNR (B)</b>	Foreign Currency Non-resident (Banks)	<b>NBFC</b>	Non-Banking Financial Companies
<b>FDD</b>	Foreign Currency Demand Drafts	<b>NHB</b>	National Housing Bank
<b>FFIEC</b>	Federal Financial Institutions Examination Council	<b>OSCB</b>	Other Indian Scheduled Commercial Bank
<b>FICPS</b>	Financial Institutions Corporate Profile System	<b>PBDAC</b>	Principal Bank for Development and Agricultural Credit
<b>FIMAS</b>	Financial Institution Message Authentication Standard	<b>PCARDB</b>	Primary Cooperative Agriculture and Rural Development Bank
<b>FIMMDA</b>	Fixed Income Money Market and Derivatives Association of India	<b>PSIA</b>	Profit Sharing Investment Account
<b>FOS</b>	Financial Origination System	<b>RIDF</b>	Rural Infrastructure Development Fund
<b>IBA</b>	Indian Banks' Association	<b>SBU</b>	Strategic Business Unit
<b>IBF</b>	International Banking Facility	<b>SCARDB</b>	State Cooperative Agriculture and Rural Development Bank
<b>IBRD</b>	International Bank for Reconstruction and Development	<b>SCB</b>	Scheduled Commercial Bank
<b>IBS</b>	International Banking Statistics	<b>SEC</b>	Securities and Exchange Commission
<b>ICBA</b>	Independent Community Bankers of America	<b>SEPP</b>	Secure Electronic Payment Protocol
<b>ICICI</b>	Industrial Credit and Investment Corporation of India	<b>SIDBI</b>	Small Industries Development Bank of India
<b>IDBI</b>	Industrial Development Bank of India	<b>SOBO</b>	Small Office Business Office
<b>IDRBT</b>	Institute for Development and Research in Banking Technology	<b>SSSBEs</b>	Small Scale Service and Business Enterprises
<b>IIBI</b>	Industrial Investment Bank of India	<b>TAFCUBs</b>	Task Force Cooperative Urban Banks
<b>IIBM</b>	Indian Institute of Bank Management	<b>UNICO</b>	Umbrella Organisation for Large Cooperative Banks in Europe
		<b>Visa</b>	Visa International Service Association

## ABBREVIATIONS OF DEFENCE

<b>ADFA</b>	Australian Defence Force Academy	<b>NID</b>	Naval Intelligence Directorate
<b>ADMM</b>	ASEAN Defence Ministers Meeting	<b>NIDS</b>	National Institute of Defence Studies
<b>AFC</b>	Air Force Cross	<b>NWACH</b>	North Western Area Combined Headquarters
<b>AMC</b>	Armed Merchant Cruiser	<b>RANC</b>	Royal Australian Naval College
<b>AMSI</b>	Admiralty Merchant Shipping Instruction	<b>RANR</b>	Royal Australian Navy Reserve
<b>AOC</b>	Air Officer Commanding	<b>RANVR</b>	Royal Australian Navy
<b>AVM</b>	Air Vice Marshall	<b>SNOWA</b>	Volunteer Reserve
<b>AWAS</b>	Australian Women's Army Service	<b>SWACH</b>	Senior Naval Officer
<b>CAMSI</b>	Confidential Admiralty Merchant Shipping Instruction	<b>W/A</b>	Western Australia
<b>CCAS</b>	Commodore Commanding the Australian Squadron	<b>WADA</b>	South Western Area Combined Headquarters
<b>CCS</b>	Combined Chiefs of Staff	<b>WRANS</b>	Western Area Headquarters (Army)
<b>CDF</b>	Chief of the Defence Force, Australia	<b>WRENS</b>	World Anti Doping Authority
<b>C-in-C</b>	Commander-in-Chief		Women's Royal Australian Naval Service
<b>CNO</b>	Chief of Naval Operations; Commonwealth Naval Order		Women's Reserve
<b>CNS</b>	Chief of Naval Staff		Emergency Naval Service
<b>CO</b>	Commanding Officer		
<b>CTF</b>	Commander Task Force		
<b>CWR</b>	Central War Room		
<b>CZM</b>	Commander-in-Chief Netherlands East Indies Naval Forces		
<b>DCNS</b>	Deputy Chief of Naval Staff	<b>AICTE</b>	All India Council for Technical Education
<b>DIISD</b>	Defence, Intelligence and Information Sharing Division	<b>AIU</b>	Association of Indian Universities
<b>DISSISSPF</b>	Defence Intelligence Information Sharing and Strategic Policy Framework	<b>ALISE</b>	Association for Library and Information Science Education
<b>DSTO</b>	Defence Science and Technology Organisation	<b>APA</b>	American Psychological Association
<b>FOCAS</b>	Flag Officer Commanding the Australian Squadron	<b>ARTI</b>	Appropriate Rural Technology Institute
<b>IWM</b>	Imperial War Museum	<b>ASTEC</b>	Assam Science Technology and Environment Council
<b>NEACH</b>	North Eastern Area Combined Headquarters	<b>ATSE</b>	Australian Academy of Technological Sciences and Engineering
		<b>BCI</b>	Bar Council of India
		<b>BLISc</b>	Bachelor of Library and Information Science
		<b>CAETS</b>	Council of Academies of Engineering and Technological Sciences

## EDUCATIONAL ABBREVIATIONS

<b>CDC</b>	Curriculum Development Committee	<b>IFLA</b>	International Federation of Library Associations and Institutions
<b>CDRI</b>	Central Drug Research Institute	<b>IGNOU</b>	Indira Gandhi National Open University
<b>CEP</b>	Continuing Education Programme	<b>ILA</b>	Indian Library Association
<b>CFTRI</b>	Central Food Technology Research Institute	<b>INFLIBNET</b>	Information and Library Network Centre
<b>CGCRI</b>	Central Glass and Ceramic Research Institute	<b>LCSH</b>	Library of Congress Subject Heading
<b>CIMAP</b>	Central Institute of Medicinal and Aromatic Plants	<b>LIS</b>	Library and Information Science
<b>CLISc</b>	Certificate Course in Library and Information Science	<b>M.Phil</b>	Master of Philosophy
<b>CLS</b>	Certificate in Library Science	<b>MCI</b>	Medical Council of India
<b>DEC</b>	Distance Education Council	<b>MIT</b>	Massachusetts Institute of Technology
<b>DESIDOC</b>	Defence Scientific Information and Documentation Center	<b>MLA</b>	Modern Library Association
<b>DLIS</b>	Department of Library and Information Science	<b>MLISc</b>	Master of Library and Information Science
<b>DLSc</b>	Diploma in Library Science	<b>NAAC</b>	National Assessment and Accreditation Council
<b>DRTC</b>	Documentation Research and Training Center	<b>NASSDOC</b>	National Social Science Documentation Center
<b>FIST</b>	Fund for Improvement of S&T	<b>NBA</b>	National Board of Accreditation
		<b>NBT</b>	National Book Trust
		<b>NCTE</b>	National Council for Teachers Education
		<b>NISCAIR</b>	National Institute for Science Communication and Information Resources
		<b>NPE</b>	National Policy on Education
		<b>ODL</b>	Open and Distance Learning
		<b>PGDIT</b>	Post Graduate Diploma in Information Technology
		<b>PGDLAN</b>	Post Graduate Diploma in Library Automation and Networking
		<b>Ph.D</b>	Doctorate in Philosophy
		<b>RRRLF</b>	Raja Rammohan Roy Library Foundation

## INFRASTRUCTURE IN UNIVERSITIES AND HIGHER EDUCATIONAL INSTITUTIONS ABBREVIATIONS

<b>IAS</b>	Indian Academy of Sciences
<b>IASLIC</b>	Indian Association of Special Libraries and Information Centers
<b>IATLIS</b>	Indian Association of Teachers in Library and Information Science
<b>ICSSR</b>	Indian Council of Social Science Research
<b>ICT</b>	Information and Communication Technology

<b>NEP</b>	National Policy on Education
<b>ODL</b>	Open and Distance Learning
<b>PGDIT</b>	Post Graduate Diploma in Information Technology
<b>PGDLAN</b>	Post Graduate Diploma in Library Automation and Networking
<b>Ph.D</b>	Doctorate in Philosophy
<b>RRRLF</b>	Raja Rammohan Roy Library Foundation

## GENERAL ABBREVIATIONS

<b>3GPP</b>	Third Generation Partnership Project
<b>4CC</b>	Four-Character Code

<b>A &amp; M</b>	Agricultural and Mechanical	<b>AIR</b>	All India Radio; Annual Information Report
<b>AAA</b>	Automatic Artwork Alignment	<b>AIR</b>	Area Information Retrieval
<b>AACTS</b>	APS Automated Client Tracking System	<b>AITUC</b>	All India Trade Union Congress
<b>AAF</b>	Advanced Authoring Format	<b>AJT</b>	Advanced Jet Trainer
<b>AB</b>	Application Bulletin	<b>ALT</b>	Application Load Table
<b>ABC</b>	Abstract Base Class	<b>AM</b>	Ante Meridiem
<b>ABI</b>	Acquired Brain Injury	<b>ARP</b>	Arithmetic Processing
<b>ABM</b>	Anti Ballistic Missiles	<b>ASSOCHAM</b>	Associated Chambers of Commerce and Industry
<b>AC</b>	Ante Christum,		Action Taken Report
	Alternating Current	<b>ATR</b>	Authorized Version
<b>ACDP</b>	Automated CD Data Processing	<b>AV</b>	Average
<b>ACDS</b>	Active Control Data Set	<b>av</b>	Avestan
<b>ACE</b>	Advanced Collaborative Environment	<b>Av</b>	Airborne Warning and Control System
<b>ACF</b>	Advanced Communication Facility	<b>B.Ed.</b>	Bachelor of Education
<b>ACM</b>	Association for Computing Machinery	<b>B8ZS</b>	Binary Eight Zero
<b>ACP</b>	Administration Control Panel	<b>BA</b>	Substitution
<b>ACP</b>	Association of Computer Professionals	<b>BARC</b>	Bachelor of Arts
<b>ACPI</b>	Advanced Configuration and Power Interface	<b>BBC</b>	Bhabha Atomic Research Centre
<b>ACR</b>	Animated Computer Rendering	<b>BC</b>	British Broadcasting Corporation
<b>AD</b>	Anno Domini	<b>BCG</b>	Before Christ; Board of Control
<b>ADC</b>	Advanced Disk Catalog	<b>BICC</b>	Binary Counter
<b>ADD</b>	Apple Data Detectors		Bacillus Calmette-Guerin
<b>ADI</b>	Accessibility and Distribution of Information	<b>BIFR</b>	Binary Image Cross Correlation
<b>ADMD</b>	Administrative Domain Management Domain	<b>BIO</b>	Board of Industrial and Financial Reconstruction
<b>ADTS</b>	Audio Data Transport Stream	<b>BIOS</b>	Basic Input Output
<b>AF</b>	Anglo-French	<b>BMDS</b>	Basic Input Output System
<b>AFB</b>	Air Force Base		Ballistic Missile Defence System
<b>AG</b>	Accountant General	<b>BRD</b>	Business Requirements Document
<b>AGA</b>	Advanced Graphics		Business Software Alliance
<b>AIDS</b>	Architecture	<b>BSA</b>	Border Security Force
	Acquired Immune Deficiency Syndrome	<b>BSF</b>	Business Support System
<b>AIMD</b>	Additive Increase, Multiplicative Decrease	<b>BSS</b>	Branch Target Address Cache
		<b>BTAC</b>	Bulgarian, Bulgaria
		<b>Bulg</b>	

<b>CADA</b>	Command Area Development Agency	<b>GST</b>	Goods and Service Tax
<b>CRAC</b>	Cyber Regulation Advisory Council	<b>HDI</b>	Human Development Index
<b>CRDI</b>	Common Rail Direct Injection	<b>HDTV</b>	High Definition Television
<b>CRPF</b>	Central Reserve Police Force	<b>HTML</b>	Hyper Text Markup Language
<b>CRR</b>	Cash Reserve Ratio	<b>HTTP</b>	Hype Text Transfer Protocol
<b>CTBT</b>	Comprehensive Test Ban Treaty	<b>HUDCO</b>	Housing and Urban Development Corporation
<b>DAVP</b>	Directorate of Advertising and Visual Publicity	<b>IAS</b>	Indian Administrative Service
<b>DDT</b>	Dichloro Diphenyl Trichloroethane	<b>IBPS</b>	Institute of Banking Personnel Selection
<b>DNA</b>	Deoxyribo Nucleic Acid	<b>ICAS</b>	Indian Civil Accounts Service
<b>DTH</b>	Direct to Home	<b>ICDS</b>	Integrated Child Development Scheme
<b>ECS</b>	Electronic Cleaning Service	<b>IDES</b>	Indian Defence Estate Service
<b>EMI</b>	Equated Monthly Instalment	<b>IFAD</b>	International Fund for Agricultural Development
<b>ESMA</b>	Essential Services Maintenance Act	<b>IFC</b>	International Finance Corporation
<b>EVM</b>	Electronic Voting Machine	<b>IFS</b>	Indian Foreign Service
<b>FAO</b>	Food and Agriculture Organisation	<b>IIS</b>	Indian Information Service
<b>FDI</b>	Foreign Direct Investment	<b>ILO</b>	International Labour Organization
<b>FDR</b>	Flight Data Recorder; Fixed Deposit Receipt	<b>INTERPOL</b>	International Criminal Police Organization
<b>FEMA</b>	Foreign Exchange Management Act	<b>IRDP</b>	Integrated Rural Development Programme
<b>FERA</b>	Foreign Exchange Regulations Act	<b>IRPS</b>	Indian Railway Personnel Service
<b>FII</b>	Foreign Institutional Investors	<b>IRS</b>	Indian Revenue Service
<b>FIPB</b>	Foreign Investment Promotion Board	<b>IST</b>	Indian Standard Time
<b>FLAG</b>	Fiber Optic Link Around the Globe	<b>ISV</b>	International Scientific Vocabulary
<b>FTP</b>	File Transfer Protocol	<b>ITU</b>	International Telecommunication Union
<b>GAIL</b>	Gas Authority of India Limited	<b>JPC</b>	Joint Parliamentary Committee
<b>GATT</b>	General Agreement on Tariff and Trade	<b>JPEG</b>	Joint Photographic Experts Group
<b>GIST</b>	Graphics and Intelligence-based Script Technology	<b>KPO</b>	Knowledge Process Outsourcing
<b>GPRS</b>	General Packet Radio System	<b>LCA</b>	Light Combat Aircraft
<b>GPS</b>	Global Positioning System	<b>LOAC</b>	Line of Actual Control
		<b>LTA</b>	Light Transport Aircraft

<b>LTTE</b>	Liberation Tigers of Tamil Eelam	<b>TADA</b>	Terrorist and Disruptive Activities Act
<b>MFN</b>	Most Favoured Nation	<b>TIN</b>	Tax Information Network
<b>MIP</b>	Moon Impact Probe	<b>UNEF</b>	United Nations Emergency Force
<b>MMS</b>	Multimedia Messaging Service	<b>UNEP</b>	United Nations Environment Programme
<b>MODEM</b>	Modulator and Demodulator	<b>UNHCR</b>	United Nations High Commissioner for Refugees
<b>MRI</b>	Magnetic Resonance Imaging		United News of India
<b>MVC</b>	Maha Vir Chakra	<b>UNI</b>	United States of America
<b>NABARD</b>	National Bank for Agricultural and Rural Development	<b>USA</b>	Union of Soviet Socialist Republic
<b>NCERT</b>	National Council of Educational Research and Training	<b>VDIS</b>	Voluntary Disclosure of Income Scheme
<b>NHRC</b>	National Human Rights Commission	<b>VLSI</b>	Very Large Scale Integration
<b>NPR</b>	National Population Register	<b>VOIP</b>	Voice Over Internet Protocol
<b>NSE</b>	National Stock Exchange	<b>VPN</b>	Virtual Private Network
<b>OGL</b>	Open General License	<b>VRS</b>	Voluntary Retirement Scheme
<b>OHG</b>	Old High German	<b>VSAT</b>	Very Small Aperture Terminals
<b>PAN</b>	Permanent Account Number	<b>WIPO</b>	World Intellectual Property Organisation
<b>POTA</b>	Prevention of Terrorism Act	<b>WLL</b>	Wireless in Local Loop
<b>PVC</b>	Param Vir Chakra	<b>WMD</b>	Weapon of Mass Destruction
<b>PVSM</b>	Param Vishisht Sewa Medal	<b>XML</b>	Extensible Markup Language
<b>RAF</b>	Rapid Action Force	<b>ZSI</b>	Zoological Survey of India
<b>RBI</b>	Reserve Bank of India		
<b>RCC</b>	Reinforced Concrete Cement		
<b>RLV</b>	Reusable Launch Vehicle		
<b>RSV</b>	Revised Standard Version		
<b>SARS</b>	Severe Acute Respiratory Syndrome		
<b>SATNAV</b>	Satellite Navigation	<b>AAQMG</b>	Assistant Adjutant and Quarter Master General
<b>SDR</b>	Special Drawing Rights	<b>ACG</b>	Assistant Commissary General
<b>SEBI</b>	Securities and Exchange Board of India	<b>ACRE</b>	Assistant Commander Royal Engineers
<b>SWAPO</b>	South West African Peoples Organization	<b>ADMS</b>	Assistant Director of Medical Services
<b>SWIFT</b>	Society for Worldwide Interbank Financial Telecommunication	<b>AG</b>	Accountant General; Adjutant General
		<b>AGG</b>	Agent to Governor General
		<b>AQMG</b>	Assistant Quarter Master General

## OFFICIAL ABBREVIATIONS

<b>AAQMG</b>	Assistant Adjutant and Quarter Master General
<b>ACG</b>	Assistant Commissary General
<b>ACRE</b>	Assistant Commander Royal Engineers
<b>ADMS</b>	Assistant Director of Medical Services
<b>AG</b>	Accountant General; Adjutant General
<b>AGG</b>	Agent to Governor General
<b>AQMG</b>	Assistant Quarter Master General

<b>ASC</b>	Army Stores Committee	<b>OASH</b>	Office of the Assistant Secretary for Health, PHS
<b>ACWA</b>	Administrative Careers with America	<b>OBA</b>	Office of Biotechnology Activities (NIH OD)
<b>ADLCP</b>	Additional Commissioner of Police or	<b>OBSSR</b>	Office of Behavioural and Social Sciences Research (NIH OD)
<b>DIG</b>	Deputy Inspector General of Police	<b>OC</b>	Office of Communications
<b>ARAC</b>	Administrative Restructuring Advisory Committee	<b>OCPL</b>	Office of Communications and Public Liaison
<b>ASDC</b>	Administrative Skills Development Curriculum	<b>OD</b>	Office of the Director
<b>ASI</b>	Assistant Sub-Inspector of Police	<b>ODEO</b>	Office of the Director
<b>ASPER</b>	Assistant Secretary for Personnel Administration, DHHS	<b>OEODM</b>	Executive Office (NIH OD)
<b>CP or DGP</b>	Commissioner of Police (State) or Director General of Police	<b>OF</b>	Office of Equal Opportunity and Diversity Management (NIH OD)
<b>DCP or SSP</b>	Deputy Commissioner of Police or Senior Superintendent of Police	<b>OFACAP</b>	Optional Form
<b>DG</b>	Director General	<b>OFM</b>	Office of Federal Advisory Committee Policy (NIH OD)
<b>DIB</b>	Director of Intelligence Bureau	<b>OHRM</b>	Office of Financial Management (NIH OD)
<b>ERA</b>	Electronic Research Administration	<b>OHSR</b>	Office of Human Resource Management
<b>GSA</b>	General Services Administration	<b>OIPA</b>	Office of International Program Activities
<b>HPC</b>	Police Head Constable	<b>OIT</b>	Office of Information Technology
<b>IMS/ADB</b>	Information Management System/Administrative Data Base System (DELPRO)	<b>OJT</b>	On-The-Job Training
<b>INS</b>	Inspector of Police	<b>OM</b>	Office of Management
<b>JCP or IGP</b>	Joint Commissioner of Police or Inspector General of Police	<b>OMA</b>	Office of Management Assessment
<b>OA</b>	Office of Administration (NIH OD)	<b>OPDIV</b>	Operating Divisions
<b>OAD HIV</b>	Office of the Associate Director for HIV/AIDS	<b>OPPA</b>	Office of Program Planning and Analysis
<b>OAMP</b>	Office of Acquisition Management and Policy (NIH OD)	<b>OSMP</b>	Office of Strategic Management and Planning
<b>OAR</b>	Office of AIDS Research (NIH OD)	<b>PC</b>	Police Constable
		<b>PCG</b>	Privacy Coordinator Group
		<b>PDF</b>	Portable Document Format
		<b>PEBS</b>	Policy, Employee Benefits, and Staffing Unit, PMB, NCI
		<b>PMB</b>	Personnel Management Branch, NCI
		<b>PR</b>	Public Relations

<b>PSA</b>	Program Support Assistants	<b>DSCC</b>	Democratic Senatorial Campaign Committee
<b>PWS</b>	Performance Work Statement	<b>EC</b>	European Community
<b>SAC</b>	Special Agreement Check	<b>ECB</b>	European Central Bank
<b>SAC</b>	Standard Administrative Code	<b>EMU</b>	European Monetary Union
<b>SAT</b>	Senior Assessment Team	<b>EU</b>	European Union
<b>SES</b>	Senior Executive Service	<b>FAA</b>	Federal Aviation Administration
<b>SI</b>	Sub-Inspector of Police	<b>FDP</b>	Freie Demokratische Partei
<b>SPC</b>	Senior Police Constable	<b>FRC</b>	Family Research Council
<b>TAIMS</b>	Time and Attendance Information Management System	<b>GAO</b>	General Accounting Office
<b>TARGET</b>	Technology Accessible Resources Give Employment Today	<b>GDP</b>	Gross Domestic Product
<b>TASC</b>	Technical Assistance and Support Center	<b>GLAAD</b>	Gay and Lesbian Alliance Against Defamation
<b>USOPM</b>	United States Office of Personnel Management	<b>GOP</b>	Gallant Old Party
<b>VA</b>	Visiting Associate	<b>GOP</b>	God's Own Party
<b>POLITICAL ABBREVIATIONS</b>			
<b>ACLU</b>	American Civil Liberties Union	<b>GOP</b>	Grand Old Party
<b>ACU</b>	American Conservative Union	<b>HR</b>	House Resolution
<b>ALP</b>	Australian Labour Party	<b>IMF</b>	International Monetary Fund
<b>ANC</b>	African National Congress	<b>IRA</b>	Irish Republican Army
<b>BJP</b>	Bharatiya Janata Party	<b>LDP</b>	Liberal Democratic Party
<b>BNP</b>	British National Party	<b>MEP</b>	Member of European Parliament
<b>CCRI</b>	California Civil Rights Initiative	<b>MNC</b>	Multinational Corporation
<b>CDU</b>	Christian Democratic Union	<b>MSI</b>	Movimiento Social Italiano
<b>CDUSA</b>	College Democrats USA	<b>NAACP</b>	National Association for the Advancement of Coloured People
<b>CEI</b>	Competitive Enterprise Institute	<b>NAS</b>	National Association of Scholars
<b>CRNC</b>	College Republican National Committee	<b>NDP</b>	New Democratic Party
<b>CRS</b>	Congressional Research Services	<b>NEA</b>	National Education Association
<b>CSU</b>	Christian Social Union	<b>NEA</b>	National Endowment for the Arts
<b>DCCC</b>	Democratic Congressional Campaign Committee	<b>NRA</b>	National Rifle Association
<b>DPP</b>	Democratic Progressive Party	<b>NRCC</b>	National Republican Congressional Committee
		<b>NRDC</b>	Natural Resources Defence Council
		<b>NRLC</b>	National Right to Life Committee
		<b>NRSC</b>	National Republican Senatorial Committee
		<b>NTU</b>	National Taxpayers Union
		<b>PAC</b>	Political Action Committee
		<b>PIRG</b>	Public Interest Research Group

<b>PJ</b>	Partido Justicialista	<b>ILC</b>	Inland Letter Card
<b>PP</b>	Partido Popular	<b>IMO</b>	Instant Money Order
<b>PRI</b>	Partido Revolucionario	<b>IFSMO</b>	International Financial System Money Order
	Institucional		International Money Transfer
<b>RNC</b>	Republican National Committee	<b>IMT</b>	Kisan Vikas Patra
<b>SR</b>	Senate Resolution	<b>KVP</b>	Mahila Samridhi Yojana
<b>SDP</b>	Social Democratic Party	<b>MSY</b>	Money Order
<b>SEC</b>	Securities and Exchange Commission	<b>MO</b>	<i>Mukhya Dak Ghar</i>
<b>SNP</b>	Scottish National Party	<b>MDG</b>	National Savings Certificate
<b>UCC</b>	Uniform Commercial Code	<b>NSC</b>	Pay Roll Savings Scheme
<b>USDA</b>	United States Department of Agriculture	<b>PRSS</b>	Postal Index Number
<b>VAT</b>	Value Added Tax	<b>PIN</b>	Postal Life Insurance
<b>WMD</b>	Weapons of Mass Destruction	<b>PLI</b>	Postal Stores Depot
<b>YAF</b>	Young Americans for Freedom	<b>PSD</b>	Postal Training Centre
		<b>PTC</b>	Postmaster General
		<b>PMG</b>	Public Call Office
		<b>PCO</b>	Public Provident Fund
		<b>PPF</b>	Railway Mail Service
		<b>RMS</b>	Regional Office
		<b>RO</b>	Registered Letter
		<b>RL</b>	Returned Letter Office
		<b>RLO</b>	Rural Postal Life
		<b>RPLI</b>	Insurance
		<b>SBCO</b>	Savings Bank Control Organisation
<b>56 APO</b>	1st CBPO	<b>SPA</b>	Speed Post Article
<b>99 APO</b>	2nd CBPO	<b>SRO</b>	Sub Record Office/Sub Record Officer
<b>APPU</b>	Asian Pacific Postal Union	<b>TMO</b>	Telegraphic Money Order
<b>AMPC</b>	Automatic Mail Processing Centre	<b>UPU</b>	Universal Postal Union
<b>CBPO</b>	Centrally Based Post office	<b>VPL</b>	Value Payable Letter
<b>CPMG</b>	Chief Postmaster General	<b>VPP</b>	Value Payable Parcel
<b>CO</b>	Circle Office	<b>V-SAT</b>	Very-Small Aperture Terminal
<b>CSD</b>	Circle Stamps Depot		
<b>CRC</b>	Computerized Registration Centre		
<b>ECS</b>	Electronic Clearance Service		
<b>EFT</b>	Electronic Fund Transfer		
<b>eMO</b>	Electronic Money Order		
<b>ePOST</b>	Electronic Post		
<b>ESMO</b>	Electronic Satellite Money Order		
<b>eVPP</b>	Electronic Value Payable Parcel		
<b>EMS</b>	Express Mail Service	<b>AAO</b>	Anglo-Australian Observatory
<b>EPP</b>	Express Parcel Post	<b>AI</b>	Artificial Intelligence
<b>GPO</b>	General Post Office	<b>AIIMS</b>	All India Institute of Medical Sciences
<b>HPO</b>	Head Post Office	<b>AINSTRAF</b>	All India Network of ST Radar Facilities
<b>ISP</b>	India Security Press (Nasik)	<b>AIR</b>	All India Radio
<b>IVP</b>	Indira Vikas Patra	<b>AMCHS</b>	Achutha Menon Centre for Health Studies

## POSTAL TELEGRAPHIC ABBREVIATIONS

<b>56 APO</b>	1st CBPO	<b>SPA</b>	Speed Post Article
<b>99 APO</b>	2nd CBPO	<b>SRO</b>	Sub Record Office/Sub Record Officer
<b>APPU</b>	Asian Pacific Postal Union	<b>TMO</b>	Telegraphic Money Order
<b>AMPC</b>	Automatic Mail Processing Centre	<b>UPU</b>	Universal Postal Union
<b>CBPO</b>	Centrally Based Post office	<b>VPL</b>	Value Payable Letter
<b>CPMG</b>	Chief Postmaster General	<b>VPP</b>	Value Payable Parcel
<b>CO</b>	Circle Office	<b>V-SAT</b>	Very-Small Aperture Terminal
<b>CSD</b>	Circle Stamps Depot		
<b>CRC</b>	Computerized Registration Centre		
<b>ECS</b>	Electronic Clearance Service		
<b>EFT</b>	Electronic Fund Transfer		
<b>eMO</b>	Electronic Money Order		
<b>ePOST</b>	Electronic Post		
<b>ESMO</b>	Electronic Satellite Money Order		
<b>eVPP</b>	Electronic Value Payable Parcel		
<b>EMS</b>	Express Mail Service	<b>AAO</b>	Anglo-Australian Observatory
<b>EPP</b>	Express Parcel Post	<b>AI</b>	Artificial Intelligence
<b>GPO</b>	General Post Office	<b>AIIMS</b>	All India Institute of Medical Sciences
<b>HPO</b>	Head Post Office	<b>AINSTRAF</b>	All India Network of ST Radar Facilities
<b>ISP</b>	India Security Press (Nasik)	<b>AIR</b>	All India Radio
<b>IVP</b>	Indira Vikas Patra	<b>AMCHS</b>	Achutha Menon Centre for Health Studies

## SCIENTIFIC ABBREVIATIONS

<b>AAO</b>	Anglo-Australian Observatory
<b>AI</b>	Artificial Intelligence
<b>AIIMS</b>	All India Institute of Medical Sciences
<b>AINSTRAF</b>	All India Network of ST Radar Facilities
<b>AIR</b>	All India Radio
<b>AMCHS</b>	Achutha Menon Centre for Health Studies

<b>AMOS</b>	Advanced Mechanical and Optical Systems	<b>CEESAT</b>	Center for Energy and Environment Science and Technology
<b>ANN</b>	Artificial Neural Network	<b>CFCT</b>	Centre for Fuel Cell Technology
<b>APLAC</b>	Asia Pacific Laboratory Accreditation Cooperation	<b>CGRF</b>	Core Group Research Facility
<b>APRO</b>	Assam Police Radio Organization	<b>CLCR</b>	Centre for Liquid Crystal Research
<b>ARCI</b>	International Advanced Research Centre for Powder Metallurgy and New Materials	<b>CMRI</b>	Central Mining Research Institute
<b>ARF</b>	Auxin Response Factor	<b>CNG</b>	Compressed Natural Gas
<b>ARI</b>	Agharkar Research Institute	<b>CNT</b>	Carbon Nanotube
<b>ARIES</b>	Aryabhatta Research Institute of Observational Sciences	<b>CONTIFUR</b>	Continuous Induction Furnace
<b>BBIL</b>	Bharat Biotech International Limited	<b>CORE</b>	Centres of Relevance and Excellence
<b>BDP</b>	Bengal Delta Plain	<b>CSIO</b>	Central Scientific Instruments Organization
<b>BGF</b>	Basic Growth Factor	<b>CTCZ</b>	Continental Tropical Convergence Zone
<b>BHU</b>	Banaras Hindu University	<b>CVS</b>	Chemical Vapour Synthesis
<b>BI</b>	Bose Institute	<b>DAE</b>	Department of Atomic Energy
<b>BIOFARM</b>	Biological Integration of Farming Activities & Resource Management	<b>DCM</b>	Digital Cartographic Model
<b>BMT</b>	Biomedical Technology	<b>DIMM</b>	Differential Image Motion Monitoring
<b>BOYSCAST</b>	Better Opportunities for Young Scientists in Chosen Areas of Science and Technology	<b>DIT</b>	Department of Information Technology
<b>BSIP</b>	Birbal Sahni Institute of Palaeobotany	<b>DLM</b>	Digital Landscape Model
<b>CAD</b>	Computer-Aided Design	<b>DMS</b>	Digital Mapping Section
<b>CAL</b>	Composite Applications Laboratory	<b>DPRP</b>	Drugs and Pharmaceuticals Research Programme
<b>CAN</b>	Concerned Action Now	<b>DRDO</b>	Defence Research and Development Organisation
<b>CCD</b>	Charge Coupled Devices	<b>DSC</b>	Detonation Spray Coating
<b>CCMB</b>	Centre for Cellular and Molecular Biology	<b>DSIR</b>	Department of Scientific and Industrial Research
<b>CCSTDs</b>	Centre for Cooperation in Science and Technology among Developing Societies	<b>DSM</b>	Defence Series Maps
<b>C-DAC</b>	Centre for the Development of Advanced Computing	<b>DST</b>	Department of Science and Technology
<b>CDC</b>	Centre for Disease Control and Prevention	<b>DVD</b>	Digital Vector Data
		<b>EAC</b>	Entrepreneurship Awareness Camp
		<b>EC</b>	European Commission

<b>EDC</b>	Entrepreneurship Development Cell	<b>GSLV</b>	Geo-Synchronous Launch Vehicle
<b>EDP</b>	Entrepreneurship Development Programme	<b>GTRE</b>	Gas Turbine Research Establishment
<b>EGRL</b>	Equatorial Geophysical Research Laboratory	<b>GTS</b>	Gavilgarh-Tan Shear
<b>EMF</b>	Electro-Magnetic Forming	<b>HAGAR</b>	High Altitude Gamma Ray
<b>EPB</b>	Equatorial Plasma Bubble	<b>HBCSE</b>	Homi Bhabha Centre for Science Education
<b>EPMA</b>	Electron-Probe Micro Analyzer	<b>HCT</b>	Himalayan Chandra Telescope
<b>EPR</b>	Electron Paramagnetic Resonance	<b>HESP</b>	Hanle Echelle Spectro-Polarimeter
<b>ESF</b>	Equatorial Spread F	<b>HHCP</b>	Hartmann-Hahn Cross-Polarization
<b>ETP</b>	Effluent Treatment Plant	<b>IAO</b>	Indian Astronomical Observatory
<b>EVLP</b>	Extended Visitor and Linkage Programme	<b>IAP</b>	Inter Academy Panel
<b>EYGIPLAD</b>	Empowering Youth through Geo-Informatics and Participation for Local Area Development	<b>IARI</b>	Indian Agricultural Research Institute
<b>FAD</b>	Fish Aggregation Device	<b>ICAR</b>	Indian Council of Agricultural Research
<b>FDP</b>	Faculty Development Programme	<b>ICGEB</b>	International Centre for Genetic Engineering and Biotechnology
<b>FESEM</b>	Field Emission Scanning Electron Microscopy	<b>ICMR</b>	Indian Council of Medical Research
<b>FET</b>	Field Effect Transistor	<b>ICP</b>	Inductively Coupled Plasma
<b>FIST</b>	Fund for improvement of S and T Infrastructure in Universities and Higher Educational Institutions	<b>ICRISAT</b>	International Corps Research Institute for the Semi-Arid Tropic
<b>FRED</b>	Front End Application Developer	<b>ICRP</b>	Indian Climate Research Programme
<b>FSSW</b>	Friction Stir Spot Welding	<b>ICSU</b>	International Council of Scientific Unions
<b>GAGAN</b>	GPS Aided Geo Augmented Navigation	<b>IDP</b>	Instrumentation Development Programme
<b>GBPIHED</b>	GB Pant Institute of Himalayan Environment and Development	<b>IEH</b>	Indian Engineering Heritage
<b>GCM</b>	General Circulation Model	<b>IFCPAR</b>	Indo-French Centre for the Promotion of Advanced Research
<b>GCP</b>	Ground Control Points	<b>IHBTR</b>	Institute of Himalayan Bioresource Technology
<b>GDL</b>	Gas Diffusion Layer	<b>IHY</b>	International Heliophysical Year
<b>GIS</b>	Geographic Information System	<b>IIA</b>	Indian Institute of Astrophysics
<b>GLP</b>	Good Laboratory Practice		
<b>GML</b>	Geography Mark-up Language		
<b>GPCR</b>	G-Protein Coupled Receptor		
<b>GSI</b>	Geological Survey of India		

<b>IIASA</b>	International Institute for Applied Systems Analysis	<b>ISRO</b>	Indian Space Research Organisation
<b>IIBAT</b>	International Institute of Biotechnology and Toxicology	<b>IS-STAC</b>	Inter-Sectoral Science and Technology Advisory Committee
<b>IICT</b>	Indian Institute of Chemical Technology	<b>ITPAR</b>	India-Trento Programme for Advanced Research
<b>IIG</b>	Indian Institute of Geomagnetism	<b>ITRC</b>	Indian Toxicology Research Centre
<b>IIIT</b>	Indian Institute of Information Technology	<b>IUCEE</b>	Indo-US Centre for Engineering Education
<b>IIP</b>	Indian Institute of Petroleum	<b>IUSSTF</b>	Indo-US Science and Technology Forum
<b>IISc</b>	Indian Institute of Science	<b>JNCASR</b>	Jawaharlal Nehru Centre for Advanced Scientific Research
<b>IIT</b>	Indian Institute of Technology		Jawaharlal Nehru University
<b>IJHS</b>	Indian Journal of History of Science	<b>JNU</b>	Jawaharlal Nehru University
<b>IJPAM</b>	Indian Journal of Pure and Applied Mathematics	<b>JNV</b>	Jawahar Navodaya Vidyalaya
<b>IJSC</b>	India-Japan Science Council	<b>JSPS</b>	Japan Society for Promotion of Science
<b>ILAC</b>	International Laboratory Accreditation Cooperation	<b>KRVP</b>	Karnataka Rajya Vijnan Parishat
<b>ILTP</b>	Integrated Long-Term Programme	<b>KSKGRL</b>	K.S. Krishnan Geomagnetic Research Laboratory
<b>IMF</b>	Interplanetary Magnetic Field	<b>KVPY</b>	Kishore Vaigyanik Protsahan Yojana
<b>IMS</b>	Ion Mass Spectrometer	<b>LCFA</b>	Low Cost Flexible Automation
<b>INAE</b>	Indian National Academy of Engineering		Light Emitting Diode
<b>INSDOC</b>	Indian National Scientific Documentation Centre	<b>LED</b>	Last Glacial Maximum
<b>INST</b>	Institute of Nano Science and Technology	<b>LGM</b>	Liquified Petroleum Gas
<b>IPR</b>	Institute of Plasma Research/Intellectual Property Rights	<b>LPG</b>	Left Ventricular Assist Device
<b>IRC</b>	Indian Road Congress	<b>LVAD</b>	Micro Arc Oxidation
<b>IRHPA</b>	Intensification of Research in High Priority Areas	<b>MAO</b>	Magic-Angle Spinning
<b>IRIS</b>	Initiative for Research and Innovation in Science	<b>MAS</b>	Mixed phase Cloud
<b>ISCOS</b>	Indian Science Communication Society	<b>MCLLOUMM</b>	Microphysical Model
<b>ISO</b>	International Standards Organisation	<b>MEA</b>	Ministry of External Affairs
		<b>MF</b>	Medium Frequency
		<b>MFIC</b>	Multi Frequency
		<b>MIS</b>	Impedance Cardiograph
			Management Information System

<b>MJV</b>	Mutual Joint Visit	<b>NEIST</b>	North East Institute of Science and Technology
<b>MMOS</b>	Mixed Metal Oxide Semiconductors	<b>NEO</b>	Non-Edible Oil
<b>MoEF</b>	Ministry of Environment and Forests	<b>NER</b>	North Eastern Region
<b>MONTCLIM</b>	Monsoon and Tropical Climate	<b>NFMTC</b>	Nano Functional Materials Technology Centre
<b>MOT</b>	Magneto-Optic Trap	<b>NGO</b>	Non-Governmental Organization
<b>MOU</b>	Memorandum of Understanding	<b>NGRI</b>	National Geophysical Research Institute
<b>MRA</b>	Mutual Recognition Arrangement	<b>NIC</b>	National Informatics Centre
<b>MS</b>	Microwave Sintering	<b>NIH</b>	National Institute of Health/National Institute of Hydrology
<b>MSW</b>	Municipal Solid Waste	<b>NIO</b>	National Institute of Oceanography
<b>MWP</b>	Microwave Plasma	<b>NIPER</b>	National Institute of Pharmaceutical Education and Research
<b>NABL</b>	National Accreditation Board for Testing and Calibration Laboratories	<b>NISCAIR</b>	National Institute of Science Communication and Information Resources
<b>NAM</b>	Non-Aligned Movement	<b>NISTADS</b>	National Institute of Science, Technology and Development Studies
<b>NARL</b>	National Atmospheric Research Laboratory	<b>NIT</b>	National Institute of Technology
<b>NAT</b>	North Almora Thrust	<b>NLST</b>	National Large Solar Telescope
<b>NATAG</b>	Nano Applications and Technology Advisory Group	<b>NML</b>	National Metallurgical Laboratory
<b>NCARDMATH</b>	National Centre for Advanced Research in Discrete Mathematics	<b>NMO</b>	National Member Organization
<b>NCD</b>	Nanocrystalline Diamond	<b>NMR</b>	Nuclear Magnetic Resonance
<b>NCDMA</b>	National Clean Development Mechanism Authority	<b>NMSI</b>	National Mathematical Sciences Initiative
<b>NCE</b>	New Chemical Entities	<b>NOIDA</b>	New Okhla Industrial Development Authority
<b>NCL</b>	National Chemical Laboratory	<b>NPCS</b>	National Program on Carbon Sequestration
<b>NCSC</b>	National Children's Science Congress	<b>NPL</b>	National Physical Laboratory
<b>NCSM</b>	National Council of Science Museums	<b>NRDMS</b>	Natural Resources Data Management System
<b>NCSTC</b>	National Council for Science and Technology Communication		
<b>NEERI</b>	National Environmental Engineering Research Institute		
<b>NEHU</b>	North Eastern Hill University		

<b>NRRDA</b>	National Rural Road Development Agency	<b>PAC-AS</b>	Programme Advisory Committee on
<b>NAS</b>	National Academy of Sciences	<b>PCGIAP</b>	Atmospheric Sciences Permanent Committee on
<b>NSAG</b>	Nano Science Advisory Group	<b>PCR</b>	GIS and Infrastructure for Asia Pacific
<b>NSCC</b>	National Science Communication Congress	<b>PDT</b>	Project Completion Report
<b>NSD</b>	National Science Day	<b>PEMFC</b>	Photodynamic Therapy
<b>NSF</b>	National Science Foundation	<b>PERC</b>	Polymer Electrolyte Membrane Fuel Cell
<b>NSL</b>	National Science Library	<b>PFC</b>	Project Evaluation and Review Committee
<b>NSTEDB</b>	National Science and Technology Entrepreneurship Development Board	<b>PHC</b>	Patent Facilitating Centre
<b>NSTMIS</b>	National Science and Technology Management Information System	<b>PLI</b>	Primary Health Care
<b>NTDB</b>	National Topographic Databases	<b>PMF</b>	Point Load Index
<b>NTSC</b>	National Teachers' Science Conference	<b>POC</b>	Proton-Motive Force
<b>NUIS</b>	National Urban Information System	<b>POP</b>	Program of Cooperation
<b>NYKS</b>	Nehru Yuva Kendra Sangathan	<b>PPM</b>	Plaster of Paris
<b>OECD</b>	Organization for Economic Cooperation and Development	<b>PPP</b>	Proton Precession
<b>OGC</b>	Open Geospatial Consortium	<b>RDCIS</b>	Magnetometer
<b>OGT</b>	Oxford Gene Technology		Public Private Partnership
<b>OIM</b>	Orientation Imaging Microscopy		Research and Development
<b>OISE</b>	Office of International Science and Engineering		Centre for Iron and Steel
<b>OLR</b>	Outgoing Longwave Radiation		
<b>ONGC</b>	Oil and Natural Gas Corporation		
<b>OSCARD</b>	Organization for Social Change and Rural Development		
<b>OSM</b>	Open Series Map		
<b>PAC</b>	Programme Advisory Committee		
		<b>ROP</b>	Ring-Opening Polymerization
		<b>RRI</b>	Raman Research Institute
		<b>RSY</b>	Rashtriya Sadbhavana Yojna
		<b>RTF-DCS</b>	Research Training Fellowships for Developing Country Scientists
		<b>RVPSP</b>	Rashtriya Vigyan Evam Prodyogiki Sanchar Parishad
		<b>SAC-PM</b>	Scientific Advisory Committee to the Prime Minister
		<b>SAIF</b>	Sophisticated Analytical Instrument Facilities
		<b>SAIL</b>	Steel Authority of India Limited
		<b>SASE</b>	Snow and Avalanche Study Establishment
		<b>SBU</b>	Secondary Building Units

## RESOURCE MANAGEMENT ABBREVIATIONS

<b>SCF</b>	Science Communicators Forum	<b>STAWS</b>	Science and Technology Application for the Weaker Sections
<b>SCOPE</b>	Scientific Committee on Problems of Environment	<b>STED</b>	Science and Technology Entrepreneurship Development
<b>SCSP</b>	Scheduled Castes Sub-Plan	<b>STEP</b>	Science and Technology Entrepreneurs Park
<b>SCTIMST</b>	Sree Chitra Tirunal Institute for Medical Sciences and Technology	<b>STI</b>	Survey Training Institute
<b>SDI</b>	Spatial Data Infrastructure	<b>STIC</b>	Sophisticated Test and Instrumentation Centre
<b>SEAEP</b>	Socio-Economic Awareness and Environment Protection	<b>STIO</b>	Scientists and Technologists of Indian Origin
<b>SEM</b>	Scanning Electron Microscope	<b>STORM</b>	Severe Thunderstorms: Observations and Regional Modelling
<b>SERC</b>	Science and Engineering Research Council	<b>STST</b>	Skill Development
<b>SERS</b>	Surface Enhanced Raman Scattering		Training through Science and Technology
<b>SHG</b>	Self-Help Groups	<b>SVO</b>	Straight Vegetable Oil
<b>SIATI</b>	Society of Indian Aerospace Technologies and Industries	<b>SWNT</b>	Single Wall Carbon Nanotube
<b>SINP</b>	Saha Institute of Nuclear Physics	<b>TBI</b>	Technology Business Incubator
<b>SKILLS</b>	Skills and Knowledge for Improved Livelihoods and Living Standards	<b>TDB</b>	Technology Development Board
<b>SME</b>	Small and Medium Enterprises	<b>TEC</b>	Total Electron Content
<b>SMITA</b>	Smart and Innovative Textile Materials	<b>TECC</b>	Taiwan Economic and Cultural Centre
<b>SNBNCBS</b>	S.N. Bose National Centre for Basic Sciences	<b>TEDP</b>	Technology Based Entrepreneurship Development Programme
<b>SOI</b>	Survey of India	<b>TEM</b>	Transmission Electron Microscope
<b>SPM</b>	Scanning Probe Microscopy	<b>TePP</b>	Technopreneur Promotion Programme
<b>SSAG</b>	Standing Scientific Advisory Group	<b>THEP</b>	Theoretical High Energy Physics
<b>SSRC</b>	Standing Scientific Research Committee	<b>TIDE</b>	Technology Informatics Design Endeavour
<b>SSTP</b>	State Science and Technology Programme	<b>TIE</b>	Technology Intervention for Elderly
<b>STAC</b>	Science and Technology Advisory Committee	<b>TIFAC</b>	Technology Information Forecasting and Assessment Council
<b>STARD</b>	Science and Technology Application for Rural Development	<b>TIFR</b>	Tata Institute of Fundamental Research
		<b>TIME</b>	Technology Intervention in Mountain Ecosystem

<b>TIME-IS</b>	Technology Innovation and Management	<b>VIT</b>	Vellore Institute of Technology
	Entrepreneurship	<b>VLF</b>	Very Long Frequency
	Information Service	<b>VP</b>	Vigyan Prasar
<b>TPPM</b>	Two-Pulse Phase Modulation	<b>VPF</b>	Vascular Permeability Factor
<b>TPSC</b>	Theoretical Physics Seminar Circuit	<b>VSBK</b>	Vertical Shaft Brick Kiln
<b>TSD</b>	Technology Systems Development	<b>VSM</b>	Vibrating Sample Magnetometer
<b>TSP</b>	Tribal Sub-Plan	<b>VSSC</b>	Vikram Sarabhai Space Centre
<b>TSPM</b>	Total Suspended Particulate Matter	<b>WDC</b>	World Data Center
<b>TWAS</b>	Third World Academy of Sciences	<b>WFS</b>	Web Feature Service
<b>UCOST</b>	Uttarakhand Council for Science and Technology	<b>WIHG</b>	Wadia Institute of Himalayan Geology
<b>UCS</b>	Uniaxial Compressive Strength	<b>WMS</b>	Web Map Service
<b>UGC</b>	University Grants Commission	<b>WOLEDS</b>	White Organic Light Emitting Diodes
<b>UHHG</b>	Urban Home Herbal Gardens	<b>WP-RASS</b>	Wind Profiler-Radio Acoustic Sounding System
<b>UNBSSI</b>	United Nations Basic Space Science Initiative	<b>WRF</b>	Weather Research Forecast
<b>UNDP</b>	United Nations Development Programme	<b>WTI</b>	Water Technology Initiative
<b>UPES</b>	University of Petroleum and Energy Studies	<b>WTP</b>	Women Technology Park
<b>UVIT</b>	Ultraviolet Imaging Telescope	<b>YSO</b>	Young Stellar Objects
<b>VBO</b>	Vainu Bappu Observatory		
<b>VECC</b>	Variable Energy Cyclotron Centre		
<b>VEGF</b>	Vascular Endothelial Growth Factor		
<b>VGP</b>	Virtual Geomagnetic Pole		
<b>VICAS</b>	Voluntary Institute for Community Applied Science		
<b>VIPNET</b>	Vigyan Prasar Network of Science Clubs		
<b>VIPRIS</b>	Vigyan Prasar Information System		
<b>VIS</b>	Village Information System		
		<b>AEN/MC</b>	Assistant Engineer/ Machines
		<b>BCM</b>	Ballast Cleaning Machine
		<b>BFR</b>	Bogie Flat for Rails
		<b>BRM</b>	Ballast Regulating Machine
		<b>CE</b>	Chief Engineer
		<b>CEE</b>	Chief Electrical Engineer
		<b>CFO</b>	Chief Foreman
		<b>CME</b>	Chief Mechanical Engineer
		<b>CMM</b>	Chief Material Manager
		<b>COM</b>	Chief Operating Manager
		<b>COS</b>	Controller of Stores
		<b>CPOH</b>	Central Periodical Overhauling
		<b>CRF</b>	Capital Recovery Factor
		<b>CRS</b>	Commissioner of Railway Safety

## RAILWAY ABBREVIATIONS

<b>CSM</b>	Continuous Tamping Machine	<b>MC</b>	Machines
<b>CSP</b>	Concrete Sleeper Plant	<b>MCI</b>	Malleable Cast Iron
<b>CSTE</b>	Chief Signal & Telecommunication Engineer	<b>MPT</b>	Multipurpose Tamper
<b>CTE</b>	Chief Track Engineer	<b>OEM</b>	Original Equipment Manufacturer
<b>CTR</b>	Composite Track Record	<b>OHE</b>	Overhead Equipments
<b>CWR</b>	Continuous Welded Rail	<b>P Way</b>	Permanent Way
<b>DEN</b>	Divisional Engineer	<b>PCB</b>	Printed Circuit Board
<b>DOT</b>	Department of Telecommunication	<b>POH</b>	Periodical Overhauling
<b>DSK</b>	Depot Store Keeper	<b>PQRS</b>	Plasser's Quick Relaying System
<b>DTS</b>	Dynamic Track Stabilizer	<b>PRC</b>	Prestressed Reinforced Concrete
<b>DUO</b>	Duomatic Machine	<b>PSC</b>	Prestressed Concrete
<b>Dy.CE/TT</b>	Deputy Chief Engineer/ Tie Tamping	<b>RGM</b>	Rail Grinding Machine
<b>ETKM</b>	Equated Track Kilometer	<b>RPM</b>	Revolutions Per Minute
<b>FP</b>	Fish Plate	<b>S&amp;D</b>	Supply & Disposal
<b>GR</b>	General Rules	<b>S&amp;T</b>	Signal & Telecommunication
<b>G&amp;SR</b>	General & Subsidiary Rules	<b>SBC</b>	Shoulder Ballast Cleaner
<b>GC</b>	Gauge Conversion	<b>SBCM</b>	Shoulder Ballast Cleaning Machine
<b>GM</b>	General Manager	<b>SE</b>	Section Engineer
<b>GMT</b>	Gross Million Tonnes	<b>SEJ</b>	Switch Expansion Joint
<b>GPM</b>	Gallon Per Minute	<b>SEN</b>	Senior Engineer
<b>GVA</b>	Geometry Value Assessment	<b>SM</b>	Station Master
<b>HP</b>	Horse Power	<b>SPURT Car</b>	Self-Propelled Ultrasonic Rail Testing Car
<b>HQ</b>	Headquarter	<b>Sr. DEN</b>	Senior Divisional Engineer
<b>Hrs</b>	Hours	<b>Sr.DOM</b>	Senior Divisional Operating Manager
<b>HS</b>	Hand Signal	<b>SSE/MC</b>	Senior Section Engineer/ Machines
<b>HSD</b>	High Speed Diesel	<b>SSO</b>	Senior Stores Officer
<b>HSK</b>	Highly Skilled	<b>TM</b>	Track Machine
<b>I/C</b>	Incharge	<b>TRT</b>	Track Relaying Train
<b>IOH</b>	Intermediate Overhauling	<b>TTM</b>	Tie Tamping Machine
<b>IR</b>	Indian Railways	<b>UNO</b>	Unomatic Machine
<b>IRICEN</b>	Indian Railways Institute of Civil Engineering Pune	<b>USFD</b>	Ultrasonic Flaw Detection
<b>IRPWM</b>	Indian Railways Permanent Way Manual	<b>UT</b>	Universal Tamper
<b>IRTMTC</b>	Indian Railways Track Machines Training Centre	<b>UTV</b>	Utility Track Vehicle
<b>JA Grade</b>	Junior Administrative Grade	<b>VHF</b>	Very High Frequency
<b>JE</b>	Junior Engineer		
<b>LV</b>	Last Vehicle		
<b>LWR</b>	Long Welded Rail		
<b>MAS</b>	Material At Site		
<b>SPORTS ABBREVIATIONS</b>			
<b>AAA</b>	Amateur Athletic Association		
<b>ICSF</b>	International Casting Sport Federation		
<b>AAC</b>	Adidas Athletic Club		

<b>AAU</b>	Amateur Athletic Union	<b>DAV</b>	Deutscher Aerobic Verband
<b>ABA</b>	Australian Basketball Association	<b>DBB</b>	Deutscher Basketball-Bund
<b>ACC</b>	Atlantic Coast Conference	<b>DEL</b>	Deutsche Eishockey Liga
<b>AFC</b>	American Football Conference	<b>DH</b>	Designated Hitter
<b>AFL</b>	Australian Football League	<b>DISC</b>	Discuss throw
<b>AGTOA</b>	American Greyhound Track Operators Association	<b>DISQ</b>	Disqualified
<b>AIBA</b>	Association Internationale de Boxe Amateur	<b>DLO</b>	Deutsche Leichtathletik Ordnung
<b>AIBA</b>	International Boxing Association (amateur)	<b>DMM</b>	Deutsche Mehrkampf Meisterschaft
<b>AIOWF</b>	Association of International Olympic Winter Sports Federation	<b>DNC</b>	Did Not Compete
<b>AL</b>	American League	<b>DNF</b>	Did Not Finish
<b>ALB</b>	Allgemeine Leichtathletik Bestimmungen	<b>DOM</b>	Dominican Republic
<b>ALCS</b>	American League Championship Series	<b>DSM</b>	Deutsches Sport Marketing
<b>AOC</b>	Australian Olympic Committee	<b>DTM</b>	Deutsche Tourenwagen Meisterschaft
<b>ARISF</b>	Association of IOC Recognised International Sports Federations	<b>EN</b>	Empty Net
<b>ATP</b>	Association of Tennis Professionals	<b>EOR</b>	Equalled Olympic Record
<b>BBL</b>	British Basketball League	<b>ERA</b>	Earned Run Average
<b>BWF</b>	Badminton World Federation	<b>ESL</b>	Electronic Sports League
<b>BWI</b>	British West Indies	<b>EWR</b>	Equalled world record
<b>C5PBA</b>	Canadian 5 Pin Bowlers Association	<b>FA</b>	Football Association
<b>CAF</b>	Central African Republic	<b>FAI</b>	World Air Sports Federation
<b>CAS</b>	Court Of Arbitration For Sport	<b>FIG</b>	International Gymnastics Federation
<b>CAY</b>	Cayman Islands	<b>FIH</b>	International Hockey Federation
<b>CBI</b>	Confederazione Boccistica Internazionale	<b>FILA</b>	International Federation of Associated Wrestling Styles
<b>CCES</b>	Canadian Centre for Ethics in Sport	<b>IWF</b>	International Wrestling Federation
<b>CFL</b>	Canadian Football League	<b>FIR</b>	International Racketlon Federation
<b>D</b>	Defenceman	<b>FIRS</b>	International Roller Sports Federation
<b>DAA</b>	Deutsche Aerobic Akademie	<b>FITA</b>	International Archery Federation
<b>DAN</b>	Diver's Alert Network	<b>FMJD</b>	World Draughts Federation
		<b>GAISF</b>	General Association of International Sports Federations
		<b>IAAF</b>	International Association of Athletics Federations

<b>IBAF</b>	International Baseball Federation	<b>IOC</b>	International Olympic Committee
<b>IBF</b>	International Boxing Federation	<b>IRB</b>	International Racing Bureau
<b>IBSA</b>	International Blind Sports Federation	<b>IRB</b>	International Rugby Board
<b>IBSF</b>	International Billiards and Snooker Federation	<b>ITF</b>	International Tennis Federation
<b>IBTA</b>	International Billiards and Snooker Federation	<b>ITF</b>	International Throwball Federation
<b>IBU</b>	International Boot-throwing Association	<b>ITHF</b>	International Table Hockey Federation
<b>ICC</b>	International Biathlon Union	<b>MLL</b>	Major League Lacrosse
<b>IDBF</b>	International Cricket Council	<b>MLS</b>	Major League Soccer
<b>IDSF</b>	International Dragon Boat Federation	<b>NASCAR</b>	National Association for Stock Car Auto Racing
<b>IFA</b>	International Dance Sport Federation	<b>NBA</b>	National Basketball Association
<b>IFAF</b>	International Fistball Association	<b>NBL</b>	National Basketball League
<b>IFBA</b>	International Federation of American Football	<b>NCAA</b>	National Collegiate Athletic Association
<b>IFBB</b>	International Federation of Broomball Associations	<b>NeCeDo</b>	Netherlands Centre for Doping Affairs
<b>IFF</b>	International Federation of Bodybuilding and Fitness	<b>NFC</b>	National Football Conference
<b>IFNA</b>	International Floorball Federation	<b>NFL</b>	National Football League
<b>INF</b>	International Federation of Netball Associations	<b>NHL</b>	National Hockey League
<b>ISF</b>	International Netball Federation	<b>NHPA</b>	National Horseshoe Pitchers Association of America
<b>IFSC</b>	International Sumo Federation	<b>NRL</b>	National Rugby League
<b>IFSS</b>	International Federation of Sport Climbing	<b>PADA</b>	Pakistan Anti-Doping Association
<b>IGF</b>	International Federation of Sleddog Sports	<b>PADI</b>	Professional Association of Diving Instructors
<b>IHF</b>	International Golf Federation	<b>RFA</b>	Rugby Fives Association
<b>IIHF</b>	International Handball Federation	<b>RLIF</b>	Rugby League
<b>IJF</b>	International Ice Hockey Federation	<b>RPRA</b>	International Federation of Royal Pigeon Racing Association
<b>IKF</b>	International Judo Federation	<b>USADA</b>	United States Anti-Doping Agency
	International Kabaddi Federation	<b>USGA</b>	United States Golf Association
		<b>USHA</b>	United States Handball Association
		<b>USOC</b>	United States Olympic Committee

<b>USSRA</b>	United States Squash Racquets Association
<b>WBC</b>	World Boxing Council
<b>WBF</b>	World Bridge Federation
<b>WCA</b>	World Cube Association
<b>WCBS</b>	World Confederation of Billiard Sports
<b>WSF</b>	World Squash Federation
<b>WTA</b>	Womens Tennis Association

## MILITARY ABBREVIATIONS

<b>AA and QMG</b>	Assistant Adjutant and Quartermaster General
<b>AA</b>	Anti-Aircraft
<b>AA</b>	Army Act
<b>AASC</b>	Anti-Aircraft Searchlight Company
<b>AASS</b>	Anti-Aircraft Searchlight Section
<b>AB</b>	Army Book
<b>ABPO</b>	Advanced Base Post Office
<b>ACC</b>	Army Cyclist Corps
<b>ACG</b>	Assistant Chaplain General
<b>ACI</b>	Army Council Instruction (or Art. Dpt) Artillery
<b>AD</b>	Depot
<b>ADAPS</b>	Assistant Director Army Postal Services
<b>ADC</b>	Aide-de-Camp
<b>ADGT</b>	Assistant Director-General of Transportation
<b>ADL</b>	Assistant Director of Labour
<b>ADLR</b>	Assistant Director of Light Railways
<b>ADOS</b>	Assistant Director Ordnance Services
<b>ADRT</b>	Assistant Director Railway Traffic
<b>ADS</b>	Advanced Dressing Station
<b>ADVS</b>	Assistant Director Veterinary Services
<b>AEC</b>	(or A. Emp. Coy) Area Employment Company
<b>AF</b>	Army Form
<b>AFA</b>	Army Field Artillery;
<b>AG</b>	Australian Field Artillery
<b>AGS</b>	Adjutant General
<b>AIF</b>	Army Gymnastic Staff
<b>AIS</b>	Australian Imperial Force
<b>AMFO</b>	Assistant Inspector of Searchlights
<b>AMLO</b>	Assistant Military Forwarding Officer
<b>AMO</b>	Assistant Military Landing Officer
<b>AMS</b>	Administrative Medical Officer
<b>ANZAC</b>	Australian and New Zealand Army Corps
<b>AO</b>	Army Order
<b>AOC</b>	Army Ordnance Corps
<b>AOD</b>	Army Ordnance Department
<b>AP</b>	Armour Piercing (ammunition)
<b>APC</b>	Army Pay Corps and Assistant Principal Chaplain
<b>APM</b>	Assistant Provost Marshal
<b>APO</b>	Army Post Office
<b>AQMG</b>	Assistant Quartermaster-General
<b>ARD</b>	Alberta Reinforcement Depot
<b>ARMW</b>	Army Reserve Munition Worker
<b>ARP</b>	Ammunition Refilling Point
<b>ARS</b>	Advanced Regulating Station
<b>ASC</b>	Army Service Corps
<b>ASD</b>	Army Schools Department
<b>ASO</b>	Area Searchlight Officer (or Amm. Sub. Pk)
<b>ASP</b>	Ammunition Sub-Park
<b>AT</b>	Army Troops
<b>AVC</b>	Army Veterinary Corps
<b>BAC</b>	Brigade Ammunition Column
<b>BAPO</b>	Base Army Post Office

<b>BC</b>	Battery Commander or Base Commandant	<b>CLC</b>	Chinese Labour Corps
<b>BCA</b>	Battery Commander's Assistant	<b>CLLE</b>	Charger-Loading
<b>Bdmr</b>	Bandmaster	<b>CLLM</b>	Lee-Enfield Rifle
<b>BG</b>	Broad Gauge (railway)	<b>CLRO</b>	Charger-Loading
<b>BGGS</b>	Brigadier-General General Staff	<b>CMO</b>	Lee-Metford Rifle
<b>BGRA</b>	Brigadier-General Royal Artillery	<b>CMP</b>	Corps Light Railway
<b>BL</b>	Breech Loading	<b>CO</b>	Officer
<b>BLC</b>	Breech Loading Converted	<b>COO</b>	Court-Martial Officer
<b>BM</b>	Brigade Major	<b>CP</b>	Corps of Military Police
<b>BOR</b>	British Other Rank	<b>CQMS</b>	Commanding Officer,
<b>BRCS</b>	British Red Cross Society		Conscientious Objector
<b>BSM</b>	Battery Sergeant-Major	<b>CRA</b>	Chief Ordnance Officer
<b>BWIR</b>	British West Indies Regiment	<b>CRCE</b>	Censorship and Publicity
<b>BWM</b>	British War Medal	<b>CRE</b>	Company Quartermaster
<b>CB</b>	Confinement to Barracks (punishment) and	<b>CRO</b>	Master Sergeant
<b>CBSO</b>	Counter-Battery	<b>CSIC</b>	Commanding Royal
<b>CC</b>	Counter-Battery Staff Officer	<b>CSM</b>	Artillery
<b>CCCC</b>	Confined to Camp (punishment)	<b>CT</b>	Chief Railway
<b>CCD</b>	Cape Colony Cyclist Corps	<b>CVBC</b>	Construction Engineer
<b>CCRA</b>	Commander of Coast		Commanding Royal
<b>CCS</b>	Defences	<b>DAA</b>	Engineers
<b>CDS</b>	Corps Commander Royal Artillery	<b>DAAG</b>	Corps Roads Officer
<b>CEF</b>	Casualty Clearing Station	<b>DAC</b>	Cadet School Infantry
<b>CEPC</b>	Corps Dressing Station		Company
<b>CF</b>	Canadian Expeditionary Force	<b>DACG</b>	Company Sergeant Major
<b>CFC</b>	Chief Engineer Port Construction	<b>DAD Roads</b>	Communication Trench
<b>CGS</b>	Chaplain to the Forces	<b>DAD Sigs</b>	Cape Volunteer Bearer
<b>CHA</b>	Canadian Forestry Commission	<b>DADAPS</b>	Corps
<b>CHDAVC</b>	Chief of General Staff	<b>DADGR &amp; E</b>	Director of Army Accounts
<b>CID</b>	Commander Heavy Artillery	<b>DADGT</b>	Deputy Assistant Adjutant
<b>CIGS</b>	Convalescent Horse Depot		General
	Army Veterinary Corps	<b>DADL</b>	Deputy Assistant Director
	Committee of Imperial Defence		of Roads
	Chief of the Imperial General Staff		Deputy Assistant Director
			of Signals
			Deputy Assistant Director
			Army Postal Services
			Deputy Assistant Director
			of Graves Registration and
			Enquires
			Deputy Assistant
			Director-General of
			Transportation
			Deputy Assistant Director
			of Labour

<b>DADMS</b>	Deputy Assistant Director Medical Services	<b>DDTN</b>	Deputy Director of Transportation
<b>DADOS</b>	Deputy Assistant Director Ordnance Services	<b>DDVS</b>	Deputy Director Veterinary Services
<b>DADPS</b>	Deputy Assistant Director Postal Services	<b>DDW</b>	Deputy Director of Works
<b>DADRT</b>	Deputy Assistant Director Railway Traffic	<b>DEOS</b>	Director of Equipment and Ordnance Stores
<b>DADS</b>	Deputy Assistant Director Supplies	<b>DFC</b>	Distinguished Flying Cross
<b>DADT</b>	Deputy Assistant Director Transport	<b>DFS</b>	Director of Financial Services
<b>DADW</b>	Deputy Assistant Director of Works	<b>DFW</b>	Director of Fortifications and Works
<b>DAG</b>	Deputy Adjutant General	<b>DGAMS</b>	Director-General, Army Medical Services
<b>DAMS</b>	Deputy Assistant Military Secretary	<b>DGAVS</b>	Director-General, Army Veterinary Services
<b>DAP</b>	Divisional Ammunition Park	<b>DGNS</b>	Director-General National Service
<b>DAPC</b>	Deputy Assistant Principal Chaplain	<b>DGO</b>	Divisional Gas Officer
<b>DAPS</b>	Director of Army Postal Services	<b>DGTF</b>	Director-General of the Territorial Force
<b>DAQMG</b>	Deputy Assistant Quartermaster General	<b>DIL</b>	Dangerously Ill List
<b>DBC</b>	Director of Barrack Construction	<b>DIWD</b>	Director Inland Waterways and Docks
<b>DCIGS</b>	Deputy Chief of the Imperial General Staff	<b>DIY</b>	Derbyshire Imperial Yeomanry
<b>DCM</b>	Distinguished Conduct Medal	<b>DLR</b>	Director of Light Railways
<b>DCM</b>	District Court-Martial	<b>DM</b>	Director of Mobilisation
<b>DDS &amp; T</b>	Deputy Director Supplies and Transport	<b>DMO</b>	Director of Military Operations
<b>DDAPS</b>	Deputy Director of Army Postal Services	<b>DMS</b>	Director of Medical Services, also Deputy Military Secretary
<b>DDGMR</b>	Deputy Director-General Military Railways or Movements and Railways	<b>DMT</b>	Director of Military Training
<b>DDGT</b>	Deputy Director-General of Transportation	<b>DNTO</b>	Divisional Naval Transport Officer
<b>DDIWT</b>	Deputy Director Inland Waterway Transport	<b>DORA</b>	Defence of the Realm Act
<b>DDMS</b>	Deputy Director Medical Services	<b>DORE</b>	District Office Royal Engineers
<b>DDOS</b>	Deputy Director Ordnance Services	<b>DOS</b>	Director of Ordnance Services
<b>DDRT</b>	Deputy Director Railway Traffic	<b>DP</b>	Drill Purpose
		<b>DPS</b>	Director of Personal Services
		<b>DPW</b>	Director of Prisoners of War
		<b>DQMG</b>	Deputy Quartermaster-General

<b>DR</b>	Despatch Rider	<b>FSR</b>	Field Service Regulations
<b>DRF</b>	Depression Range-Finder	<b>FWD</b>	Four Wheel Drive
<b>DRG&amp;E</b>	Director of Graves	<b>GCM</b>	General Court-Martial
	Registration and Enquires	<b>GHQ</b>	General Headquarters
<b>DRLS</b>	Despatch Rider Letter	<b>GMP</b>	Garrison Military Police
	Service	<b>GOC</b>	General Officer
<b>DRO</b>	Director of Recruiting and Organization	<b>GOCinC</b>	Commanding General Officer
<b>DRT</b>	Director Railway Traffic	<b>GRC</b>	Commanding-in-Chief
<b>DSC</b>	Distinguished Service Cross (a naval decoration)	<b>GRO</b>	Graves Registration Commission
<b>DSD</b>	Director of Staff Duties	<b>GRU</b>	General Routine Order
<b>DSM</b>	Distinguished Service Medal (a naval decoration)	<b>GS</b>	Graves Registration Unit
<b>DSO</b>	Distinguished Service Order	<b>GSO</b>	General Service and General Staff
<b>DSQ</b>	Director of Supplies and Quartering	<b>GSW</b>	General Staff Officer
<b>DTM</b>	Director of Transport and Movements	<b>HA</b>	Gunshot Wound
<b>DTMO</b>	Divisional Trench Mortar Officer	<b>HAR</b>	Heavy Artillery
		<b>HBMGC</b>	Heavy Artillery Reserve
<b>DTN</b>	Director of Transportation	<b>HE</b>	Heavy Branch Machine Gun Corps (Later Tank Corps)
<b>DW</b>	Director of Works	<b>HPD</b>	High Explosive
<b>E &amp; M</b>	Electrical and Mechanical	<b>HS</b>	Home Postal Depot
<b>EBSVR</b>	East Bengal State Volunteer Rifles	<b>HSC</b>	Home Service
<b>EEF</b>	Egyptian Expeditionary Force	<b>HT</b>	Hospital Ship Case (medical)
<b>EFC</b>	Expeditionary Force Canteen	<b>HV</b>	Horse Transport
<b>ELC</b>	Egyptian Labour Corps	<b>IA</b>	High Velocity
<b>EMO</b>	Embarkation Medical Officer	<b>IAF</b>	Indian Army
<b>FANY</b>	First Aid Nursing Yeomanry	<b>IE</b>	Indian Air Force
<b>FAO</b>	Forward Area Officer (Light Railways)	<b>IGC</b>	Illegal enlistment
<b>FAU</b>	Friends Ambulance Unit	<b>IGT</b>	Inspector-General of Communications
<b>FGCM</b>	Field General Court-Martial	<b>IHL</b>	Inspector-General of Transportation
<b>FLC</b>	Fijian Labour Contingent (Later Corps)	<b>IO</b>	Imprisonment with Hard Labour
<b>FOO</b>	Forward Observation Officer	<b>IOM</b>	Intelligence Officer
<b>FP</b>	Field Punishment	<b>IOR</b>	Inspector of Ordnance
<b>FPO</b>	Field Post Office	<b>IS</b>	Machinery
<b>FSC</b>	Field Survey Company	<b>IW &amp; D</b>	Indian Other Rank
<b>FSL</b>	Field Searchlight	<b>IWG</b>	Inspector of Searchlights
<b>FSM</b>	Field Service Manual		Inland Waterways and Docks
			Imperial War Graves Commission
			Inland Water Transport Judge Advocate General

<b>KR</b>	King's Regulations	<b>OC</b>	Officer Commanding,
<b>L/C or</b>		<b>OR</b>	Officer Cadet
<b>L/Cpl</b>	Lance Corporal	<b>ORS</b>	Other Rank
<b>LEE</b>	London Electrical Engineers	<b>OTC</b>	Orderly Room Sergeant
<b>LO</b>	Liaison Officer	<b>P &amp; BT</b>	Officers Training Corps
<b>LofC</b>	Lines of Communication	<b>PB</b>	Physical and Bayonet
<b>LR</b>	Local Reserve	<b>PBI</b>	Training
<b>MAC</b>	Motor Ambulance Convoy	<b>PC</b>	Permanent Base (medical)
<b>MB</b>	Medical Board	<b>PM</b>	Poor Bloody Infantry (colloquial)
<b>MC</b>	Military Cross	<b>PNTO</b>	Principal Chaplain (non-Church of England)
<b>MDS</b>	Main Dressing Station	<b>POW</b>	Provost Marshal
<b>MEF</b>	Mediterranean Expeditionary Force	<b>PPCLI</b>	Principal Naval Transport Officer
<b>MFD</b>	Military Forwarding Department	<b>PSC</b>	Prisoner of War
<b>MFO</b>	Military Forwarding Officer	<b>PU</b>	Princess Patricia's Canadian Light Infantry
<b>MFP</b>	Military Foot Police	<b>PUO</b>	Passed Staff College
<b>MGC</b>	Machine Gun Corps	<b>QF</b>	Permanently Unfit (medical)
<b>MGGS</b>	Major General General Staff	<b>QMAAC</b>	Pyrexia of Unknown Origin (medical term usually applied to Trench Fever)
<b>MGO</b>	Master General of the Ordnance	<b>QMG</b>	Quick Firing
<b>MGRA</b>	Major General Royal Artillery	<b>QMS</b>	Queen Mary's Army Auxiliary Corps
<b>MGS</b>	Machine Gun School	<b>Qs</b>	Quartermaster General
<b>MLO</b>	Military Landing Officer	<b>RAF</b>	Quartermaster Sergeant
<b>MM</b>	Military Medal	<b>RAFA</b>	Qualified for Staff
<b>MMGC</b>	Motor Machine Gun Corps	<b>RAGA</b>	Royal Air Force
<b>MML</b>	Manual of Military Law	<b>RAP</b>	Royal Australian Field Artillery
<b>MMP</b>	Military Mounted Police	<b>RCE</b>	Royal Australian Garrison Artillery
<b>MPI</b>	Mean Point of Impact	<b>RCO</b>	Regimental Aid Post
<b>MPSC</b>	Military Police Staff Corps	<b>RDC</b>	Railway Construction
<b>MS</b>	Military Secretary	<b>REPS</b>	Engineer
<b>MSM</b>	Meritorious Service Medal	<b>RFA</b>	Railway Control Officer
<b>MT</b>	Mechanical Transport	<b>RFC</b>	Royal Defence Corps
<b>MVC</b>	Motor Volunteer Corps	<b>RGA</b>	Royal Engineers Postal Section
<b>MVS</b>	Mobile Veterinary Section	<b>RH</b>	Royal Field Artillery
<b>NACB</b>	National Army Catering Board	<b>RHA</b>	Royal Flying Corps
<b>NCC</b>	Non-Combatant Corps		Royal Garrison Artillery
<b>NTO</b>	Naval Transport Officer		Railhead
<b>NYD</b>	Not Yet Diagnosed (medical term)		Royal Horse Artillery, and Reserve Heavy Artillery
<b>NYDN</b>	Not Yet Diagnosed		
	Nervous (medical term for suspected shell shock)		

<b>RM</b>	Riding Master, and Royal Marines	<b>SP</b>	Strongpoint
<b>RMA</b>	Royal Marine Artillery	<b>SPT</b>	(preceding a man's number) Sportmen's Battalion Royal Fusiliers
<b>RMLC</b>	Royal Marine Labour Corps	<b>SR</b>	Special Reserve
<b>RMLI</b>	Royal Marine Light Infantry	<b>SRS</b>	Sound Ranging Section
<b>RNAS</b>	Royal Naval Air Service	<b>SSM</b>	Squadron Sergeant Major (cavalry)
<b>RND</b>	Royal Naval Division (63 Div)	<b>STK</b>	(preceding a man's number) Stockbroker's Battalion Royal Fusiliers
<b>RO</b>	Recruiting Officer	<b>TAT</b>	Temporary Ambulance
<b>ROD</b>	Railway Operating Division		Train
<b>ROO</b>	Railway Ordnance Officer	<b>TB</b>	Temporary Base (medical)
<b>RP</b>	Rules of Procedure,	<b>TC</b>	Tank Corps
	Regimental Police,	<b>TCO</b>	Train Conducting Officer
	Refilling Point	<b>TDO</b>	Telephone Dug-out
<b>RSM</b>	Regimental Sergeant Major	<b>TEE</b>	Tyne Electrical Engineers
<b>RSO</b>	Railhead Supply Officer	<b>TF</b>	Territorial Force
<b>RTC</b>	Reserve Training Centre	<b>TM</b>	Trench Mortar
<b>RTE</b>	Railway Transport Establishment	<b>TMB</b>	Trench Mortar Battery
<b>RTO</b>	Railway Transport Officer (later Railway Traffic Officer)	<b>TO</b>	Transport Officer
	Returned to Unit	<b>TOS</b>	Taken on Strength
<b>RTU</b>	Small Arms Ammunition	<b>TR</b>	Training Reserve
<b>SAA</b>	South African Native Labour Corps	<b>TRB</b>	Training Reserve Brigade
<b>SANLC</b>	Staff Captain	<b>TSM</b>	Troop Sergeant Major (cavalry)
<b>SC</b>	Senior Chaplain to the Forces	<b>VAD</b>	Voluntary Aid Detachment
<b>SCF</b>	Staff Duties	<b>VADGS</b>	Voluntary Aid Detachment General Service
<b>SD</b>	Surveyor-General of Supply	<b>VC</b>	Victoria Cross
<b>SGS</b>	Sergeant (rank)	<b>VO</b>	Veterinary Officer
	Self-Inflicted Wound	<b>VTC</b>	Volunteer Training Corps
	Superintendent of Light Railways	<b>WAAC</b>	Women's Army Auxiliary Corps (later QMAAC)
<b>SMLE</b>	Short Magazine Lee-Enfield	<b>WD</b>	War Department
	Struck off strength. Also used in usual sense (of emergency).	<b>WE</b>	War Establishment
<b>SOS</b>		<b>WIR</b>	West India Regiment
		<b>WO</b>	War Office
		<b>WWCS</b>	Walking Wounded Collecting Station
		<b>YOC</b>	Young Officers Company
		<b>YS</b>	Young Soldier

