

2024

**GENERAL KNOWLEDGE
2024
FOR COMPETITIVE
EXAMS**



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INDIAN HISTORY

ANCIENT INDIA

PRE-HISTORIC PERIOD INDUS VALLEY CIVILISATION

Palaeolithic Period

- **Homo sapiens** first appeared towards the end of this phase.
- In this period, man barely managed to gather his food and subsisted on **hunting**.
- Distinguished by the development of the first stone tools made up of **Quartzite**.
- Palaeolithic period is divided into **three phases**. *They are*
 1. Lower Palaeolithic
 2. Middle Palaeolithic
 3. Upper Palaeolithic

Mesolithic Period

- Domestication of animals (particularly, dogs) began and characteristic tools were used, called as **microliths**.
- **Bhimbetka** in Madhya Pradesh, is known for ancient caves depicting pictures of birds, animals and humans.

Neolithic Period

- Neolithic people knew about **fire** and **wheel**.
- An important site of this age is **Burzahom**, which means 'the place of birch'.

Chalcolithic Period

- Use of Copper and Stone made tools.
- They practised agriculture, venerated Mother Goddess and worshipped the bull.

- Indus Valley Civilisation is one of the four earliest civilisations of the world.
- According to radiocarbon dating, initiation of Indus Valley Civilisation can be dated around 2500-1750 BC.
- **Systematic town planning** was based on grid system; burnt bricks were used to construct houses; well-managed drainage system; fortified Citadel; highly urbanised; absence of iron implements.
- The **Great Bath** (Mohenjodaro) was used for religious bathing. There were changing rooms alongside.
- Six **granaries** in a row were found in the Citadel at Harappa.
- The towns were divided into 2 parts: the Upper Part or **Citadel** and the **Lower Part**. Harappans were ruled by a class of merchants, as no evidence of weapons are found there.
- Indus people sowed seeds in November and reaped their harvest in April, because of the danger of flood.
- Produced wheat, barley, *rai*, peas, seasmum, rice and mustard.
- Indus people were the first to produce cotton, which the Greeks termed as *Sindon* (derived from Sindh).
- **Animals** known were oxen, sheep, buffaloes, goats, pigs, elephants, dogs, cats, asses and camels.

- Well-knit external and internal trade. **Barter** system was prevalent.
- A very interesting feature of this civilisation was that iron was not known to the people.
- The Indus people used weights and measures in the multiples of 16.
- Harappans looked on Earth as fertility Goddess and phallic (*lingam*) and *yoni* worship was prevalent.
- **Unicorn** was the most worshipped animal. Many trees (pipal), animals (bull), birds (dove, pigeon) and stones too were worshipped though no evidence of temple has been found.
- **Dead bodies** were placed in North-South orientation.
- The Seal of **Pashupati** depicts elephant, tiger, rhinoceros and buffalo. Two deers appear at the feet of Pashupati.
- The Indus people believed in ghosts and evil forces evident by their use of amulets for protection against them. **Fire altars** are found at Lothal and Kalibangan.
- The greatest artistic creation of the Harappan culture were the seals, made of steatite. **Harappan script** is pictographic and hasn't been deciphered yet.
- The script was written from right to left in the first line and left to right in the second line. This style is called **Boustrophedon**.
- **Occupations** practiced were spinning, weaving, boat-making, goldsmiths, making pottery and seal-making.
- The possible causes of the decline of the civilisation may be invasion of the Aryans, recurrent floods, social break-up of Harappans and earthquakes, etc.
- **Boundaries** North-Mandu (J&K); South-Daimabad (Maharashtra); East- Alamgirpur; West-Sutkagendor.

Indus Valley Sites

Site	Discovery/Finding(s)
Harappa	Situated on river Ravi in Montgomery district of Punjab (Pakistan). It was excavated by Daya Ram Sahni in 1921-23. The Indus Civilisation is named after it as the Harappan Civilisation. Stone dancing Natraja and Cemetery-37 have been found here.
Mohenjodaro (Mound of Dead)	Situated on river Indus in Larkana district of Sind (Pak). It was excavated by RD Bannerji in 1922. The main building includes the Great Bath, the Great Granary, the Collegiate Building and the Assembly Hall. The dancing girl made of bronze has been found here. Pashupati Mahadeva/proto Shiva seal; fragment of woven cotton, etc are other findings.
Chanhudaro (Sindh, Pakistan)	On river Indus; discovered by NG Majumdar (1931); only Indus site without citadel; bronze figurines of bullock cart and <i>ekkas</i> ; a small pot suggesting a an ink pot.
Lothal (Gujarat)	Discovered by SR Rao (1954); situated on river Bhogava. A part of the town was divided into citadel and the lower town and dockyard. Evidence of rice has been found here.
Kalibangan (meaning, <i>Black Bangles</i>) (Rajasthan)	Discovered by BB Lal (1961); situated on Ghaggar river, a ploughed field; a wooden furrow; seven fire-altars; bones of camel; and evidence of two types of burials namely—circular grave and rectangular grave.
Dholavira	It was found on river Luni of Kachchh district in Gujarat discovered by JP Joshi (1967-68). It has a <i>unique water management system</i> ; only site to be divided into 3 parts; largest Harappan inscription and a stadium.
Surkotada (Gujarat)	Discovered by JP Joshi in 1972; evidence of horse found; oval grave; pit burials and seemingly a port city.
Banawali (Haryana)	On river Saraswati; discovered by RS Bisht (1973); evidence of both pre-Harappan and Harappan culture; lacked systematic drainage system; evidence of good quality barley.
Rakhigarhi (Haryana)	Largest Indus valley site.

VEDIC PERIOD

Rig Vedic Period (1500-1000 BC)

- Vedic civilisation started with the migration of Aryan people in North-Western part of India.
- The Aryans were semi-nomadic pastoral people and originally believed to have lived somewhere in the **Steppes**, stretching from Southern Russia to Central Asia.
- The whole region in which the Aryans were first settled in India was called **the Land of 7 Rivers** or **Sapta Sindhawa**. (the Indus and its five tributaries and the Saraswati).
- **The Dasrajan War** Battle of 10 kings against Sudas (Bharata king of Tritsus) on the bank of river Parushni. Sudas emerged victorious.

Political Organisation

- It was mainly a tribal system of government in which the military element was strong.
- Tribe was known as **Jana** and its king as **Rajan**.
- Although king's post was hereditary, we have also some traces of election by the tribal assembly called **Samitis**.
- Other tribal assemblies that were mentioned in Rigveda were **Sabha**, **Vidatha** and **Gana**.
- Villages were headed by **Gramani**.
- In day-to-day administration, the King was assisted by the **Purohita** (most important), a **Senani** and **Gramani**.

Society

People were loyal to the tribe, called **Jana** (mentioned 275 times in the Rigveda) as kingdom/territory was not yet established. Women enjoyed freedom and respect.

Religion

- Worshipped Nature, Indra (also called Purandara-breaker of forts) was the most important divinity.
- **Soma** was considered to be the God of plants.
- People worshipped the divinities mainly for **Praja** (children), **Pashu** (cattle), food, health and wealth. No temple or idol worship was noted.

Economy

No regular revenue system, kingdom maintained by voluntary tribute called **balli** and booty won in battles.

- Aryan's main occupation was mainly pastoral. Agriculture was a secondary occupation.
- Cow was a standard unit of exchange. Gold coins-**Nishka**, **Krishnal** and **Satmana**.
- The staple crop was **Yava** (barley).

Rigvedic Terms

Term	Meaning
Dasyus	Original inhabitant of India
Ayas	Copper/bronze
Vajrapati/ Kalapas	Officer enjoying authority over large tract of land
Gramini	Head of the village
Gavisthi	Fighting hordes, Search for cows/war for cows

Rigvedic Rivers

River	Name in Rigveda
Indus	Sindhu
Kurram	Krumu
Jhelum	Vitasta
Chenab	Asikni
Ravi	Parushini
Beas	Vipas
Sutlej	Sutudri
Gomati	Gomal
Saraswati	Sarasvati
Ghaggar	Drishadavati

Later Vedic Period (1000-500 BC)

- In this period, Aryans expanded from Punjab over the whole of Western Uttar Pradesh covered by the Ganga-Yamuna Doab.

Political Organisation

- King (**Samrat**) became more powerful and tribal authority tended to become territorial.
- King's position strengthened by rituals like **Ashwamedha** and **Vajapeya Yajnas**.

Society

- Society was clearly divided into four varnas—Brahmana, Kshatriya, Vaishya and Shudra. Position of women deteriorated. The institution of Gotra (descent from common ancestors) appeared for the first time.

Economy

- Beginning of town and settled life.
- Agriculture was the main livelihood.
- Wheat and rice (called **vrihi** in later Vedic texts) became the staple crop.
- New occupation like those of ironsmith, coppersmith and jewel work emerged. Weaving were reserved for women.

Religion

- **Prajapati** became the supreme God, followed by **Rudra** (animal God) and **Lord Vishnu** (preserver and protector of people).
- Idolatry began in this period.
- Pushana, who looked after the cattle was 'God of Shudras'.
- Sacrifices, rather than prayers, became more important.

Vedic Literature

The Vedas

- **Rigveda** The oldest Indo-European language text is a collection of hymns. Contains 1028 hymns divided into 10 mandalas. The 10th Mandala contains **Purushasukta hymn** that explain about four varnas, whereas 3rd Mandala contains Gayatri mantra, which was compiled in the praise of Sun God.
- **Samaveda** Collection of melodies, contains Dhrupad raga. It is a book of chants.
- **Yajurveda** Contains hymns and rituals/sacrifices.
- **Atharvaveda** Charms and spells to ward-off evils and diseases.

The Brahmanas

- They explain the hymns of Vedas. Contains ritualistic formulae and explains the social and religious meaning of rituals. Each veda has several Brahmanas attached to it.
Rigveda : Kaushitaki and Aitareya
Yajurveda : Taittiriya and Satapatha
Samaveda : Panchvish and Jemineya
Atharvaveda : Gopatha

The Aranyakas

The word *Aranya* means the forest. These texts were called Aranyakas, because they were written mainly for the hermits and students living in the jungle.

The Upanishadas

- Philosophical texts emphasising value of right belief and knowledge; criticising rituals/sacrifices; and 108 in number. **Brihadaranyaka** is the oldest upanishada.
- Also known as 'Vedanta'.

Smritis

Explains rules and regulations in Vedic life. These are Manusmriti (the first law book); Naradasmriti, Yajnavalkya-smriti and Parasharasmriti.

Vedangas

These are Limbs of Vedas and are six in number.

- Shiksha (Pronunciation)
- Kalpa (Rituals)
- Vyakaran (Grammar)
- Nikrukta (Etymology)
- Chhanda (Metrics)
- Jyotish (Astrology)

Puranas

Deals with world creation, the geneologies of Gods and Rishis and the Royal dynasties. There are 18 famous 'Puranas'. The 'Matsya Purana' is the oldest puranic text.

Darshana

There are six schools of Indian philosophy, called Shada-darshana.

These are

Nyaya Darshana	<i>Gautam</i>
Vaishesika Darshana	<i>Kanada Rishi</i>
Sankhya Darshana	<i>Kapila</i>
Yoga Darshana	<i>Patanjali</i>
Purva Mimamsa	<i>Jaimini</i>
Uttara Mimamsa	<i>Badrayna or Vyasa</i>

Upavedas

There are four Upavedas

<i>Upaveda</i>	<i>Deals with</i>	<i>Upaveda of</i>
Dhanurveda	Art of warfare	Yajurveda
Gandharva-veda	Art and music	Samaveda
Shilpaveda	Architecture	Atharvaveda
Ayurveda	Medicine	Rigveda

Epics

Mahabharata by Vyasa, also called Jaya Samhita and Satasahasri Samhita has 100000 verses and are older than Ramayana, written by **Valmiki**, and has 29000 verses.

GENERAL KNOWLEDGE

The Mahajanapadas

Mahajanapada (Locations) Capital (s)

Gandhara (Between Kabul and Rawalpindi)	Taxila
Anga (Bhagalpur and Munger in Bihar)	Champa
Magadha (Patna and Gaya district, Bihar)	Girivraj, Rajagriha (Bimbisara); Patliputra (Udayin); Vaishali (Shishunaga); Patliputra (Ashoka)
Kashi (Varanasi district, UP)	Varanasi
Vajji (Vaishali district, UP)	Vaishali
Malla (South of Vaishali district, UP)	Kusinagara and Pava
Chedi (River Ken Bundelkhand area)	Sothivati-nagar or Shuktimati
Vatsa (River Yamuna, Allahabad and Mirzapur district in UP)	Kaushambi
Kosala (Eastern UP)	Shravasti and Ayodhya (Saket)
Kuru (Ganga-Yamuna doab. Delhi-Meerut region)	Hastinapur and Indraprastha
Panchala (Ganga-Yamuna doab, Rohilkhand)	Ahichhatra and Kampilya
Matsya (Jaipur-Bharatpur-Alwar district)	Viratnagar/Bairath
Surasenas (Mathura region)	Mathura
Asmaka (River Godavari) (Near Paithan in Maharashtra)	Patna or Patali
Avanti (Malwa)	Ujjain (Northern capital), Mahismati (Southern capital)
Kamboja (Hazara district of Pakistan)	Rajapur or Hataka

JAINISM AND BUDDHISM

- Came into existence around 600 BC.
- The main causes being the reaction against domination of Brahmanas and spread of agricultural economy in the North-East.

Jainism

- Founded by Rishabhadeva (Emblem : Bull) born in Ayodhya.
- There were 24 tirthankaras (great teachers), the 23rd being Parshvanatha and the 24th being the Vardhamana Mahavira.
- Mahavira was born in 540 BC in **Kundagram** near Vaishali.
- Father **Siddhartha** of Jnatrik Kshatriya Clan.
- Mother Trishala—sister of Lichchhavi Chief Chetaka, married to **Yashoda** and

had a daughter named Priyadarshini, whose husband Jamali became his first disciple. Mahavira became an ascetic at the age of 30, attained **Kaivalya** (Jina) outside the town of Jimbhikgrama at the age of 42 and died at the age of 72 in 468 BC in **Pavapuri**.

- Five Doctrines of Jainism
 1. Do not commit violence (Ahimsa)
 2. Do not steal (Asteya)
 3. Do not acquire property (Aparigraha)
 4. Do not speak lie (Satya)
 5. Observe continence (Brahmacharya)
- **Triratnas of Jainism** are right knowledge, right faith and right conduct.
- Jainism says salvation is possible only by abandoning all possessions, a long course of fasting, self mortification, study and meditation.
- Jainism recognised existence of God, but lower than **Jina**. It didn't condemn *varna* system unlike Buddhism.
- Jainism could not delink clearly from brahmanical religion, hence failed to attract masses; admitted both men and women. Jain monastic establishments were called **basadis**.
- Jainism was patronised by **Kharavela**—the king of Kalinga; Chandragupta Maurya *became the disciple of Bhadrabahu and spread Jainism in the South*.
- Jainism was divided into two sects during the reign of Chandragupta Maurya, mainly due to famine in Magadha named. **Svetambaras** (wearing white dresses) under Shulbhadra and **Digambaras** (*naked*) under Bhadrabahu.
- Jaina texts were written in **Prakrit language**.

Councils

First Council (300 BC) At Pataliputra Under Shulbhadra (Pataliputra) Jaina Canons compiled.

Second Council At Vallabhi (AD 5th Century). Under Kshamasramana (*Vallabhi*) 12 *Angas* and 12 Upangas were compiled in **Ardh Magadhi language**.

Buddhism

Founded by Gautama Buddha, also known as **Siddhartha** or *Sakyamuni* or Tathagata.

- Born in 563 BC in Lumbini in Nepal in Shakya Kshatriya Clan.
- His father Suddhodana was a Shakya ruler and his mother Mahamaya of Kosalan dynasty died early. Brought up by step mother Gautami.
- Married to Yashodhara and had a son Rahul.
- **Triratnas** in Buddhism stand for 3 pillars
 - **Buddha** Its founder
 - **Dhamma** His teachings
 - **Sangha** Order of Buddhist monks and nuns

Buddhism was also divided in two main sects namely **Hinayana** and **Mahayana**.

<i>Phases of Buddha's Life</i>	<i>Symbols</i>
Birth	Lotus and Bull
Mahabhinishkraman (Renunciation)	Horse
Nirvana (Enlightenment)	Bodhi Tree
Dharmachakra Pravartana (First Sermon)	Wheel
Mahaparinirvana (Death)	Stupa

The Dhamma

The Four Great Truths

- The world is full of sorrow and misery.
- The cause of all pain and misery is desire.

Buddhist Councils

<i>Buddhist Councils</i>	<i>Period</i>	<i>Place</i>	<i>Chairman</i>	<i>Patron</i>
First	483 BC	Rajagriha	Mahakashyapa	Ajatashatru
Second	383 BC	Vaishali	Sabakami	Kalashoka
Third	250 BC	Patliputra	Mogaliputta Tissa	Ashoka
Fourth	AD 72	Kundalvana	Vasumitra, Ashwaghosa	Kanishka

- Pain and misery can be ended by killing or controlling desire.
- Desire can be controlled by following the Eight-Fold Path.

The Eight-Fold Path

- | | |
|------------------------|------------------------|
| 1. Right Understanding | 5. Right Efforts |
| 2. Right Thought | 6. Right Speech |
| 3. Right Action | 7. Right Mindfulness |
| 4. Right Livelihood | 8. Right Concentration |

Madhya Marga (The Middle Path)

Man should avoid both extremes, i.e. life of comforts and luxury and a life of severe asceticism.

Buddhist Literature

In **Pali language** commonly referred to as **Tripitakas**, i.e., 'three fold basket'.

Vinaya Pitaka

Rules of discipline in Buddhist monasteries.

Sutta Pitaka

It contains collection of Buddha's sermons and teachings. It is largest among all three pitakas.

Abhidhamma Pitaka

Explanation of the philosophical principles of the Buddhist religion. **Mahavamsa** and **Dipavamsa** are the other Buddhist texts of Sri Lanka.

Causes of Decline of Buddhism

Use of Sanskrit, the language of intellectuals, in place of Pali, the language of the common people. Revival of Hinduism.

DYNASTIES OF ANCIENT INDIA

Haryanka Dynasty

- **Bimbisara** was the founder, who expanded the Magadha kingdom by annexing Anga, and entering into matrimonial alliances with Kosala and Vaishali. He was contemporary of Buddha. Capital-**Rajgir** (Girivraja).
- **Ajatashatru** came to power by killing his father. Annexed Vaishali, Kosala and Lichchavi kingdom.
- **Udayin** founded the new capital, **Pataliputra**.

Shishunaga Dynasty

Founded by Shishunaga; Kalashoka or Kakavarin of this dynasty convened the Second Buddhist Council. Their greatest achievement was the destruction of Avanti.

Nanda Dynasty

- Considered **non-Kshatriyan** dynasty, founded by **Mahapadma Nanda**. Alexander attacked during Dhana Nanda's reign. **Cyrus** was the first foreign invader of India.
- Alexander**, the king of Macedonia, invaded India in 326 BC and fought the Battle of Hydaspes (Jhelum) with **Porus** (Purushottam) of **Paurava dynasty**.

Mauryan Dynasty

Important rulers of Mauryan Dynasty are

Chandragupta Maurya (321-298BC)

The first ruler who overthrew the Nanda dynasty with the help of **Chanakya**.

- He has been called **Sandrocottus** by Greek scholars.
- Chandragupta defeated **Seleucus Nikator**, the general of Alexander (304 BC), who later sent **Megasthenes** the author of **Indica** to Chandragupta's court.
- His mother was **Mura**—a Shudra woman in Nanda's court.
- Mudrarakshasa** was written by Vishakhadatta and describes about mechanisation of Chanakya against Chandragupta's enemy. Chandragupta maintained six wings of armed forces.
- He adopted Jainism and went to **Sravanabelgola** with **Bhadrabahu**.

Bindusara (298-273 BC)

He was called **Amitraghat** (i.e., slayer of foes) by Greek writers; Greek ambassador, **Deimachos** visited his court; said to conquer the **land between the two seas**—The Arabian Sea and Bay of Bengal.

Bindusara appointed his eldest son Sumana as his viceroy at Taxila and Ashoka at Ujjain.

Ashoka (293-273 BC)

- For the first eight years Ashoka ruled like a cruel king and maintained discipline.
- He was called **Devanamapriya**, Dear to Gods in some of his inscriptions.

- The name **Ashoka** occurs only in copies of Minor Rock Edict I.
- Three languages were used for Ashokan inscription that is Prakrit, Greek and Aramic.
- Most of the Ashokan edicts were written in Brahmi script. It was James Prinsep who deciphered first the Brahmi script of Ashokan edicts in AD 1837.
- Ashoka was the first king to maintain direct contact with people through inscriptions.
- Kalinga War** (261 BC) mentioned in 13th Major Rock Edict converted Ashoka to Buddhism under **Upagupta**.
- Sanchi Stupa** was built by Ashoka.
- The last Mauryan king **Brihadratha**, was killed by Pushyamitra Sunga in 185 BC, who established the Sunga dynasty.
- The **Punch-marked coins** carrying the symbol of the peacock and the hill and crescent, famed the imperial currency of Mauryas.
- The Mauryan artisans started the practice of carving caves of monks to live in. **Barabar Caves** near Gaya is earliest example of such cave.
- Ringwells** for domestic use of water appeared first under the Mauryas.
- Sri Lanka is called **Tamrapani** in the Ashokan inscription.

The Sunga Dynasty (185-73 BC)

- The Sunga Dynasty was established by **Pushyamitra Sunga**. (who killed last Mauryan King Brihadratha)
- They were basically Brahmins. This period saw the revival of Bhagvatism.
- Patanjali** wrote 'Mahabhasya' at this time.
- In arts, the **Bharhut stupa** is the most famous monument of the Sunga period.

The Kanva Dynasty (73-28 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 which was later replaced by the Satavahanas.

The Indo-Greeks

- The most famous king among the Indo-Greeks was **Menander** (165-145 BC) also called **Milinda**, his capital was **Sakala** (modern Sialkot) in Punjab.
- Converted to Buddhism by Nagasena as per the **Milindapanho**—a Pali text.
- The Greeks were the first to issue coins attributable to the king and also the first to issue gold coins in India; introduced Hellenistic art.

The Shakas

- The most famous ruler was **Rudradaman I** (AD 130-150), who repaired Sudarshana lake in Kathiawar region, issued first ever inscription in Chaste Sanskrit (Junagarh inscription). He defeated the Satavahanas twice.
- **Vikramaditya**, the king of Ujjain, was the only one who defeated the Shakas. To commemorate the victory, he started the **Vikram Samvat** in 57 BC.
- **The Parthians** The most famous king was **Gondophernes** (AD 19-45), in whose reign St Thomas visited India to propagate Christianity.

The Kushanas

- Also called **Yechi** or **Tocharians**, were nomadic people from the Steppes.
- **Kanishka** was the greatest of the Kushanas, who started the **Saka Era** in AD 78.
- Kushanas were the first rulers to issue **gold coins** on a wide scale known for metallic purity.
- In the royal court of **Kanishka**, a host of scholars found patronage, like Parsva, Vasumitra, Asvaghosha, Nagarjuna, Charak (Physician) and Mathara. He also patronised the Greek engineer Agesilaus.

The Satavahanas (or Andhras)

- **Simuka** (60-37 BC) was the founder of the Satavahana dynasty.
- Satavahanas were finally succeeded by the **Ikshvakus** in AD 3rd century.
- Under the Satavahanas, many chaityas (worship halls) and viharas (monasteries) were cut out from rocks mainly in North-West Deccan or Maharashtra the famous examples were **Nasik**, **Kanheri** and **Karle**.

- The official language of the Satavahanas was **Prakrit**.
- The Satavahanas issued **coins** of lead (mainly), copper, bronze and potin.
- Gautamiputra Satakarni was a famous king.

Sangam Age

- Sangam Age corresponds to the post-Mauryan and pre-Gupta periods.
- South India, during the Sangam Age, was ruled by three dynasties- the cheras, cholas and pandyas.

The Pandyas

- Their capital was **Madurai** famous for pearls. The Pandyas were first mentioned by Megasthenes.
- Traded with Roman empire, sent embassies to emperor Augustus.

The Cholas

- The Chola kingdom, also called as Chola mandalam was situated to the North-East of Pandya Kingdom between Pennar and Vellar rivers.
- Their Capital was Kaveripattanam/ Puhar.

The Cheras

- Their capital was **Vanji** (also called Kerala country). It had important trade relations with the Romans.

Sangam Literature

- Sangam was a college or an assembly of Tamil poets, held under **Royal Patronage**.
Three Sangams were held
 - (i) at Madurai chaired by Agastya.
 - (ii) at Kapatpuram, chaired by Tolkappiyar.
 - (iii) at Madurai, chaired by Nakkirar.
- Kural by Tiruvalluvar is called the '**Fifth Veda**' or **the Bible of Tamil Land**.'

Gupta Period

The important rulers of Gupta period are

Chandragupta I (AD 319-334)

Married a Lichchhavi princess, who strengthened his position and enhanced the prestige of the Guptas.

- He was the first Gupta ruler to acquire the title of **Maharajadhiraja**.
- Chandragupta I was able to establish his authority over Magadha, Prayaga and Saketa.

Samudragupta (AD 335-380)

- He is called the **Napoleon of India** (by VA Smith) on account of his conquests.
- **Meghavarman** the ruler of Sri Lanka, sent a missionary to his court for permission to build a Buddhist temple at Gaya.
- The Allahabad pillar inscription gives detailed information about Samudragupta, it was composed by his court poet **Harisena**.
- He assumed the titles of **Kaviraj** and **Vikrama**.

Chandragupta II (AD 380-414)

- Mehrauli inscription on Iron Pillar near Qutub Minar is related to him.
- His court was adorned by **Navratnas**, the chief being **Kalidasa** and **Amarsimha**.
- **Fa-hien**, Chinese Pilgrim (AD 399-414) visited during his reign.
- Defeated Saka Kshatrapa Rudrasimha III
- Chandragupta II also succeeded in killing Ramagupta, and not only seized his kingdom, but also married his widow Dhruvadevi.
- He was the first Gupta ruler to issue the silver coins in the memory of victory over **Sakas** and to have adopted the titles **Sakari** and **Vikramaditya**.
- The Gupta age is called **golden age** of Indian history and saw the issuance of the largest number of gold coins.

Kumaragupta I (AD 415-455)

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

Skandagupta (AD 455-467)

- Skandagupta was the last great ruler of the Gupta dynasty.
- During his reign the Gupta empire was invaded by the Hunas.
- Success in repelling the Hunas seems to have been celebrated by the assumption of the title 'Vikramaditya' (Bhitari Pillar Inscription).

Pushyabhuti Dynasty (AD 606-647)

- The greatest king was **Harshavardhana**, son of Prabhakar Vardhana of Thaneshwar. He shifted the capital to **Kannauj**.
- **Hieun Tsang** visited during his reign.
- He established a large monastery at Nalanda. **Banabhata** adorned his court, wrote **Harshacharita** and **Kadambari**. Harsha himself wrote three plays—**Priyadarshika**, **Ratnavali** and **Nagananda**.

Rashtrakutas

- Founded by Dantidurg; Krishna I built the Kailasha temple at **Ellora**. Amoghavarsha, who is compared to Vikramaditya, wrote the first Kannada poetry **Kaviraj Marg**. Rashtrakutas are credited for building cave shrine **Elephanta**, dedicated to **Shiva**.

Gangas

Ruled Orissa; Narsimhadeva constructed the Sun Temple at Konark; Anantvarman built the **Jagannath Temple** at Puri; and Kesaris, who used to rule before Gangas built the **Lingaraja Temple** at Bhubaneswar.

Pallavas

Founder—**Simhavishnu**; Capital—Kanchi; greatest king **Narsimhavarman**, who founded the town of Mamallapuram (Mahabalipuram) and built rock-cut rathas and even pagodas.

- **Palas**, with their capital at Monghyr is known for Dharmapala, their second king, who founded the Vikramashila University and revived the Nalanda University.
- The greatest ruler of **Pratiharas** was **Bhoja** (also known as Mihir, Adivraha).
- Khajuraho temples were built during the reign of **Chandellas** of Bundelkhand.
- **Chalukyas** of Vatapi—founded by Jayasimha were contemporary to Harshavardhan.
- **Rajputs** divided into four clans: Pratiharas (S Rajasthan), Chauhans (E Rajasthan), Chalukyas/Solankis (Kathiawar), Parmaras (Malwa).

The Cholas

- Founder **Vijayalaya**, Capital **Tanjore**.
- **Aditya I** wiped out the Pallavas and weakened the Pandyas.
- **Purantaka I** captured Madurai, but was defeated by the Rashtrakuta ruler **Krishna III** at the **Battle of Takkolam**.
- **Rajaraja I** (AD 985-1014) led a naval expedition against Shailendra empire (Malaya Peninsula) and conquered

Northern **Sri Lanka**; constructed Rajarajeshwari (or Brihadeshvara) Shiva temple at **Tanjore**.

- **Rajendra I** (AD 1014-1044) annexed the whole of Sri Lanka; took the title of **Gangaikonda** and founded **Gangaikonda Cholapuram**.
- **Dancing Figure of Shiva** (Nataraja) belongs to the Chola period. Local self government existed.

MEDIEVAL INDIA

- **Mohammad bin Qasim** invaded India in AD 712 and conquered Sindh.
- Sultan **Mahmud of Ghazni** led about 17 expeditions of India.
- In 1025, he attacked and raided the most celebrated Hindu temple of **Somnath**, situated on the sea coast of Kathiawar.

Ilutmish (AD 1210-1236)

- Attack of Mongols; formed **Turkan-e-Chahalgani** or Chalisa (a group of 40 powerful Turkish nobles).
- Divided his empire into **Iqtas** (assignment of land in lieu of salary).
- Introduced 2 types of coins-silver tanka and copper jital.

FOUNDATION OF THE DELHI SULTANATE

- **Mohammad Ghori** invaded India and was defeated by Prithviraj Chauhan in **First Battle of Tarain** (1191).
- Ghori defeated the Rajput king in Second Battle of Tarain (1192) and laid the foundation of the Muslim dominion in India. He may be considered the **'founder of Muslim rule' in India**.

Razia Sultan (AD 1236-1240)

- First and last Muslim woman ruler of Medieval India.
- She disregarded Purdah, married Altunia, the Governor of Bhatinda.
- Bahram Shah, son of Ilutmish, killed her.

Balban (AD 1266-1286)

- Separated Military Department (*Diwan-e-Ariz*) and Finance Department (*Diwan-e-Wazarat*).
- He declared that king was the deputy of God (Niyabat-e-Khudai) and shadow of God (Zil-e-Ilahi) and introduced the practices of **Sijdah** and **Paibos**.

Ilbari Dynasty (AD 1206-1290)

Qutub-ud-din-Aibak

- Capital **Lahore** (initial); **Delhi** (later)
- The founder of the Slave dynasty. Also called **Lakh Baksh** because of his generosity.
- Qutub-ud-din Aibak laid the foundation of **Qutub Minar**, after the name of the famous Sufi saint Khwaja Qutubuddin Bakhtiyar Kaki; built Quwwat-ul-Islam (first mosque in India) and **Adhai Din ka Jhopra** (Ajmer).
- Died while playing Chaugan (polo) at Lahore.

Khalji Dynasty (AD 1290-1320)

- **Jalaluddin Firuz Khalji** was the first ruler, who reviewed that India cannot be a totally Islamic state.
- **Alauddin Khalji** His conquests were that of Gujarat ruled by Vaghela king; Ranthambhor, Chittor and Malwa and later to the South (mainly by Malik Kafur).
- He abolished Zamindari in **Khalisa** land. No iqta was allotted in Doab area.

- Alauddin adopted the policy of **Blood and Iron** in tackling the Mongols.
- He built Khizrabad, **Alai Darwaja** and his capital city **Siri**.
- Also built **Hauz Khas** in Delhi and added entrance door to **Qutub Minar**, introduced market reforms.
- Adopted the title of **Sikandar-i-Sani**.
- Built a permanent army, introduced Chehra and Dagh System.
- First Turkish Sultan who separated religion from politics.
- His court poets were **Amir Khusrau** and **Mir Hassan Dehlvi**.

Tughlaq Dynasty (AD 1320-1413)

- Founded by **Ghiyasuddin Tughlaq**, who built the fortified city of *Tughlaqabad* and made it his capital.
- He was the first sultan to start irrigation works.
- **Muhammad-bin-Tughlaq** also called the **wise fool king** on account of five experiments, namely (a) Transfer of capital to Daulatabad (b) Taxation in Doab (c) Qarachil expedition (d) Khurasan expedition (e) Token currency.
- The Sultan set-up a separate department for agriculture, *Diwan-i-kohi*. He gave *Sondhar* loans to farmers.
- South Indian states of the Vijayanagara empire, the Bahmani kingdom and the Sultanate of Madura were founded.
- The famous traveller of Morocco, **Ibn-Batuta** visited his court.
- **Firoz Shah Tughlaq** built new towns of Hissar, Firozpur, Fatehabad, Jaunpur and Firozabad (his capital). During his reign two Ashokan pillars, one from Topara in Ambala and the other from Meerut were brought. Built canals was fond of slaves and wrote a book **Fatuh-at-e-Firozshahi**.
- He repaired Qutub Minar when it was struck by lightning.
- Firoz Shah Tughlaq also made **Iqtadari system** hereditary and imposed new taxes like **Kharaj** (land tax equal to one-tenth of the producer) and **Zakat** and **Khams** (one-tenth of the booty captured in war).
- He made **Jizya** a separate tax and he imposed this tax upon the **Brahmans** for the first time in the history of Sultanate.
- He introduced the following coins—Aadha, Bhikh, Shashgani and Hasthragani.
- **Timur** Mongol leader of Central Asia, ordered general massacre in Delhi (AD 1398) at the time of Nasiruddin Mahmud (last Tughlaq king).

Sayyids and Lodhis

- **Sayyids** dynasty was founded by Khizr Khan : Successors-Mubarak Shah, Muhammad Shah and Alauddin Alam Shah.
- The **Lodhis** were the first Afghans to rule India.
- **Bahlol Lodhi** (AD 1451-1481) founded the dynasty.
- **Sikander Lodhi** (AD 1418-1517) introduced **Gaz-i-Sikandari**. (unit for measuring cultivated field). He founded Agra in 1504. He wrote the Persian verse 'Gulrukhi'.
- He was succeeded by **Ibrahim Lodhi** (1517-1526), who was defeated by **Rana Sanga** of Mewar in the Battle of Khatoli. Ibrahim Lodhi was also defeated by **Babur** in April, 1526 which led to the establishment of the Mughal rule in India.

PROVINCIAL KINGDOMS

Gujarat

- Broke away from Delhi in AD 1397 under **Zafar Khan**, who assumed the title of **Sultan Muzaffar Shah**.
- His grandson Ahmed Shah I built a new city **Ahmedabad**.
- The next prominent ruler was **Mahmud Beghra**. During his rule, the Portuguese set-up a factory at Diu.

Kashmir

Kashmir was ruled by Hindu rulers until **Shamsuddin Shah** asserted himself in AD 1339. The greatest ruler was **Zain-ul-Abidin** (AD 1420-70), who is called the **Akbar of Kashmir**, built Zaina lank, artificial island in **Wular lake**.

Mewar

- Rajput rule restored by **Rana Hamir** after Alauddin Khilji captured Chittor in AD 1303.
- The greatest was **Rana Kumbha** who built the **Vijay Stambh** at Chittor to commemorate his victory over Mahmud Khalji of Malwa.

Vijayanagara Kingdom

(AD 1336-1565)

- Founded by Harihara I and Bukka I.
- Four dynasties ruled over Vijayanagar-Sangam, Saluva, Tuluva and Aravidu.
- **Devaraya I** built a dam across Tungabhadra river and Italian traveller **Nicolo de Conti** visited his court followed by the Russian merchant **Nikitin**.
- **Devaraya II**, the greatest ruler, who was seen as incarnation of Indra by Commoners; He was also called 'Gajabetekara' and wrote **Mahanataka Sudhanidhi** and commentary on the **Brahma Sutras** in Sanskrit; Persian Ambassador **Abdur Razzaq** visited his court. Krishnadeva Raya (AD 1509-29) was the greatest ruler.
- Krishnadeva Raya was known as **Abhinava Bhoja**, **Andhra Pitamah** and **Andhra Bhoja** because of being a great patron of literature. Eight great poets of Telugu (Ashta Diggaja) adorned his court like Pedanna and Tenalirama.
- Portuguese **Dominigo Paes** and **Barbosa** visited his court.
- **Battle of Talikota** (AD 1565) **Sadasiva**, the last ruler of the Tuluva dynasty was defeated by an alliance of Ahmadnagar, Bijapur, Golconda and Bidar.

Bahmani Kingdom

- **Alauddin Hasan Bahman Shah** (AD 1347-58), also known as **Hasan Gangu**, founded it with capital at **Gulbarg**.
- **Ahmad Shah Wali** transferred the capital from **Gulbarg** to **Bidar**.
- Bahmani kingdom broke up into :
 - **Nizamsahis of Ahmadnagar**
Founder **Malik Ahmad Bahri**
 - **Adilsahis of Bijapur**
Founder **Yusuf Adil Shah**
 - **Imadsahis of Berar**
Founder **Fatullah Khan Imad-ul-Mulk**
 - **Qutubsahis of Golconda**
Founder **Quli Qutub Shah**
 - **Baridsahis of Bidar**
Founder **Ali Barid**
- The **Gol Gumbaz** (a tomb with World's second largest dome) was built by Muhammad Adil Shah at **Bijapur**.
- Muhammad Quli Qutubshah founded **Hyderabad** and built **Charminar**.

Mughal Empire

(AD 1526-1707)

Babur (AD 1526-1530)

- Founder of Mughal empire, who introduced gunpowder in India; defeated Ibrahim Lodhi in the **First Battle of Panipat** (AD 1526); Rana Sanga (Sangram Singh) at **Battle of Khanwa** (AD 1527); Medini Rai of Chanderi at **Battle of Chanderi** (AD 1528) and Mahmud Lodi at **Battle of Ghagra** (AD 1529); he wrote **Tuzuk-i-Baburi** in Turkish language.
- Babur declared **Jehad** and adopted the title **Ghazi**.
- Died in 1530 and was buried at **Aram Bagh** (Agra). Later his body was taken to **Bagh-e Babun** (Kabul).

Humayun (AD 1530-1556)

- Built **Dinpanah** at Delhi as his second capital.
- Sher Shah Suri gradually gained power. He fought two battles with Humayun—**Battle of Chausa** (AD 1539) and another **Battle of Kannauj** (AD 1540) culminating into Humayun's defeat.
- Humayun passed 15 years in exile; again invaded India in 1555 with the help of his officer Bairam Khan.
- Died in AD 1556 due to a fall from his library building's stairs; **Gulbadan Begum**, Humayun's half-sister wrote **Humayun-nama**.

Akbar (AD 1556-1605)

- Coronated at the young age of 14 by Bairam Khan; defeated Hemu at the **Second Battle of Panipat** (AD 1556) with the help of Bairam Khan; conquered Malwa (AD 1561) defeating Baz Bahadur followed by Garh-Katanga (ruled by Rani Durgawati), Chittor (AD 1568), Ranthambhor and Kalinjar (AD 1569), Gujarat (AD 1572), Mewar (Battle of Haldighati, AD 1576 Akbar and Rana Pratap), Kashmir (AD 1586), Sindh (AD 1593) and Asirgarh (AD 1603) were also conquered.

- **Buland Darwaza** was constructed at Fatehpur Sikri after victory over Gujarat in AD 1572.
- Married to **Harkha Bai**, daughter of Rajput ruler Bharmal
- **Ralph Fitch** (in AD 1585) was the first Englishman to visit Akbar's court.
- Abolished **Jaziyah** (AD 1564); believed in **Sulh-i-Kul** (peace to all), built Ibadat Khana (Hall of prayer) at Fatehpur Sikri; issued 'Degree of Infallibility (AD 1579); formulated religious order **Din-i-Ilahi** (AD 1582). Birbal was the first to embrace it.
- Land revenue system was called Todar Mal **Bandobast** or **Zabti System** measurement of land, classification of land and fixation of rent; and introduced **Mansabdari System** (holder of rank) to organise nobility and army.
- The Navratnas included Todar Mal, Abul Fazal, Faizi, Birbal, Tansen, Abdur Rahim Khana-i-Khana, Mullah-do-Pyaza, Raja Man Singh and Fakir Aziao-Din

Jahangir (AD 1605-1627)

- Executed the fifth Sikh guru, **Guru Arjan Dev**.
- Greatest failure was loss of Kandahar to Persia in AD 1622.
- Married Mehr-un-Nisa in AD 1611 and conferred the title of **Nurjahan** on her; He established **Zanjir-i-Adal** at Agra Fort for the seekers of royal justice.
- **Captain Hawkins** and **Sir Thomas Roe** visited his court.
- Famous painters in his court-Abdul Hassan, Ustad Mansur and Bishandas.

Shahjahan (AD 1628-1658)

- Annexed Ahmadnagar while **Bijapur** and **Golconda** accepted his overlordship.
- Secured **Kandahar** (AD 1639).
- Two Frenchmen, **Bernier** and **Tavernier** and an Italian adventurer **Manucci** visited his court.
- Built **Moti Masjid** and **Taj Mahal** at Agra, **Jama Masjid** and **Red Fort** at Delhi. His reign is considered the **Golden Age** of the **Mughal architecture**.

Aurangzeb (Alamgir) (AD 1658-1707)

- Aurangzeb became victorious after the brutal war of succession among his brother Dara, Shuja and Murad.
- Rebellions during his rule—**Jat Peasantry** at Mathura, **Satnami peasantry** in Punjab and **Bundelas** in Bundelkhand.
- The annexation of Marwar in AD 1658 led to a serious rift between Rajput and Mughals after the death of Raja Jaswant Singh.
- Ninth Sikh Guru, **Guru Tegh Bahadur** was executed by him in AD 1675.
- Mughal conquests reached territorial climax during his reign.
- It stretched from Kashmir in North to Jinji in South, from the Hindukush in West to Chittagong in East.
- He was called **Darvesh** or a **Zinda Pir**. He forbade **Sati**. Conquered Bijapur (AD 1686) and Golconda (AD 1687) and reimposed Jaziya in AD 1679.
- He built **Biwi ka Makbara** on the tomb of his queen **Rabaud-Durani** at Aurangabad; **Moti Masjid** within Red Fort, Delhi; and the Jami or Badshahi Mosque at Lahore.

Causes behind the fall of Mughal Empire

- Weak and incompetent successors
- Wars of succession
- Aurangzeb's Deccan, religious and Rajput policies
- Jagirdari crisis
- Growth of Marathas and other regional powers
- Foreign invasions of Nadir Shah (1739) and Abdali

Sur Dynasty

- The founder of Sur dynasty was **Farid**.
- Afghan ruler of Bihar, Bahar Khan Lohani gave the title of **Sher Shah** to Farid. Introduced Silver coin called **Rupaya** and Copper coin **Dam**.
- Built his tomb at **Sasaram** and built a new city on the bank of Yamuna river in Delhi (present day **Purana Qila**).

LATER MUGHALS

- **Bahadur Shah I** (1707-12) Original name was Muazzam; Title-Shah Alam I.
- **Jahandar Shah** (1712-13) He ascended the throne with the help of Zulfikar Khan; abolished Jizya.
- **Farrukhsiyar** (1713-19) He lacked the ability and knowledge to rule independently. His reign saw the emergence of the Sayyid Brothers.
- **Muhammad Shah** (1719-48) Nadir Shah invaded India and took away Peacock throne and Kohinoor diamond.
- **Ahmed Shah** (1748-54) Ahmed Shah Abdali (General of Nadir Shah) marched towards Delhi and the Mughals ceded Punjab and Multan.
- **Alamgir** (1754-59) Ahmed Shah occupied Delhi. Later, Delhi was plundered by Marathas.
- **Shah Alam II** (1759-1806) could not enter Delhi for 12 years.
- **Akbar II** (1806-37) pensioner of East India Company. He gave the title 'Raja' to Ram Mohan Roy.
- **Bahadur Shah II** (1837-57) Last Mughal Emperor who was made premier during the 1857 Revolt.

Literature of Mughal Period

Author	Work
Babur	Tuzuk-i-Babari
Abul Fazal	Ain-i-Akbari, Akbarnamah
Jahangir	Tuzuk-i-Jahangir
Hamid Lahori	Padshahnama
Darashikoh	Majma-ul-Bahrain
Mirza Md Qasim	Alamgirnama

MARATHAS (AD 1674-1818)

Shivaji (AD 1627-80)

- Born at Shivner to **Shahji Bhonsle** and **Jijabai**. His religious teacher was **Samarth Ramdas** and guardian was **Dadaji Kondadev**.
- **Treaty of Purandar** (AD 1665) between Shivaji and Mughals.
- Coronation at Raigarh (AD 1674) and assumed the title of **Haindava Dharmadharak** (Protector of Hinduism).

- **Ashtapradhan** (eight ministers) helped in administration. These were **Peshwas**, **Sar-i-Naubat** (Military), **Mazumdar** or **Amatya** (Accounts); **Wagenavis** (Intelligence); **Surunavis** (Correspondence); **Dabir** or **Sumanta** (Ceremonies); **Nyayadhish** (Justice); and **Panditrao** (Charity).
- Successors of Shivaji were Shambhaji, Rajaram and **Shahu** (fought at Battle of Khed in AD 1708).

Peshwas (AD 1719-18)

- **Balaji Vishwanath** was the first Peshwa, who concluded an agreement with the Sayyid Brothers (the king makers in history) by which Mughal emperor Farukh Siyar recognised Shahu as the king of Swaraja.
- **Baji Rao** considered as the "greatest exponent of guerilla tactics after Shivaji"; Maratha power reached its zenith and system of confederacy began; defeated Siddis of Janjira; Conquest of Bassein and Salsette from Portuguese.
- **Balaji Baji Rao** known as Nana Sahib; **Third Battle of Panipat** (AD 1761) between Marathas and Ahmed Shah Abdali gave a big jolt to the Maratha empire.

SIKH GURUS

- **Guru Nanak Ji** (1469-39) founded Sikh religion.
- **Guru Angad** (1539-52) invented Gurmukhi.
- **Guru Amardas** (1552-74) struggled against sati system, and purdah system and established 22 **Gadiyans** to propagate religion.
- **Guru Ramdas** (1574-81) founded Amritsar in 1577. Akbar granted the land.
- **Guru Arjan Dev** (1581-1606) founded **Swarn Mandir** (Golden Temple) and composed **Adi Granth** later expanded into the **Guru Granth Sahib**.
- **Guru Hargobind Singh** (1606-44) established **Akal Takht**, and fortified Amritsar.
- **Guru Har Rai** (1644-61) provided care to Dara Shikoh.
- **Guru Harkishan** (1661-64)
- **Guru Tegh Bahadur** (1664-75)
- **Guru Gobind Singh** (1675-1708) was the last Guru who founded the Khalsa. After him Sikh guruship ended.

MODERN INDIA

ADVENT OF THE EUROPEANS

Portuguese

- **Vasco-da-Gama** reached the port of Calicut in 1498 during the reign of king Zamorin. (Hindu ruler of Calicut).
- **Settlements** Daman, Salsette, Chaul and Bombay (West coast), San Thome (near Madras) and at Hooghly.
- **Alfonso de Albuquerque**, the second Governor of India (first being Francisco de Almeida) arrived in 1509 and captured Goa in AD 1510.

Dutch

- Dutch East India Company was formed in AD 1602.
- Dutch were defeated by English at the **Battle of Bedara** in AD 1759 and as per agreement, the Dutch gained the control over Indonesia and the British over India, Sri Lanka and Malaya.
- **Settlements** They set-up their first factory at Masulipatnam in 1605. Their other factories were at Pulicat, Chinsura, Patna, Balasore, Naga pattanam, Cochin, Surat, Karaikal and Kasimbazar.

English

- The English East India Company was formed in 1599 under a charter granted by Queen Elizabeth in 1600. Jahangir granted a farman to **Captain William Hawkins** permitting the English to erect a factory at Surat (1613).
- In 1615, **Sir Thomas Roe** succeeded in getting an imperial farman to trade and establish factory in all parts of the Mughal Empire by ruler Jahangir.
- In 1690, a factory was established at Suttanati by **Job Charnock**. In 1698, following the acquisition of zamindari of three villages of **Suttanati, Kalikata** and **Govindpur**, the city of Calcutta was founded. Fort William was set-up in 1700.
- In 1717, John Surman obtained a farman from Farrukhsiyar, which gave

large concessions to the company. This farman has been called the Magna Carta of the Company.

- **Battle of Plassey** (1757) English defeated Sirajuddaula, the nawab of Bengal.
- **Battle of Buxar** (1764) Captain Munro defeated joint forces of Mir Qasim (Bengal), Shujauddaula (Awadh) and Shah Alam II (Mughal).

Danes

- **The Danish East India Company** was formed in 1616.
- The Danish colony 'Tranquebar' was established on Southern Coromandel coast of India.
- **Settlements** Serampur (Bengal) and Tranquebar (Tamil Nadu) sold their settlements to the English in 1845.

French

- **The French East India Company** was formed by Colbert under state patronage in 1664. The First **French factory** was established at Surat by Francois Caron in 1668. A factory at Masulipatnam was set-up in 1669.
- French were defeated by English in **Battle of Wandiwash** (1760).

GOVERNOR-GENERALS OF BENGAL

Warren Hastings (AD 1774-85)

- Brought the **dual government** to an end by the **Regulating Act**, 1773.
- The Act of 1781 made clear demarcation between the jurisdiction of the Governor General-in-Council and Supreme Court at Calcutta.
- **Pitt's India Act** (1784), Rohilla War (1774), First Maratha War (1775-1782) and Treaty of Salbai with Marathas (1782) and Second Mysore War (1780-84). Foundation of Asiatic Society of Bengal (1784) in Calcutta by **Sir William Jones**.
- English translations of **Bhagavad Gita** by Charles Wilkins in 1785.

Lord Cornwallis (AD 1786-93)

- **Third Mysore War** (1790-92) and **Treaty of Seringapatnam** (1792).
- Introduced Permanent Settlement in Bengal and Bihar (1793).
- He is called the **Father of Civil Services** in India, introduced judicial reforms by separating revenue administration from judicial administration and established a system of circles (*thanas*, headed by a *Daroga* (an Indian)).
- Translation of *Abhigyan Shakuntalam* in English by **William Jones** in 1789.

Sir John Shore (AD 1793-98)

- Played an important role in the introduction of Permanent Settlement.
- **Battle of Khanda** between the Nizams and the Marathas (1795).

Lord Wellesley (AD 1798-1805)

- Introduction of the **Subsidiary Alliance** (1798), first alliance with Nizam of Hyderabad followed by Mysore, Tanjore, Awadh, the Peshwa, the Bhonsle and the Scindia.
- **Treaty of Bassein** (1802) and the Second Maratha War.

George Barlow (1805-07)

- Vellore Mutiny (1806)

Lord Minto I (AD 1807-13)

- Concluded the **Treaty of Amritsar** with Maharaja Ranjit Singh (1809). **Charter Act of 1813** was passed.

Lord Hasting (AD 1813-23)

- **Anglo Nepal War** (1814-1816) and Treaty of Sagauli (1816).
- **Third Maratha War** (1817-18) dissolution of Maratha confederacy and creation of Bombay Presidency.
- Pindari War and establishment of **Ryotwari System** by Thomas Munro (1820).

Lord Amherst (AD 1823-28)

- **First Burmese War** (1824-26), **Treaty of Yandaboo** (1826) and capture of Bharatpur (1826).

GOVERNOR-GENERALS OF INDIA

Lord William Bentinck (AD 1828-35)

- **Charter Act of 1833** was passed and he was made the **first Governor General of India**. Before him, the designation given was **Governor General of Bengal**.
- Carried out social reforms like prohibition of sati (1829) and elimination of thugs (1830). On Macaulay's recommendations, English was made the medium of higher education. Suppressed female infanticide and child sacrifice.

Lord Metcalfe (AD 1835-36)

Known as **liberator of the press** in India.

Lord Auckland (AD 1836-42)

First Afghan War (1838-42), a disaster for the English.

Lord Ellenborough (AD 1842-44)

Brought an end to the Afghan war. War with Gwalior (1843), **Annexation of Sind** by Charles Napier (1843).

Lord Hardinge (AD 1844-48)

First Anglo-Sikh War (1845-46) and Treaty of Lahore (1846). Gave preference to English educated persons in employment.

Lord Dalhousie (AD 1848-56)

- Introduction of **Doctrine of Lapse** and annexation of Satara (1848), Jaitpur and Sambhalpur (1849), Baghat (1850), Udaipur (1852), Jhansi (1853), Nagpur (1854) and Awadh (annexed in 1856 on account of maladministration).
- Laid down the **first railway line** between Bombay and Thane (1853), Telegraph line between Calcutta and Agra and **Postal reforms** (first issue of the Indian stamp in Karachi in 1854) with the Post Office Act.
- **Widow Remarriage Act**, 1856 (the main force being Ishwar Chand Vidyasagar).
- Started **Public Works Department**, Grand Trunk Road work and harbour of Karachi, Bombay and Calcutta developed.
- Charter Act, 1853-Selection to Civil Service through competitive examination.
- Started Engineering College at Roorkee; made Shimla, the summer capital of India.

VICEROYS OF INDIA

Lord Canning (AD 1856-62)

- The **last Governor General** and the **first Viceroy**. Withdrew Doctrine of Lapse.
- Revolt of 1857, Mutiny took place. Indian Penal Code 1860 was passed.
- Passed the Act, 1858, which ended the rule of the East India Company. The Universities of Calcutta, Bombay and Madras were established in 1857.

Lord Elgin (AD 1862)

- Wahabi Movement

Lord John Lawrence (AD 1864-69)

- Established the **High Courts** at Calcutta, Bombay and Madras in 1865.
- Telegraphic communication was opened with Europe. Created the Indian Forest Department.

Lord Mayo (AD 1869-72)

- Organised the Statistical Survey of India and for the **first time** in Indian history, a **census** was held in 1871.
- Started the process of financial decentralisation in India. Established the Department of Agriculture and Commerce.
- Established the Rajkot College at Kathiawar and Mayo College at Ajmer for the Indian princes.
- He was the only viceroy to be murdered in office by a Pathan convict in the Andamans in 1872.

Lord Northbrooke (AD 1872-76)

Kuka Rebellion in Punjab, Famine in Bihar.

Lord Lytton (AD 1876-80)

- Known as the '*Viceroy of Reverse Character*'.
- **Royal Titles Act of 1876** and the assumption of the title of 'Empress of India' by Queen Victoria, the Delhi Durbar in January 1877.
- **Vernacular Press Act** (also called the 'Gagging Act' to restrain the circulation of printed matter) and the **Arms Act** (made it mandatory for Indians to acquire license in arms) of 1878.

Lord Ripon (AD 1880-84)

- **First Factory Act** of 1881 prohibited Child Labour under the age of 7. **Local Self-Government** was introduced in 1882.
- Repealed the **Vernacular Press Act** in 1882. Finances of the centre were divided.
- Lord Ripon is regarded as '**the founding father of local self governance**' in India.
- An Education Commission was appointed under **Sir William Hunter** in 1882 to improve primary and secondary education.
- The **Ilbert Bill Controversy** (1883) enabled Indian district magistrates to try European criminals.

Lord Dufferin (AD 1884-88)

Third Burmese War (AD 1885-86). Establishment of the **Indian National Congress** in 1885.

Lord Lansdowne (AD 1888-94)

- **Factory Act of 1891** granted weekly holiday and stipulated working hours for women and children.
- Civil services were divided into Imperial, Provincial and Subordinate Services.
- **Indian Councils Act** of 1892.
- The **Durand Commission** defined the Durand Line between British India and Afghanistan (now between Pakistan and Afghanistan) in 1893.

Lord Elgin II (AD 1894-99)

- Southern uprisings of 1899. **Great famine** of 1896-1897 and **Lyll Commission** on famine was established.

Lord Curzon (AD 1899-1905)

- A Commission was appointed under **Sir Thomas Raleigh** in 1902 to suggest reforms regarding universities, the **Indian Universities Act of 1904** was passed on the basis of its recommendations.
- **Ancient Monuments Preservation Act** of 1904. Thus, Archaeological Survey of India was established.
- **Agricultural Research Institute** was established at Pusa in Delhi. Partitioned Bengal in 1905.

Lord Minto (AD 1905-10)

Swadeshi Movement (1905-08); foundation of Muslim League (1906); Surat Session and split in the Congress (1907). Morley-Minto Reforms (1909).

Lord Hardinge (AD 1910-16)

Capital shifted from Calcutta to Delhi (1911); Delhi Durbar; Partition of Bengal was cancelled. The **Hindu Mahasabha** was founded in 1915 by Pandit Madan Mohan Malaviya.

Lord Chelmsford (AD 1916-21)

- Gandhi returned to India (1915) and founded the **Sabarmati Ashram** (1916), Champaran Satyagraha (1917), Satyagraha at Ahmedabad (1918), Kheda Satyagraha (1918).
- **August Declaration** (1917) by Montague, the then Secretary of State, and Montford reforms or the Government of India Act of 1919.
- **Rowlatt Act** (March, 1919) and the **Jallianwala Bagh Massacre** (13th April, 1919).
- **Khilafat Committee** was formed and Khilafat Movement started (1919-20).
- **Non-Cooperation Movement** started (1920-22). Women's University was founded at Poona (1916).

Lord Reading (AD 1921-26)

- Repeal of Rowlatt Act. Chauri-Chaura incident. RSS founded in 1925. Suppressed Non-Cooperation Movement. Formation of Swaraj Party.
- Moplah Rebellion (1921) took place. **Kakori Train** Robbery on 1st August, 1925. **Communal Riots** of 1923-25 in Multan, Amritsar, Delhi etc.

Lord Irwin (AD 1926-31)

- **Simon Commission** visited India in 1927. Congress passed the Indian Resolution in 1929.
- Dandi March (12th March, 1930). Civil Disobedience Movement (1930).
- **First Round Table Conference** was held in England in 1930. Gandhi-Irwin Pact.
- Lahore Session of Congress and **Poorna Swaraj Declaration** (1925).

Lord Willingdon (AD 1931-36)

- **Second Round Table Conference** in London in 1931 and **third** in 1932.
- **Government of India Act** (1935) was passed. Communal Awards (16th August, 1932) assigned separate electorate for Gandhiji went on a **epic fast** to protest against this division.

Lord Linlithgow (AD 1936-43)

- Congress Ministries resignation celebrated as '**Deliverance Day**' by the Muslim League (1939), the **Lahore Resolution** (23rd March, 1940) of the Muslim League demanding separate state for the Muslims. (It was at this session that Jinnah propounded his **Two-Nation Theory**). Outbreak of World War II in 1939. **Cripps Mission** in 1942. **Quit India Movement** (8th August, 1942).

Lord Wavell (AD 1943-47)

- **Cabinet Mission Plan** (16th May, 1946).
- First meeting of the Constituent Assembly was held on 9th December, 1946.
- Arranged the **Shimla Conference** on 25th June, 1945 with the failure of talks between the Indian National Congress and Muslim League.
- Election to the Constituent Assembly were held and an interim government was appointed under Nehru.

Lord Mountbatten (March to August, 1947)

- **Last Viceroy of British India** and the **first Governor-General of free India**.
- Partition of India decided by the 3rd June Plan or **Mountbatten Plan**.
- Retired in June, 1948 and was succeeded by **C Rajagopalachari**, the first and the last Indian Governor-General of Free India.
- **Indian Independence Act** was passed by the British Parliament on 4th July, 1947, by which India became independent on 15th August, 1947.

THE REVOLT OF 1857

- Started at Meerut on 10th May, 1857.
- **Political Causes** The policy of Doctrine of Lapse.
- **Economic Causes** Heavy taxation, evictions, Discriminatory Tariff Policy against Indian products and destruction of traditional handicrafts that hit peasants, artisans and small zamindars.
- **Military Discrimination** as Indian soldiers were paid low salaries, they could not rise above the rank of subedar and were racially insulted.
- **Grievances of Sepoys** The introduction of Enfield rifle, and its cartridge of which was greased with animal fat, provided the spark.
- A rebellion broke out among Sepoys of Meerut on 10th May, 1857 which later spread to other parts of the country.
- British social reforms (widow remarriage, abolition of sati, education for girls, Christian missionaries).

Centres of Revolt and the Leaders

<i>Centre of Revolt</i>	<i>Leader</i>	<i>British Suppressor</i>
Delhi	Bahadur Shah II, Bakht Khan	John Nicholson, Hudson
Banaras	Liaquat Ali	James Neill
Kanpur	Nana Saheb, Tantia Tope, Azimullah Khan	Campbell, Havelock
Lucknow	Hazrat Mahal (Begum of Awadh)	Havelock, James Neill, Campbell
Jhansi	Rani Laxmi Bai	Sir Hugh Rose
Bareilly	Khan Bahadur Khan	Sir Colin Campbell
Awadh (Bihar)	Veer Kunwar Singh	William Taylor and Vincent Eyre

Causes of Failure

- The Nizam of Hyderabad, the Raja of Jodhpur, Scindia of Gwalior, the Holkar of Indore, the rulers of Patiala, Sindh and Kashmir and the Rana of Nepal provided active support to the British.
- Comparative lack of efficient leadership.

Impact of the Revolt

- The control of Indian administration was passed on to the **British Crown** by the Government of India Act, 1858.
- Reorganisation of the army.
- After the revolt, the British pursued the Policy of **Divide and Rule**.

CHIEF NATIONAL ACTIVITIES

The Indian National Congress

- It was formed in 1885 by **AO Hume** a retired Civil Servant.
- The first session was held in Bombay under Presidentship of WC Bannerjee in 1885, attended by 72 delegates from all over India.
- 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.
- **Moderate leaders** Dada Bhai Naoroji, Badruddin Tayabji, Gopal Krishna Gokhale, Surendranath Bannerjee and Anand Mohan Bose.

Partition of Bengal (1905)

- The partition was announced by **Lord Curzon** on 16th October, 1905 through a royal proclamation, reducing the old province of Bengal in size by creating East Bengal and Assam out of the rest of Bengal.

Swadeshi Movement (1905)

This movement had its origin in the anti-partition movement of Bengal. Lal, Bal, Pal and Aurobindo Ghosh played an important role. INC took the Swadeshi call first at the Banaras Session, 1905 presided over by GK Gokhale.

Muslim League (1906)

- It was set-up in 1906 by Aga Khan, Nawab Salimullah of Dhaka and Nawab Mohsin-ul- Mulk.
- The league supported the **Partition of Bengal** and opposed the **Swadeshi Movement**, demanded special safeguards to its community and a separate electorate for Muslims.

- This led to communal differences between the Hindus and the Muslims.

Demand for Swaraj

(Calcutta Session in Dec, 1906)

- The INC, under the leadership of Dadabhai Naoroji, adopted 'Swaraj' (Self-government) as the goal of Indian People.

Surat Session (1907)

- The INC split into two groups: the **Extremists** and the **Moderates**, due to the debate on nature of **Swadeshi Movement**.
- Extremists were led by Lal, Bal, Pal while the Moderates by GK Gokhale.

Morley-Minto Reforms (1909)

- The reforms envisaged a separate electorate for Muslims, besides other constitutional measures.
- Lord Minto came to be known as the Father of Communal Electorate.

Ghadar Party (1913)

- Formed by Lala Hardayal, Taraknath Das and Sohan Singh Bhakna. Headquarter—San Francisco.
- The name was taken from a weekly paper, **Ghadar**, which had been started on 1st November, 1913 to commemorate the 1857 Revolt.

Home Rule Movement (1916)

- Started by BG Tilak (April, 1916) at Poona and Annie Besant and S Subramania Iyer at Adyar, near Madras (September, 1916).
- **Objective** Self-government for India in the British Empire.
- During this movement, Tilak raised the slogan **Swaraj is my Birth Right and I shall have it**.

Lucknow Pact (1916)

Pact between INC and Muslim League following a war between Britain and Turkey leading to anti-British feelings among Muslims. Both organisations jointly demand dominion status for the country congress accepted separate electorate for Muslims.

August Declaration (1917)

- After the Lucknow Pact, the British policy was announced which aimed at "increasing association of Indians in every branch of the administration for progressive realisation of responsible government in India as an integral part of the British empire". This came to be called the August Declaration.
- **The Montague—Chelmsford reforms or the Act of 1919** was based on this declaration.

Rowlatt Act (18th March, 1919)

- This gave unbridled powers to the government to arrest and imprison suspects without trail. This law enabled the government to suspend the right of **Habeas Corpus**, which had been the foundation of civil liberties in Britain.
- **Rowlatt Satyagraha** was started against the act. This was the first countrywide agitation by Gandhiji.

Jallianwala Bagh Massacre

(13th April, 1919)

- People were agitated over the arrest of **Dr Saifuddin Kitchlew** and **Dr Satya Pal** on 10th April, 1919.
- **General Dyer** fired at people who assembled in the Jallianwala Bagh, Amritsar. Michael O' Dwyer was Lt. Governor of Punjab that time. The Hunter Commission was appointed to enquire into it.
- Rabindra Nath Tagore returned his knighthood in protest.
- **Sardar Udham Singh** killed Michael O' Dwyer in Caxton Hall, London on March 13, 1940.

Khilafat Movement (1920)

- Muslims were agitated by the treatment done with Turkey by the British in the treaty that followed the **First World War**.
- Ali brothers, **Mohd Ali** and **Shaukat Ali** started this movement. It was jointly led by the Khilafat leaders and the Congress.

Non-Cooperation Movement (1920)

- Congress passed the resolution in its Calcutta Session in September, 1920.
- It was the first mass-based political movement under Gandhiji.
- The movement envisaged resignation from nominated offices and posts in the local bodies.

- Refusal to attend government *durbars* and boycott of British courts by the lawyers.
- Refusal of general public to offer themselves for military and other government jobs and boycott of foreign goods.

Chauri-Chaura Incident (1922)

- The Congress Session at Allahabad in December 1921, decided to launch a **Civil Disobedience Programme**. Gandhiji was appointed its leader.
- But before it could be launched, a mob of people at Chauri-Chaura (near Gorakhpur) clashed with the police and burnt 22 policemen on 5th February, 1922. This compelled Gandhiji to withdraw the Non-Cooperation Movement on 12th February, 1922.

Swaraj Party (1923)

- Motilal Nehru, CR Das and NC Kelkar (called Pro-changers) demanded that the nationalist should end the boycott of the Legislative Councils, enter them and expose them.
- They formed Swaraj Party for this purpose with CR Das as the President.

Simon Commission (1927)

- It was constituted by John Simon, to review the political situation in India and to introduce further reforms and extension of parliamentary democracy.
- Indian leaders opposed the commission, as there were no Indians in it, they cried **Simon Go Back**.
- The government used brutal repression and at Lahore, **Lala Lajpat Rai** was severely beaten in lathi-charge and later succumbed to death.

The Nehru Report (1928)

- After boycotting the Simon Commission, all political parties constituted a committee under the chairmanship of **Motilal Nehru** to evolve and determine the principles for the Constitution of India.

Lahore Session (1929)

- On 19th December, 1929, under the presidentship of **JL Nehru**, the INC, at its Lahore Session, declared **Poorna Swaraj** (complete independence) as its ultimate goal.
- The tri-coloured flag adopted on 31st December, 1929, was unfurled and 26th January, 1930 was fixed as the **First Independence Day**, to be celebrated every year. Later, this day was chosen as the **Republic Day of India**.

Dandi March (1930)

- Also called the **Salt Satyagraha**.
- Gandhiji started his march from Sabarmati Ashram on 12th March, 1930 for the small village Dandi to break the Salt Law.
- He picked a handful of salt and inaugurated the **Civil Disobedience Movement**.

Civil Disobedience Movement

- Countrywide mass participation by women.
- The Garhwal soldiers refused to fire on the people at Peshawar.

First Round Table Conference (1931)

- It was the first conference arranged between the British and Indians as equals. It was held on 12th November, 1930 in London to discuss Simon Commission.
- Hindu Mahasabha and Muslim League participated in it. The conference failed due to absence of the Indian National Congress.

Gandhi Irwin Pact (1931)

- The government represented by Lord Irwin, and INC led by Gandhiji signed a pact on 5th March, 1931.
- In this, the INC called off the Civil Disobedience Movement and agreed to join the Second Round Table Conference.

- The government allowed the villagers on the coast to make salt for consumption and released the political prisoners. The **Karachi Session of 1931** of Congress endorsed the Gandhi Irwin Pact.

Second Round Table Conference (1931)

- Gandhiji represented the INC and went to London to meet British Prime Minister Ramsay McDonald.
- The conference however failed as Gandhiji could not agree with British Prime Minister on his policy of Communal Representation and refusal of the British Government on the basic Indian demand for freedom.

The Communal Award (16th August, 1932)

- Announced by **Ramsay McDonald**. It showed **divide** and **rule policy of the British**.
- It envisaged communal representation of depressed classes, Sikhs and Muslims.
- Gandhiji opposed it, and started fast unto death in Yervada jail Pune (Maharashtra).

Poona Pact/ Gandhi- Ambedkar Pact (25th September, 1932)

- The idea of separate electorate for the depressed classes was abandoned, but seats reserved for them in the Provincial Legislature were increased.
- Thus, Poona Pact agreed upon a joint electorate for upper and lower castes.

Third Round Table Conference (1932)

- Proved fruitless as most of the national leaders were in prison.

Demand for Pakistan

- In 1930, **Iqbal** suggested that the North-West provinces and Kashmir should be made Muslim states within the federation.

- **Chaudhary Rehmat Ali** gave the term **Pakistan** in 1933.
- Muslim League first passed the proposal of separate Pakistan in its Lahore Session in 1940 (called **Jinnah's Two-Nation Theory**). It was drafted by **Sikandar Hayat Khan**, moved by Fazlul Haq and seconded by Khaliquzzamah.
- In December 1943, the Karachi Session of the Muslim League adopted the slogan **Divide and Quit**.

August Offer (8th August, 1940)

- It offered (i) Dominion status in the unspecified future, (ii) A post-war body to enact the Constitution (iii) To expand the Governor-General's Executive Council to give full weightage to minority opinion.
- This was rejected by the INC, but was accepted by the Muslim League.

The Cripps Mission (1942)

- The British Government with a view to get cooperation from Indians in the Second World War, sent **Sir Stafford Cripps** to settle terms with Indian leaders.
- He offered dominion status to be granted after war.
- Congress rejected it. Gandhiji termed it as '*a post - dated cheque on a crashing bank*'.

The Revolt of 1942 and the Quit India Movement

- Also called the **Wardha Proposal**, a Leaderless Revolt.
- The resolution was passed on 8th August, 1942, at Bombay. Gandhiji gave the slogan **Do or Die**.
- On 9th August, the Congress was banned and its important leaders were arrested. Gandhiji was kept at the **Aga Khan Palace**, Pune.
- The people became violent. The movement was, however, crushed by the government.

Indian National Army (INA)

- **Subhash Chandra Bose** escaped to Berlin in 1941 and set-up the Indian League there. In July 1943, he joined the INA at Singapore. Ras Bihari Bose handed over the leadership to him.
- INA had three fighting brigades, named after Gandhi, Azad and Nehru. **Rani of Jhansi Brigade** was an exclusive women force. INA had its headquarters at Rangoon and Singapore.

The Cabinet Mission Plan (1946)

- Members were Pethick Lawrence, Stafford Cripps and AV Alexander. Lord Wavell was the Viceroy of India that time.
- *Main proposals*
 1. Rejection of demand for a full-fledged Pakistan.
 2. Loose union under a Centre with Centre's control over defence and foreign affairs.
 3. Provinces were to have full autonomy and residual powers.
 4. Provincial legislatures would elect a Constituent Assembly.

The Muslim League accepted it on 6th June, 1946. The Congress also partially accepted this plan.

Formation of Interim Government

(2nd September, 1946)

- It came into existence on 2nd September, 1946 in accordance with Cabinet Mission's proposals and was headed by **JL Nehru**. Muslim League refused to join it initially.
- **Prime Minister Attlee** on 20th February, 1947 announced that British would withdraw from India by 30th June, 1948.

Formation of Constituent Assembly (December, 1946)

- The Constituent Assembly met on 9th December, 1946 and Dr Rajendra Prasad was elected as its President.

Jinnah's Direct Action Resolution (16th August, 1946)

- Provoked by the success of the Congress in the voting for Constituent Assembly Jinnah withdrew his acceptance to the Cabinet Mission Plan.
- Muslim League passed a Direct Action Resolution, which condemned both the British Government and the Congress (16th August, 1946). It resulted in heavy communal riots.
- Jinnah celebrated **Pakistan Day** on 27th March, 1947.

Mountbatten Plan (also called 3rd June Plans) (3rd June, 1947)

The plan formulated by Lord Mountbatten outlined that

- India was to be further divided into India and Pakistan.
- There would be a separate Constitutional Assembly for Pakistan to frame its Constitution.
- The princely states would enjoy the liberty to either join India or Pakistan, or could even remain independent.
- Bengal and Punjab will be partitioned and a referendum in NWFP and Sylhet district of Assam would be held. A separate state of Pakistan would be created. **Boundary Commission** was to be headed by Radcliffe.

Partition and Independence (August, 1947)

- **Indian Independence Act**, 1947 implemented on 15th August 1947, abolished the sovereignty of British Parliament. Dominions of **India** and **Pakistan** were created. Each dominion was to have a Governor-General. Pakistan was to comprise Sind, British Baluchistan, NWFP, West Punjab and East Bengal.
- **Sardar Vallabhbhai Patel**, the first Home Minister, integrated all the states by 15th August, 1947. Kashmir, Hyderabad, Junagarh, Goa (with Portuguese) and Pondicherry (with French) later acceded to Indian Federation.

Socio-Religious Reform Movements

<i>Religious Institution</i>	<i>Founder</i>	<i>Ideas</i>
Brahmo Samaj was founded in Calcutta (1828)	<i>Raja Ram Mohan Roy Author of Gift to Monotheists and Percepts of Jesus and the Journals Sambad Kaumudi and Mirat-ul Akbar</i>	Propagated monotheism, opposed sacrifices, idolatory, superstition and sati.
Young Bengal Movement (1826-31)	<i>Henry Louis Vivian Derozio, probably the first modern nationalist poet brought out journal 'Jananresan'</i>	Opposed the vices in society and believed in truth, freedom and right.
Tattavabodhini Sabha (1839)	<i>Debendranath Tagore brought out the journal Tattavabodhini Patrika</i>	Propagated Brahmo Samaj idea, eventually founding Adi Brahmo Samaj (1866).
Dharma Sabha (1820), Rohilkhand	<i>Radhakant Deb</i>	Emergred to counter Brahmo Samaj and propagated orthodoxy.
Wahabi Movement (1820), Rohilkhand	<i>Syed Ahmed of Rai Bareilly</i>	Popularised the teachings of Waliullah, stressed the role of individual conscience in religion.
Namdhari or Kuka Movement (1841-71)	<i>Bhai Balak Singh and Baba Ram Singh</i>	For political and social reforms among Sikhs.
Paramhans Mandali (1849)	<i>Dadoba Pandurang</i>	Emphasised the unity of God, against caste rules.
Rahnumai Mazdayasanan Sabha (1851)	<i>SS Bengali, Dadabhai Naoroji and others</i>	To improve the social condition of Parsis and restore the purity of Zoroastrianism. Their journal was Rast Gotar.
Prarthana Samaj (1867), Bombay	<i>Atmaram Pandurang</i>	Monotheism, upliftment of women, abolition of caste discrimination.
Indian Reform Association (1870), Calcutta	<i>Keshab Chandra Sen</i>	Opposed child marriage, advocated widow remarriage and inter-caste marriages.
Arya Samaj (1875), Bombay	<i>Dayanand Saraswati (original name Mulshankar)</i>	Gave the slogan Go Back to the Vedas and within a revivalist framework denounced rites, idolatory, Brahmins's supremacy etc.
Aligarh Movement (1875) grew into Mohammedan Anglo-Oriental College (1875) and later Aligarh Muslim University	<i>Syed Ahmed Khan, his journal Tahzib-al-Akhlaq</i>	Religious reform through emphasis on principle of equality in religion, favoured scientific and national outlook.
The Theosophical Society (1875), New York (later shifted to Adyar)	<i>Madam HP Blavatsky and Col HS Olcott</i>	Drew inspiration from Upanishads, philosophy of the Vedanta and transmigration of the souls.
Deccan Education Society (1884), Pune	<i>MG Ranade, VG Chiplinkar and GG Agarkar</i>	To contribute to education and culture in Western India established Fergusson College , Pune (1885).
Seva Sadan (1885), Bombay	<i>Behramji M Malabari</i>	Against child marriages, and forced widowhood.
Deva Samaj (1887), Lahore	<i>Shiv Narain Agnihotri</i>	Favoured a code of conduct against bribe- taking, gambling, etc.
Madras Hindu Association (1892)	<i>Veresalingam Pantulu</i>	Social Purity Movement and against Devadasi system.
Ramkrishna Mission (1897), Belur	<i>Vivekananda (original name Narendranath Dutta)</i>	Revive Hinduism, against caste restrictions, superstition in Hinduism and overhaul of education system.

<i>Religious Institution</i>	<i>Founder</i>	<i>Ideas</i>
Servants of Indian Society (1905), Bombay	Gopal Krishna Gokhale	Famine relief and improving tribal conditions, in particular.
Bharat Stri Mahamandal (1910), Calcutta	Sarlabai Devi Chaudhrani	Women's education and emancipation.
Social Service League (1911)	NM Joshi	Improving the condition of the masses.
Women's Indian Association (1917), Madras	Annie Besant	Upliftment of Indian women.

Popular Names of Personalities

<i>Popular Name</i>	<i>Personality</i>	<i>Popular Name</i>	<i>Personality</i>
Andhra Kesari	T Prakasam	JP	Jayaprakash Narayan
Babuji	Jaggiwan Ram	Lady with the Lamp	Florence Nightingale
Bapu	Mahatma Gandhi	Lion of the Punjab	Lala Lajpat Rai
CR	C Rajagopalachari	Little Corporal	Napoleon
Desh Bandhu	Chitranjan Das	Lokmanya	Bal Gangadhar Tilak
Grand Old man	Dadabhai Naoroji	Jawan	Indian soldier
Lal, Bal, Pal	Lala Lajpat Rai, Bal Gangadhar Tilak, Bipin Chandra Pal	Mahamanya	Pandit Madan Mohan Malaviya
		Man of Blood	Bismarck
Guru ji	MS Golwalkar	Netaji	Subhash Chandra Bose
Gurudev	Rabindranath Tagore	Nightingale of India	Sarojini Naidu
Iron Man	Vallabhbhai Patel	Pandit ji	Jawaharlal Nehru
Sparrow	Major Rajender Singh	Shastri ji	Lal Bahadur Shastri

Crematoriums of Famous Persons

<i>Crematorium</i>	<i>Famous Person(s)</i>	<i>Crematorium</i>	<i>Famous Person (s)</i>
Raj Ghat	Mahatma Gandhi	Shanti Van	Jawaharlal Nehru
Vijay Ghat	Lal Bahadur Shastri	Shakti Sthal	Indira Gandhi
Kisan Ghat	Ch Charan Singh	Abhay Ghat	Morarji Desai
Veer Bhumi	Rajiv Gandhi	Samata Sthal	Jagjivan Ram
Ekta Sthal	Giani Zail Singh, Chandra Shekhar	Karma Bhumi	Dr Shankar Dayal Sharma
Uday Bhoomi	KR Narayana	Mahaprayan Ghat	Dr Rajendra Prasad

Newspapers and Journals

<i>Name</i>	<i>Published by</i>
Bengal Gazette	JA Hickey
Kesari	BG Tilak
Maratha	BG Tilak
Amrita Bazar Patrika	Sisir Kumar Ghosh and Motilal Ghosh
Vande Mataram	Aurobindo Ghosh
Yugantar	Bhupendranath Dutta and Barinder Kumar Ghosh
Bombay Chronicle	Firoz Shah Mehta

Books and Authors

<i>Book</i>	<i>Author</i>
Ghulam Giri	Jyotiba Phule
Pather Panchali	B.Bhushan Bannerji
Satyarth Prakash	Swami Dayanand
Anand Math	Bankim Chandra Chatterji
Unhappy India	Lala Lajpat Rai
India Divided	Rajendra Prasad
The Discovery of India	Jawaharlal Nehru

ART AND CULTURE

Classical Dancers of India

<i>Dance</i>	<i>Dancer</i>
■ Bharatanatyam	Bala Saraswati, CV Chandrasekhar, Leela Samson, Mrinalini Sarabhai, Padma Subramanyam, Rukmini Devi, Sanyukta Panigrahi, Sonal Mansingh, Yamini Krishnamurti
■ Kathak	Bharti Gupta, Birju Maharaj, Damayanti Joshi, Durga Das, Gopi Krishna, Kumudini Lakhia, Sambhu Maharaj, Sitara Devi
■ Kuchipudi	Josyula Seetharamaiah, Vempathi Chinna Sathyam
■ Manipuri	Guru Bipin Sinha, Jhaveri Sisters, Nayana Jhaveri, Nirmala Mehta, Savita Mehta
■ Odissi	Debaprasad Das, Dharendra Nath Patnaik, Indrani Rahman, Kelucharan Mahapatra, Priyambada Mohanty
■ Kathakali	Mrinalini Sarabhai, Guru Shankaran, Namboodripad, Thottam Shankaran, Kutti Nayyar, Shankar Kurup, KC Pannikar, TT Ram Kulti
■ Mohiniattam	Protima Devi, Sanyukta Panigrahi, Sonal Mansingh, Pankaj Charan Das, Kelucharan Mahapatra, Madhvi Mudgal, etc

State and Folk Dances

■ Andhra Pradesh	Kuchipudi, Ghantamardala, Ottam Thedal, Veedhi Natakam
■ Assam	Bihu, Bichhua, Natpuja, Maharas, Kaligopal, Bagurumba, Khel Gopal, Canoe, Jhumura Hobjana
■ Bihar	Jata-Jatin, Bakho-Bakhain, Panwariya, Sama-Chakwa, Bidesia
■ Gujarat	Garba, Dandiya Ras, Tippani Juriun, Bhavai
■ Haryana	Jhumar, Phag, Daph, Dhamal, Loor, Gugga, Khor, Gagor
■ Himachal Pradesh	Jhora, Jhali, Chharhi, Dhaman, Chhapeli, Mahasu, Nati, Dangi
■ Jammu and Kashmir	Rauf, Hikat, Mandjas, Kud Dandi Nach, Damali
■ Karnataka	Yakshagan, Huttari, Suggi, Kuniitha, Karga, Lambi
■ Kerala	Kathakali (Classical), Ottam Thulal, Mohiniattam, Kaikottikali
■ Maharashtra	Lavani, Nakata, Koli, Lezim, Gafa, Dahikala Dasavtar or Powada
■ Odisha	Odissi (Classical), Savari, Ghumara, Painka, Munari, Chhau
■ Paschim Banga	Kathi, Gambhira, Dhali, Jatra, Baul, Marasia, Mahal, Keertan
■ Punjab	Bhangra, Giddha, Daff, Dhaman, Bhand, Naqal
■ Rajasthan	Ghumar, Chakri, Ganagor, Jhulan Leela, Jhuma, Suisini, Ghapal, Kalbeliya
■ Tamil Nadu	Bharatanatyam, Kumi, Kolattam, Kavadi
■ Uttar Pradesh	Nautanki, Raslila, Kajri, Jhora, Chappeli, Jaita
■ Uttarakhand	Garhwali, Kumayuni, Kajari, Jhora, Raslila, Chappeli

Instruments and Vocalists

Carnatic	MS Subbalakshmi, Balamuralikrishna, Bombay Jaishri, HK Raghavendra, Aryakudi Ramanujan Iyenegar Venkataram, Sitarajam, Mani Krishnaswamy, Akhil Krishnan, ML Vasanthakumari, MD Ramanathan, GN Balasubramaniam
Dhrupad	Ustad Rahim Fahim-ud-din Dagar, Zahir-ud-din Dagar, Wasif-ud-din Dagar, Bundecha Bandhu, Pt Abhay Narayan Mallick, Pt Ritwik Sanyal, Uday Bhawalkar
Hindustani	Shubha Mudgal, Madhup Mudgal, Mukul Shivputra, Pandit Jasraj, Parveen Sultana, Naina Devi, Girija Devi, Ustad Ghulam Mustafa Khan, Gangubai Hangal, Krishna Hangal, V Rajput, Kumar Gandharva, Faiyyaz Khan, Mallikarjun Mansur.
Thumri	Ustad Bade Ghulam Ali Khan, Ustad Mazhar Ali Khan, Ustad Zawad Ali Khan, Poornima Chaudhary, Shanti Heerananda, Naina Devi, Rita Ganguly

Musical Instruments and Instrumentalists

<i>Instruments</i>	<i>Instrumentalists</i>
Stringed Instruments	
1. Been	Asad Ali Khan, Zia Moin-ud-din Khan
2. Santoor	Shiv Kumar Sharma
3. Sarod	Buddhadev Dasgupta, Ali Akbar Khan, Amjad Ali Khan, Bahadur Khan, Sharan Rani, Zarin S Sharma
4. Sarangi	Ustad Binda Khan
5. Sitar	Ravi Shankar, Hara Shankar Bhattacharya, Nikhil Banerjee, Vilayat Khan, Mustaq Ali Khan
6. Surb Ahar	Sajjad Hussain, Annapurna
7. Veena	Doraiswamy Iyengar, Chittibabu, Emani Sankara Shastri, Dhanammal, S Bala Chandran, KR Kumaraswamy
8. Violin	Gajanan Rao Joshi, MS Gopal Krishnan, TN Krishnan, Baluswamy, Dikshitar, Dwaran Venkataswamy Naidu Lalyuli G Jayaraman, Mysore T Chowdiah, VG Jog
Wind Instruments	
9. Flute	TR Mahalingam, N Ramani, Hari Prasad Chaurasia, Pannalal Ghosh
10. Nadaswaran	Sheikh Chinna Moula, Neeruswamy Pillai, Rajaratanam Pillai
11. Shehnai	Bismillah Khan
Percussion (Striking Thumping) Instruments	
12. Mridangam	Palghat Mani Iyer, Karaikudi R Mani, Palghat Raghu
13. Pakhawag	Pt Ayodhya Prasad, Gopal Das, Babu Ram Shanker Pagaldas
14. Tabla	Zakir Hussain, Nikhil Ghosh, Kishan Maharaj, Alla Rakha Khan, Pandit Samta Prasad, Kumar Bose, Latif Khan
15. Kanjira	Pudukkotai Dakshinamurthi Pillai

Cultural Institutions

<i>Institutions</i>	<i>Headquarters</i>	<i>Institutions</i>	<i>Headquarters</i>
■ Anthropological Survey of India, 1945	Kolkata	■ Sahitya Academy, 1954	New Delhi
■ Archaeological Survey of India, 1861	New Delhi	■ Sangeet Natak Academy, 1953	New Delhi
■ Asiatic Society, 1784 (Sir William Jones)	Kolkata	■ Library of Tibetan Works and Archives	Dharmashala
■ Indira Gandhi National Centre for Arts, 1985	New Delhi	■ Science City	Kolkata
■ Lalit Kala Akademi (National Academy of Fine Arts), 1954	New Delhi	■ Victoria Memorial Hall	Kolkata
■ National Archives of India, 1981	New Delhi	■ Birla Industrial and Tech Museum	Kolkata
■ National School of Drama, 1959	New Delhi	■ Central Institute of Buddhist Studies	Leh
		■ Nava Nalanda Mahavihara	Nalanda (Birla)
		■ National Gallery of Modern Art	New Delhi



GEOGRAPHY

WORLD GEOGRAPHY

UNIVERSE

- The study of universe is known as **Cosmology**. The universe is commonly defined as the totality of everything that exists including all physical matter and energy, the planets, stars, galaxies and the contents of intergalactic space.
- **Galaxy** A galaxy is a vast system of billions of stars, dust and light gases bound by their own gravity. There are 100 billion galaxies in the universe and each galaxy has, on average, 100 billion stars.
- Our galaxy is **Milky Way Galaxy** (or the **Akash Ganga**) formed after the Big Bang.
- **Andromeda** is the nearest galaxy to the Milky Way.
- **The Big Bang Theory** Big Bang was an explosion of concentrated matter in the universe that occurred 15 billion years ago, leading to the formation of galaxies of stars and other heavenly bodies.
- It is believed that universe should be filled with radiation called the “cosmic microwave background.” NASA has launched two mission to study these radiation, i.e. the Cosmic Background Explorer (COBE) and the Wilkinson Microwave Anisotropy Probe (WMAP).
- **Stars** are heavenly bodies made up of hot burning gases and they shine by emitting their own light.
- **Black Hole** Stars having mass greater than three times that of the Sun, have very high gravitational power, so that even light can not escape from its gravity and hence called black hole.

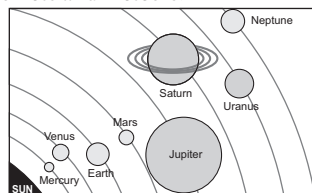
- **Comets** Made up of frozen gases. They move around the Sun in elongated elliptical orbit with the tail always pointing away from the Sun.
- **Constellations** The sky is divided into units to enable the astronomers to identify the position of the stars. These units are called constellations. There are 88 known constellations.
- **Satellites** are the heavenly bodies that revolve around the planets. Moon is the natural satellite of the Earth.

Facts about the Moon

Diameter	3476 km
Average distance from Earth	384365 km
Rotation Speed	27 days, 7 h, 43 min and 11.47 sec
Revolution Speed	27 days, 7 h, 43 min and 11.47 sec
Time taken by moonlight to reach the Earth	1.3 sec

Solar System

- The solar system consists of the Sun, eight planets and their satellites (or moons) and thousands of other smaller heavenly bodies such as asteroids, comets and meteors.



- The **Sun** is at the centre of the solar system and all these bodies revolve around it. It is the nearest star to the Earth.

Facts about 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)
Time taken by Sunlight to reach the Earth	8 min and 16.6 sec

Important Facts about Universe

Biggest Planet	<i>Jupiter</i>
Biggest Satellite	<i>Ganymede (Jupiter)</i>
Blue Planet	<i>Earth</i>
Green Planet	<i>Uranus</i>
Brightest Planet	<i>Venus</i>
Brightest Planet outside Solar System	<i>Sirius (Dog Star)</i>
Closest Star of Solar System	<i>Proxima Centauri</i>
Coldest Planet	<i>Neptune</i>
Evening Star	<i>Venus</i>
Farthest Planet from Sun	<i>Neptune</i>
Planet with maximum number of satellites	Saturn (Overtaking Jupiter)
Fastest revolution in Solar System	<i>Mercury</i>
Hottest Planet	<i>Venus</i>
Densest Planet	<i>Earth</i>
Fastest rotation in Solar System	<i>Jupiter</i>
Morning Star	<i>Venus</i>
Nearest Planet to Earth	<i>Venus</i>
Nearest Planet to Sun	<i>Mercury</i>
Red Planet	<i>Mars</i>
Slowest Revolution in Solar System	<i>Neptune</i>
Slowest Rotation in Solar System	<i>Venus</i>
Smallest Planet	<i>Mercury</i>
Smallest Satellite	<i>Deimos (Mars)</i>
Earth's Twin	<i>Venus</i>
Only Satellite with an atmosphere like Earth	<i>Titan</i>

Asteroids (or Planetoids)

Small planetary bodies that revolve around the Sun and found in between the orbits of Mars and Jupiter. Also known as minor planets.

Meteors and Meteorites

- Meteors are also called as **shooting stars**.
- **Meteors** are fragments of rocks coming towards the Earth.
- They are formed due to collision among the asteroids.
- Meteors that do not burn up completely in Earth's atmosphere and land on the Earth, are called **meteorites**.
- Meteorites are composed of various proportions of a nickel-iron alloy (10% nickel and 90% iron) and silicate minerals.

Classification of Planets

Inner Planets Include Mercury, Venus, Earth and Mars.

Outer Planets Include Jupiter, Saturn, Uranus and Neptune.

<i>Inner Planet</i>	<i>Outer Planet</i>
They are called as Terrestrial or Rocky planets.	They are called as Jovian or Gaseous planets.
They are nearer to the Sun.	They are far away from the Sun.

Dwarf Planet According to International Astronomical Union (IAU), it is a celestial body in direct orbit of the Sun, that is massive enough that its shape is controlled by gravitational forces, but has not cleared its neighbourhood. *e.g.*, Pluto, Ceres, Eris, Makemake and Haumea.

A **light year** is the distance light travels in one year at the speed of 3×10^8 m/s.

Astronomical unit mean distance between Earth and Sun.

Earth

- The Earth is an **oblate spheroid**. It is almost spherical, flattened a little at the poles with a slight bulge at the centre (equator).
- **Perihelion** Nearest position of the Earth to the Sun.
- **Aphelion** Farthest position of the Earth from Sun.
- The Earth's interior is composed of three major layers: the **crust**, the **mantle** and the **core**.

- Eduard Suess has explained the interior of Earth on the basis of chemical composition as SIAL, SIMA and NIFE.
- **SIAL** (Silicon-Aluminium) Upper part of the crust.
- **SIMA** (Silicon-Magnesium) Lower part of the crust.
- **NIFE** (Nickel-Iron) Outer part of the core.
- **Rotation of the Earth** Earth spins on its imaginary axis from West to East in one day. Result in causation of day and night, tides.
- **Revolution of the Earth** Earth's motion in elliptical orbit around the Sun in one year. Result in Change of seasons.

Statistics Data of the Earth

Age	4550 million years
Mass	5.976×10^{24} kg
Volume	1.083×10^{12} km ³
Mean Density	5.513 g/cm ³
Total Surface Area	510 million sq km
Land Area	29.2% of the total surface area
Water Area	70.8% of the total surface area
Rotation Speed	23 hr, 56 min and 4.100 sec
Revolution Speed	365 days, 5 hr and 45.51 sec
Dates when days and nights are equal	March 21 (<i>Vernal Equinox</i>); 23rd September, (<i>Autumnal Equinox</i>)
Longest day	21st June, (<i>Summer Solstice</i>) Sun is vertically overhead at Tropic of Cancer
Shortest night	22nd December, (<i>Winter Solstice</i>) Sun is vertically overhead at Tropic of Capricorn
Escape velocity	11.2 km/sec
Mean surface temperature	14°C

Latitudes

Imaginary lines drawn on the Earth's surface parallel to the equator. Equator (0°) is the biggest latitude that divides Earth in two equal hemispheres (North and South).

- | | |
|---------------------|--------|
| Tropic of Cancer | 23.5°N |
| Tropic of Capricorn | 23.5°S |
| Arctic Circle | 66.5°N |
| Antarctic Circle | 66.5°S |
- Each degree of latitude equals 111 km.
 - The most important line of latitude is the Equator.

Longitudes (Meridians)

- Meridians are a series of semicircles that run from pole to pole passing through the equator.
- **Prime Meridian** passes through Greenwich near London, divides the Earth in Eastern and Western hemisphere. Its value is 0°.
- Longitude has very important function *i.e.*, it determines local time in relation to **Greenwich Mean Time** (GMT).
- 1° change of longitude corresponds to 4 minutes difference in time.

International Date Line (IDL)

- It is the longitude where the date changes by exactly one day when it is crossed.
- 180° East and 180° West meridians is the same line, which is called the International Date Line.
- Crossing Date line from West to East — addition of 1 day
Crossing Date line from East to West — subtraction of 1 day
- Recently Samoa island decided to shift itself on west side of IDL.

Indian Standard Time (IST)

- The Earth takes approximately 24 hours to complete one rotation *i.e.*, it takes 24 hours to complete 360° of its rotation.
- Indian Standard Time is calculated on the basis of 82.5°E longitude which passes through Uttar Pradesh, Madhya Pradesh, Odisha, Chhattisgarh and Andhra Pradesh.
- IST is 5 hr 30 min ahead of GMT.

Eclipses

When the light of the Sun or the Moon is blocked by another body, the Sun or the Moon is said to be in eclipse.

- **Solar Eclipse** It is caused, when the Moon revolving around the Earth comes in between the Earth and the Sun, thus making a part or whole of the Sun invisible from a particular part of the Earth. Thus, the eclipse can be partial or complete.
- **Lunar Eclipse** When the Earth comes between the Moon and the Sun, the shadow cast by the Earth on the Moon results in a lunar eclipse.

ROCKS

Rocks are made up of individual substances, called minerals, found mostly in solid state. *Rocks are classified into three major types*

- **Igneous rocks** are formed by the solidification of the molten magma, *e.g.*, Mica, Granite etc.
- **Sedimentary rocks** are formed due to accumulation of rock particles and organic matter in layers, under tremendous pressure, *e.g.*, Gravel, Peat, Gypsum etc.
- **Metamorphic rocks** were originally igneous or sedimentary but later changed due to pressure, heat or action of water, *e.g.*, Gneiss, Marble, Quartzite etc.

Type of Rock	Original Rock	Metamorphic Rock
Igneous	Granite	Gneiss
Igneous	Basalt	Green-stone
Sedimentary	Limestone	Marble
Sedimentary	Coal	Graphite, Coal
Sedimentary	Sandstone	Quartzite
Sedimentary	Shale/Clay	Slate, Mica, Schist

Weathering

The process by which rocks are chemically or physically disintegrated into fragments.

EARTHQUAKES

- Any sudden disturbance below the Earth's surface may produce **vibrations** or shaking in Earth's crust and some of these vibrations, when reach the surface, are known as earthquakes.
- The magnitude of an earthquake is measured by **Richter Scale**.
- The intensity of earthquake waves is recorded by **Seismograph**.
- Intensity of shaking is measured on the modified **Mercalli Scale**.
- **Focus** is the point beneath the Earth where earthquake originates.
- **Epicentre** is the point just above the focus on the Earth's surface.

VOLCANISM

- Sudden eruption of hot magma (molten rock), gases, ash and other material from inside the Earth to its surface.

Types of Volcanoes

- **Active** Which erupts frequently, *e.g.*, Mauna Loa (*Hawaii*), Etna (*Sicily*), Vesuvius (*Italy*), Stromboli (*Mediterranean Sea*).
- **Dormant** Not erupted for quite sometime, *e.g.*, Fujiyama (*Japan*), Krakatoa (*Indonesia*), Barren Island (*India*).
- **Extinct** Not erupted for several centuries. *e.g.*, Arthur's Seat, Edinburgh, Scotland.
- **Ring of Fire** Hundreds of active volcanoes found on the land near the edges of the Pacific Ocean.

Tsunami

Large ocean wave that is caused by sudden motion on the ocean floor. Motion could be an earthquake, volcanic eruption or underwater landslide.

LANDFORMS

There are three major landforms mountains, plateaus and plains.

Mountains

An uplifted portion of the Earth's surface is called a hill or a mountain.

Mountains are classified into following four types

- **Fold Mountains** These are formed by folding of crustal rocks by compressive forces. *e.g.*, Himalayas (*Asia*), Alps (*Europe*).
- **Block Mountains** When great blocks of the Earth's crust are raised or lowered during the last stage of mountain building, block mountains are formed, *e.g.*, Vosges in France, Black Forest mountains in Germany.
- **Volcanic Mountains** These are formed by the matter thrown out from the volcanoes, and are also known as mountains of accumulation, *e.g.*, Mt Mauna Loa in Hawaii, Mt Popa in Myanmar.
- **Residual or Dissected Mountains** They are known as relict mountains or mountains of circum-denudation. They owe their present form to erosion by different agencies, *e.g.* Nilgiris, Girnar and Rajmahal.

Major Mountain Ranges

Range	Location	Length (km)
Andes	South America	7200
Himalayas, Karakoram and Hindukush	South Central Asia	5000
Rockies	North America	4800
Great Dividing Range	East Australia	3600
Atlas	North-West Africa	1930
Western Ghats	Western India	1610
Caucasus	Europe	1200
Alaska	USA	1130
Alps	Europe	1050

Major Mountain Peaks

Mountain Peak	Location
Mt Everest (Highest in the world)	Nepal-Tibet
K2 (Godwin Austin)	India (PoK)
Dhaulagiri	Nepal
Annapurna	Nepal
Gurla Mandhata	Tibet
Tirich Mir	Pakistan
Aconcagua	Argentina
Cotopaxi	Ecuador
Kilimanjaro	Tanzania

Plateaus

Plateaus are flat, table like, upland areas with rough top surface and steep side walls.

Famous Plateaus of the World

Plateau	Situation
Tibetan Plateau	Between Himalayas and Kunlun Mountains
Deccan Plateau	Southern India
Arabian Plateau	South-West Asia
Plateau of Brazil	Central-Eastern South America
Plateau of Mexico	Mexico
Plateau of Columbia	USA
Plateau of Madagascar	Madagascar
Plateau of Alaska	North-West North America
Plateau of Bolivia	Andes Mountains
Great Basin Plateau	South of Columbia Plateau, USA
Colorado Plateau	South of Great Basin Plateau, USA

Plains

A relatively low-lying and flat land surface with least difference between its highest and lowest points is called a Plain.

ATMOSPHERE

- The **vast expanse of air**, which envelops the earth all around is called the atmosphere. It extends to thousands of kilometres.
- It protects the Earth's surface from the Sun's harmful **ultraviolet rays**.

Structure of Earth's Atmosphere

Layer	Height (km)	Feature
Troposphere	0-18 km	Contains 75% of the gases in the atmosphere. As height increases, temperature decreases (about 6.5°C/km ascent).
Stratosphere	18-50 km	This layer contains the ozone layer. The temperature remains fairly constant in the lower part but increases slowly with increase in height due to presence of ozone gas. At upper layer temperature is almost 0°C.
Mesosphere	50-80 km	This is the coldest region of the atmosphere. The temperature drops to about – 100°C.
Ionosphere	80-600 km	Radio waves are bounced off the ions and reflect waves back to the Earth. This generally helps radio communication.
Exosphere	Above 600 km	Upper part of exosphere is called Magnetosphere. The temperature keeps on rising constantly at high rate.

- It also regulates temperature, preventing the Earth from becoming too **hot** or too **cold**.
- The **major constituents of air** in the atmosphere are Nitrogen (78%), Oxygen (21%), Argon (0.93%) and Carbon dioxide (0.03%).
- Besides water vapour, dust particles, smoke, salts and other impurities are present in air in varying quantities.

Greenhouse Effect and Global Warming

- A **greenhouse gas** (sometimes abbreviated GHG) is a gas in the atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect.
- The primary greenhouse gases in the Earth's atmosphere are water vapour, carbon dioxide, methane, nitrous oxide and ozone.
- In the **solar system**, the atmosphere of Venus, Mars and Titan also contain gases that cause greenhouse effects.
- **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.

Pressure System of Earth

- The pressure exerted by the atmosphere due to its weight, above a unit area of the Earth's surface is called **atmospheric pressure**. It is measured by **Mercury Barometer**.
- Major pressure belts of the Earth are equatorial low, sub-tropical high, sub-polar low and polar high.

Winds

Due to horizontal differences in air pressure, air flows from areas of high pressure to areas of low pressure. **Horizontal movement** of the air is called wind.

The types of winds are given below

- **Planetary Winds** The winds blowing throughout the year from one latitude to another in response to latitudinal differences in air pressure are called planetary or prevailing winds.
- Planetary winds are divided into three types they are Trade winds, Westerlies and Polar winds.
 - (i) **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.
 - (ii) **Westerlies** They blow from Sub-tropical High Pressure Belt to the Sub-Polar Low Pressure Belt in the temperate latitudes between 30° and 60°, on the either side of the Equator.
These are also called **Roaring Forties**, the **Furious Fifties** and **Shrieking or Screaming sixties**.
 - (iii) **Polar Winds** They blow from the Polar High Pressure Belt to the Sub-Polar Low Pressure Belt between 60° latitude and the Pole on both sides of the Equator.
- **Periodic Winds** They change their direction periodically with the change in pressure and temperature, e.g., Monsoon, Land and Sea Breeze.
- **Local Winds** Local winds develop as a result of local differences in temperature and pressure. e.g., Fohn, Chinook, Loo.
- **Cyclones** Rapid inward circulation of airmasses with a low pressure at centre. It is anticlockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.
- **Anticyclones** Rapid outward movement of air masses with a high pressure at centre.
- **Hurricane** This is also known as tropical cyclone or tropical storm. This is a disturbance of about 650 km across, spinning around a central area of very low pressure, with (with wind speed above) 140 km/h.

List of Local Winds

Name	Nature of Wind
<i>Chinook</i>	Hot, dry wind in Rockies, also called 'Snow Eater'.
<i>Fohn</i>	Hot, dry wind in the Alps.
<i>Khamsin</i>	Hot, dry wind in Egypt.
<i>Sirocco</i>	Hot, moist wind from Sahara to Mediterranean Sea. It is also known as Blood rain.
<i>Solano</i>	Hot, moist wind from Sahara towards Iberian Peninsula.
<i>Harmattan</i>	Hot, dry wind blowing outwards from the interior of Western Africa. Also called Guinea Doctor.
<i>Bora</i>	Cold, dry wind blowing outwards from Hungary to the North of Italy (near <i>Adriatic Sea</i>).
<i>Mistral</i>	Very cold wind, which blows from the Alps over France.
<i>Punas</i>	Cold, dry wind blowing down towards the Western side of Andes.
<i>Blizzard</i>	Very cold winds in Tundra region.
<i>Purga</i>	Cold wind in Russian Tundra.
<i>Levanter</i>	Cold wind in Spain.
<i>Norwester</i>	Hot wind in New Zealand.
<i>Santa Ana</i>	Hot wind in South California in USA.

Major Rivers of the World

River	Origin
Nile	Victoria lake
Amazon	Andes (<i>Peru</i>)
Yangtze	Tibetan Kiang Plateau
Mississippi Missouri	Itaska Lake (<i>USA</i>)
Yenisei	Tannu-Ola Mountains
Huang Ho	Kunlun Mountains
Ob	Altai Mountains, Russia
Congo	Lualaba and Luapula rivers
Amur	North East China
Lena	Baikal Mountains
Mekong	Tibetan Highlands
Niger	Guinea

Cyclones of the World

Typhoons	China Sea
Tropical Cyclones	Indian Ocean
Hurricanes	Caribbean Sea
Tornadoes	USA
Willy Willies	Northern Australia

Important Canals of the World

Panama	Pacific Ocean with Caribbean Sea
Suez	Mediterranean Sea to Red Sea
Erie	Atlantic Ocean to Great Lakes
Kiel	North Sea to Baltic Sea

Deepest Point of Oceans

Oceans	Deepest Point
<i>Pacific</i>	Mariana Trench
<i>Atlantic</i>	Puerto Rico Trench
<i>Indian</i>	Java Trench
<i>Arctic</i>	Eurasian Basin

Important Straits of the World

Strait	Water Bodies joined	Area
Bab-el-Mandeb	Red Sea and Arabian Sea	Arabia and Africa
Bering	Arctic Ocean and Bering Sea	Alaska and Asia
Bosphorus	Black Sea and Marmara Sea	Turkey
Dover	North Sea and Atlantic Ocean	England and Europe
Florida	Gulf of Mexico and Atlantic Ocean	Florida and Bahamas Islands
Gibraltar	Mediterranean Sea and Atlantic Ocean	Spain and Africa (Morocco)
Malacca	Java Sea and Bay of Bengal	India and Indonesia
Palk	Bay of Bengal and Indian Ocean	India and Sri Lanka
Magellan	South Pacific and South Atlantic Ocean	Chile
Sunda	Java Sea and Indian Ocean	Indonesia

Important Lakes of the World

Lake	Location
Caspian Sea	Asia
Superior	Canada and USA
Victoria	Africa
Huron	Canada and USA
Michigan	USA
Tanganyika	Africa
Baikal	Russia
Great Bear	Canada
Aral	Kazakhstan
Great Slave	Canada

Waterfalls

<i>Waterfall</i>	<i>Location</i>
Angel Falls	Venezuela
Tugela Falls	South Africa
Monge	Norway
Yosemite	United States
Catarata Yumbilla	Peru

Riverside Cities

<i>Town</i>	<i>River</i>
Akyab (Myanmar)	Irrawaddy
Baghdad (Iraq)	Tigris
Basara (Iraq)	Tigris and Euphrates
Belgrade	Danube
Berlin (Germany)	Spree
Bristol (UK)	Avon
Budapest (Hungary)	Danube
Cairo (Egypt)	Nile
Canton	Si-Kiang
Glasgow (Scotland)	Clyde
Hamburg (Germany)	Elbe
Jamshedpur	Subarnarekha
Kabul	Kabul
Karachi	Indus
Khartoum (Sudan)	Nile
Lahore	Ravi
Lisbon (Portugal)	Tangus
London (UK)	Thames
Lucknow	Gomti
Montreal (Canada)	Ottawa
New Castle (UK)	Tyre
New Orleans (USA)	Mississippi
New York (USA)	Hudson
Paris (France)	Seine
Philadelphia (USA)	Delaware
Rome (Italy)	Tiber
Shanghai	Yang-tse-Kiang
Srinagar	Jhelum
Warsaw (Poland)	Vistula
Washington DC	Potomac
Yangon (Myanmar)	Irawady

Great Deserts of the World

<i>Name</i>	<i>Country/Region</i>
Sahara (Libyan, Nubian)	North Africa
Australian (Gibson, Simpson), Victorian Great Sandy)	Australia
Arabian (Rub al Khali, An-Nafud)	Arabia
Dasht-e-Lut (Barren Desert)	Iran
Dasht-e-Kavir (Salt Desert)	Iran
Desierto de Sechura	Peru
Atacama	North Chile
Patagonia	Argentina
Kalahari	Botswana
Namib	Namibia

Major Islands of the World

<i>Rank</i>	<i>Name</i>	<i>Area (km²)</i>	<i>Country/Area</i>
1.	Greenland	2,175,600	Denmark
2.	New Guinea	785,753	Melanesia
3.	Borneo	748,168	Indonesia, Malaysia
4.	Madagascar	587,713	Madagascar
5.	Baffin Island	503,944	Canada
6.	Sumatra	443,066	Indonesia

Minerals of the World

<i>Mineral</i>	<i>Leading Producer</i>
Gold	China
Bauxite	Australia
Copper	Chile
Platinum	South Africa
Chromium	South Africa
Vanadium	China
Antimony	China
Tungsten	China
Phosphate	China
Manganese	China
Diamond	Russia (Botswana, in term of value)
Iron ore	China
Petroleum	USA

Famous Grasslands of the World

Grassland	Country
Steppe	Eurasia
Pustaz	Hungary
Prairie	USA
Pampas	Argentina and Uruguay (South America)
Veld	South Africa
Downs	Australia
Canterbury	New Zealand

Agriculture

Agricultural Produce	Leading Producer
Coffee	Brazil
Rubber	Thailand
Tea	China
Oil Palm	Indonesia
Cocoa	Ghana
Coconut	Indonesia
Date Palm	Egypt
Cotton	China
Wheat	China
Maize	USA
Fruits and Vegetables	China
Wool	Australia
Rice	China
Cloves	Zanzibar

Important International Boundary Lines

Name	In Between
Radcliffe Line (1947)	India and Pakistan (Indo-Pak)
McMahon Line (1914)	India and China (Indo-China)
Durand Line (1893)	Pakistan and Afghanistan
Hindenburg Line	Germany and Poland
Maginot Line	France and Germany
Oder Neisse Line	Germany and Poland
Siegfried Line	Fortification between Germany and France
38th Parallel Line	North and South Korea
49th Parallel Line	USA and Canada
24th Parallel Line	Pakistan claims that it is the boundary between India and Pakistan in Rann of Kachchh
17th Parallel Line	North Vietnam and South Vietnam

Highest and Lowest Points of the Continent

Continent	Highest (m)	Lowest (m)
Asia	Mt Everest (8850)	Dead Sea (-396)
Africa	Mt Kilimanjaro (5895)	Lake Assal (-151)
North America	Mt McKinley (6190)	Death Valley (-87)
South America	Mt Aconcagua (6962)	Valdes Peninsula (-40)
Antarctica	Vinson Massif (4897)	Bentley Subglacial Trench (-2538)
Europe	Mt El' brus (5642)	Caspian Sea (-28)
Australia	Mt Kosciuszko (2228)	Lake Eyre (-16)

Important Industrial Cities

Anshan (China)	Iron and Steel	Los Angeles (USA)	Petroleum
Baku (Azerbaijan)	Petroleum	Lyon (France)	Silk Textiles
Belfast (Ireland)	Ship-building	Magnitogorsk (Russia)	Iron and Steel
Birmingham (UK)	Iron and Steel	Manchester (UK)	Cotton Textile
Chicago (USA)	Meat Packing	Milan (Italy)	Silk Textile
Detroit (USA)	Automobile	Multan (Pakistan)	Pottery
Havana (Cuba)	Cigars	Munich (Germany)	Lenses
Hollywood (USA)	Films	Nagoya (Japan)	Automobiles
Johannesburg (South Africa)	Gold Mining	Philadelphia (USA)	Locomotives
Kansas City (USA)	Meat Packing	Pittsburg (USA)	Iron and Steel
Kawasaki (Japan)	Iron and Steel	Plymouth (USA)	Ship-building
Kimberley (South Africa)	Diamond Mining	Rourkela (India)	Iron and Steel
Krivoi Rog (Ukraine)	Iron and Steel	Sheffield (UK)	Cutlery
Leeds (UK)	Woollen Textiles	Vladivostok (Russia)	Ship-building
Leningard (Russia)	Ship-building	Wellington (New Zealand)	Dairy Products

INDIAN GEOGRAPHY

INDIA

- India is the **seventh largest country** in the world with an area of 3287263 sq km, which is 2.42% of world's area.
- India is the **second most populous** country in the world with a population of 1.21 billion, which is 17.44% of the world.
- Indian subcontinent is located in the Northern and Eastern hemisphere.
- India shares **longest boundary** with Bangladesh (4096 km), followed by China (3488 km), Pakistan (3323 km), Nepal (1751 km), Myanmar (1643 km), Bhutan (699 km) and Afghanistan (106 km).
- In India, the **Tropic of Cancer** (23.5° N latitude) passes through **8 states** (Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, West Bengal, Tripura and Mizoram).
- Islands** Andaman and Nicobar Islands in the Bay of Bengal; Lakshadweep, Amindivi and Minicoy in the Arabian Sea.
- Ocean** India lies midway between the Far East and Middle East. The trans-Indian Ocean routes connecting the industrially developed countries of Europe in the West and the under developed countries of East Asia pass close by Indian subcontinent.
It is surrounded by Arabian Sea in the South-West and Bay of Bengal in the South-East.

Indian States UTs Situated on the Border

Country	Border
Pakistan (4)	Gujarat, Rajasthan, Punjab, Jammu and Kashmir
Afghanistan (1)	Ladakh
China (5)	Ladakh, Uttarakhand, Himachal Pradesh, Sikkim, Arunachal Pradesh
Nepal (5)	Uttar Pradesh, Uttarakhand, Bihar, West Bengal, Sikkim
Bhutan (4)	Sikkim, West Bengal, Assam, Arunachal Pradesh
Bangladesh (5)	West Bengal, Assam, Meghalaya, Tripura, Mizoram

Highest Peaks of India

Highest Peak	Height (in m)	State/UTs
Mt K2	8611	PoK (India)
Kanchenjunga	8598	Sikkim
Nanda Devi	7817	Uttarakhand
Saltoro Kangri	7742	Jammu and Kashmir
Kangto	7090	Arunachal Pradesh
Reo Purgyil	6816	Himachal Pradesh
Saramati	3841	Nagaland
Sandakphu	3636	West Bengal
Khayang	3114	Manipur
Anaimudi	2695	Kerala
Dodda Betta	2636	Tamil Nadu

Important Facts

<i>Latitudinal extent</i>	8°4' North to 37° 6' North
<i>Longitudinal extent</i>	68°7' East to 97° 25' East
<i>North-South extent</i>	3214 km
<i>East-West extent</i>	2933 km
<i>Land Frontiers</i>	15200 km
<i>Total Coastline</i>	7516.6 km
<i>Number of States</i>	28
<i>Union Territories</i>	8 (After bifurcation of J & K in Jammu and Kashmir and Ladakh and merger of Dadar and Nagar Haveli with Daman and Diu)
<i>Land Neighbours</i>	Pakistan, Afghanistan, China, Nepal, Bhutan, Bangladesh and Myanmar
<i>Longest Coastline</i>	Gujarat
<i>Active volcano</i>	Barren Island in Andaman and Nicobar Islands
<i>Southern most point</i>	Indira Point or Pygmalion point in Great Nicobar
<i>Southern most tip</i>	Kanyakumari
<i>Northern most point</i>	Indira Col
<i>Western most point</i>	West of Ghaur Mota in Gujarat
<i>Eastern most point</i>	Kibithu (Arunachal Pradesh)

Bhangar and Khadar

<i>Bhangar</i>	<i>Khadar</i>
<ul style="list-style-type: none"> These are low plains. Formed of older alluvium 	<ul style="list-style-type: none"> The deposit of fresh alluvium every year brought by the Himalayas rivers makes this belt of Northern plains.
<ul style="list-style-type: none"> This belt ends in Khadar. 	<ul style="list-style-type: none"> This belt ends in Terai.

Terai and Bhabar

<i>Terai</i>	<i>Bhabar</i>
<ul style="list-style-type: none"> Terai is a broad long zone South of Bhabar plain. 	<ul style="list-style-type: none"> Bhabar is a long narrow plain along the foothills.
<ul style="list-style-type: none"> It is a marshy damp area covered with thick forest. 	<ul style="list-style-type: none"> It is a pebble studded zone of porous beds.
<ul style="list-style-type: none"> It is 20-30 km wide. 	<ul style="list-style-type: none"> It is 9-16 km wide.
<ul style="list-style-type: none"> It is suitable for agriculture. 	<ul style="list-style-type: none"> It is unsuitable for agriculture.

South to North Doabs

<i>Doab</i>	<i>Region</i>
<ul style="list-style-type: none"> Bist Doab 	<ul style="list-style-type: none"> Between Beas and Sutlej
<ul style="list-style-type: none"> Bari Doab 	<ul style="list-style-type: none"> Between Beas and Ravi
<ul style="list-style-type: none"> Rechna Doab 	<ul style="list-style-type: none"> Between Ravi and Chenab
<ul style="list-style-type: none"> Chaj Doab 	<ul style="list-style-type: none"> Between Chenab and Jhelum
<ul style="list-style-type: none"> Sind Sagar Doab 	<ul style="list-style-type: none"> Between Jhelum and Indus

The Coastal Plains

<i>Eastern Coast</i>	<i>Western Coast</i>
Smooth outline	Dissected outline
Occurrence of deltas	Occurrence of estuaries
Broad	Narrow
Long rivers	Small rivers

Eastern and Western Ghats

<i>Eastern Ghat</i>	<i>Western Ghat</i>
Located East to Deccan Plateau.	Located West to Deccan Plateau.
They are parallel to Eastern Coast, i.e., Coromandal, Northern Circar, etc.	They are parallel to Western Coast, i.e., Konkan, Kannad, Malabar etc.
Mahanadi, Cauveri, Godavari, Krishna etc rivers are drawn in this land form.	Narmada, Tapi, Sabarmati and Mahi etc rivers are drawn in this land.
Jindhagada with an altitude of 1690 m is the highest peak.	Anaimudi with an altitude of 2695 m is the highest peak.

Important Indian Towns on Rivers

<i>Town</i>	<i>River</i>
<i>Jamshedpur</i>	Subarnarekha
<i>Delhi</i>	Yamuna
<i>Kanpur</i>	Ganga
<i>Surat</i>	Tapti
<i>Ferozpur</i>	Sutlej
<i>Prayagraj</i>	At the confluence of the Ganga and Yamuna
<i>Varanasi</i>	Ganga
<i>Haridwar</i>	Ganga
<i>Badrinath</i>	Alaknanda
<i>Ludhiana</i>	Sutlej
<i>Srinagar</i>	Jhelum
<i>Ayodhya</i>	Saryu
<i>Ahmedabad</i>	Sabarmati
<i>Patna</i>	Ganga
<i>Kota</i>	Chambal
<i>Jabalpur</i>	Narmada
<i>Panji</i>	Mandavi
<i>Ujjain</i>	Kshipra
<i>Guwahati</i>	Brahmaputra
<i>Kolkata</i>	Hooghly
<i>Cuttack</i>	Mahanadi
<i>Hyderabad</i>	Musi
<i>Nasik</i>	Godavari
<i>Lucknow</i>	Gomti

Some of the Important Waterfalls of India

<i>Waterfall</i>	<i>Height (km)</i>	<i>River</i>	<i>State</i>
Kunchikal	455	Varahi	Karnataka
Jog/Gersoppa	260	Sharavati	Karnataka
Rakim Kund	168	Gaighat	Bihar
Chachai	127	Bihad	Madhya Pradesh
Kevti	98	Mahana	Madhya Pradesh
Sivasamudram	90	Cauveri	Karnataka

Important Lakes of India

<i>Name of Lake</i>	<i>State/UTs</i>	<i>Important Fact</i>
<i>Chilka Lake</i>	Odisha	It is largest brackish water lake of India.
<i>Kolleru Lake</i>	Andhra Pradesh	It is a freshwater lake.
<i>Loktak Lake</i>	Manipur	It is a freshwater lake having inland drainage in Manipur.
<i>Lonar Lake</i>	Maharashtra	It is a meteorite crater lake in Buldhana area of Maharashtra. The water is highly charged with Sodium carbonates and Sodium chloride.
<i>Pangong Lake</i>	Jammu and Kashmir	It is a salty lake.
<i>Pulicat Lake</i>	Tamil Nadu & Andhra Pradesh border	It is a saline and lagoon lake.
<i>Sambhar Lake</i>	Rajasthan	It is a shallow lake which is saline, located near Jaipur.
<i>Tso Moriri Lake</i>	Jammu & Kashmir	It is a salty lake.
<i>Vembanad Lake</i>	Kerala	It is a lagoon lake and largest lake by surface area.
<i>Wular & Dal Lakes</i>	Jammu and Kashmir	Wular lake was created due to tectonic activities and is largest fresh water lake of India.

Important Rivers of India

<i>Name</i>	<i>Originates from</i>	<i>Falls into</i>
<i>Ganges</i>	Gangotri Glacier	Bay of Bengal
<i>Sutlej</i>	Mansarovar Rakas Lakes	Chenab
<i>Indus</i>	Near Mansarovar Lake	Arabian Sea
<i>Ravi</i>	Kullu Hills near Rohtang Pass	Chenab
<i>Beas</i>	Near Rohtang Pass	Sutlej
<i>Jhelum</i>	Verinag in Kashmir	Chenab
<i>Yamuna</i>	Yamunotri	Ganga
<i>Chambal</i>	Singar Chouri Peak, Vindhyan escarpment	Yamuna
<i>Ghaghara</i>	Matsatung Glacier	Ganga
<i>Kosi</i>	Near Gosain Dham Peak	Ganga
<i>Betwa</i>	Vindhyanchal	Yamuna
<i>Son</i>	Amarkantak	Ganga
<i>Brahmaputra</i>	Near Mansarovar Lake	Bay of Bengal
<i>Narmada</i>	Amarkantak	Gulf of Khambat
<i>Tapti</i>	Betul District in Madhya Pradesh	Gulf of Khambat
<i>Mahanadi</i>	Raipur District in Chhattisgarh	Bay of Bengal
<i>Luni</i>	Aravallis	Rann of Kachchh
<i>Ghaggar</i>	Himalayas	Near Fatehabad
<i>Sabarmati</i>	Mewar hill, Aravallis	Gulf of Khambat
<i>Krishna</i>	Western Ghats	Bay of Bengal
<i>Godavari</i>	Nasik district in Maharashtra	Bay of Bengal
<i>Cauveri</i>	Brahmagir Range of Western Ghats	Bay of Bengal
<i>Tungabhadra</i>	Western Ghats	Krishna

Important River Projects and their Beneficiary States

<i>Project</i>	<i>River</i>	<i>Purpose</i>	<i>Beneficiary States</i>
<i>Bhakra Nangal Project</i>	Sutlej	Power and irrigation	Punjab, Himachal Pradesh, Haryana and Rajasthan
<i>Damodar Valley</i>	Damodar	Power, irrigation and flood control	Jharkhand and West Bengal, shared by Madhya Pradesh
<i>Hirakud</i>	Mahanadi	Power and irrigation	Odisha
<i>Tungabhadra Project</i>	Tungabhadra	Power and irrigation	Andhra Pradesh and Karnataka
<i>Nagarjunasagar Project</i>	Krishna	Power and irrigation	Andhra Pradesh and Telangana
<i>Gandak River Project</i>	Gandak	Power and irrigation	Bihar, Uttar Pradesh, Nepal (joint venture of India and Nepal)
<i>Kosi Project</i>	Kosi	Flood control, Power and irrigation	Bihar
<i>Farakka Project</i>	Ganga, Bhagirathi	Power, irrigation, avoid accumulation of silt to improve navigation	West Bengal
<i>Beas Project</i>	Beas	Irrigation and power	Rajasthan, Haryana, Punjab and Himachal Pradesh
<i>Indira Gandhi Canal Project (Rajasthan Canal Project)</i>	Sutlej, Beas and Ravi	Irrigation	Rajasthan, Punjab and Haryana
<i>Chambal Project</i>	Chambal	Power and irrigation	Madhya Pradesh and Rajasthan
<i>Kakrapar Project</i>	Tapti	Irrigation	Gujarat
<i>Ukai Project</i>	Tapti	Power and irrigation	Gujarat
<i>Tawa Project</i>	Tawa (Narmada)	Irrigation	Madhya Pradesh
<i>Poochampad Project</i>	Godavari	Irrigation	Telangana
<i>Malaprabha Project</i>	Malaprabha	Irrigation	Karnataka
<i>Durgapur Barrage</i>	Damodar	Irrigation and navigation	West Bengal and Jharkhand
<i>Mahanadi Delta Project</i>	Mahanadi	Irrigation	Odisha
<i>Iddukki Project</i>	Periyar	Hydroelectricity	Kerala
<i>Koyna Project</i>	Koyna	Hydroelectricity	Maharashtra
<i>Ramganga Multipurpose Project</i>	Chisot stream near Kala	Power and irrigation	Uttar Pradesh and Uttarakhand
<i>Matatila Project</i>	Betwa	Multipurpose power and irrigation	Uttar Pradesh and Madhya Pradesh
<i>Tehri Dam Project</i>	Bhilangana, Bhagirathi	Hydroelectricity	Uttarakhand
<i>Rihand Scheme</i>	Rihand	Hydroelectricity	Uttar Pradesh
<i>Kundah Project</i>	Kundah/Bhavani	Hydroelectricity and irrigation	Tamil Nadu

Natural Vegetation of India

<i>Name</i>	<i>Climatic Requirement</i>	<i>Feature</i>	<i>Important Species</i>	<i>Found in Area</i>
<i>Tropical Wet Evergreen</i>	Rainfall > 250 cm Temperature 25-27°C Humidity 80% or more	Dense forest, tall trees	Mesa, Dhup, White cedar, Jamun, Bamboo, Agar and Hopea	Noth-East India, Western slopes of Western Ghats, Andaman and Nicobar Islands
<i>Tropical Semi-Evergreen</i>	Rainfall > 200-250 cm, Temperature 24-27°C Humidity 80%	Evergreen mixed with deciduous, Height 24-36 m	Semul, Rosewood, Indian Chestnut, Kusum, Mesua	Lower slopes of Eastern Himalayas, Odisha Coast
<i>Tropical Dry Evergreen</i>	Areas receive rain from North-East Monsoon, Temperature 28°C, Humidity 74%	Presence of canopy, low height, about 9-12 m	Khirmi, Jamun, Tamarind, Neem, Cane	Coromandal Coast of Tamil Nadu
<i>Tropical Moist Deciduous</i>	Moderate rainfall of 150-200 cm, Temperature 26-27°C, Humidity 60-80%	Trees shed their leaves in the dry season	Sal, Teak, Sandalwood, Ebony, Mahua, Shisham	Western Ghats, Eastern coastal plains, Eastern Plateau
<i>Tropical Dry Deciduous</i>	Rainfall < 150 cm, Dry season	Undergrowth is shrubby and grassy, trees shed their leaves in the dry season	Sal, Teak, Khair, Palash, Tendu, Laurel	Uttar Pradesh, Tamil Nadu, Western Ghats, Rajasthan and West Bengal
<i>Tropical Thorny</i>	Rainfall 50-70 cm, Temperature 25-27°C, Humidity < 47%	Trees are stunted (6-9 m), trees have long roots, sharp spines and glossy leaves to conserve water	Babul, Acacia, Khair, Khejri	South-Western Punjab, Western Haryana and Uttar Pradesh, Western Madhya Pradesh, Kachchh and Saurashtra, Rajasthan
<i>Tidal/Littoral Mangrove</i>	Rainfall > 200 cm, high water salinity and areas are flooded regularly	Trees are evergreen, breathing roots called pneumatophores	Keora, Amur, Sundari, Agar, Bhendli, Nipa	Delta regions of Ganga, Mahanadi, Godavari and Krishna

Soils in India

<i>Types</i>	<i>States where Found (Occurrence)</i>	<i>Composition</i>	<i>Crops Grow</i>
<i>Alluvial</i>	Punjab, Haryana, Uttar Pradesh, Bihar and Jharkhand	Rich in potash and lime but deficient in nitrogen and phosphorus.	Large variety of rabi and kharif crops such as wheat, rice, sugarcane, cotton and jute etc.
<i>Black soil (Regur soil)</i>	Deccan Plateau, Valleys of Krishna and Godavari, Andhra Pradesh, Madhya Pradesh and Tamil Nadu.	Rich in iron, lime, aluminium, magnesium, calcium, but lacks in nitrogen, phosphorus and humus.	Cotton sugarcane, jowar, tobacco, wheat and rice.
<i>Red</i>	Eastern parts of Deccan Plateau, Tamil Nadu, Goa, Odisha and Meghalaya.	Rich in iron and potash, but deficient in lime, nitrogen, phosphorus and humus.	Wheat, rice, cotton, sugarcane and pulses.
<i>Laterite</i>	Summits of Eastern and Western Ghats, Assam hills, Andhra Pradesh, Karnataka, West Bengal and Odisha.	Rich in iron but poor in silica, lime, phosphorus, potash and humus.	Tea, coffee, rubber, cashew and millets.
<i>Desert</i>	West and North-West India, Rajasthan, North Gujarat and Southern Punjab.	Rich in soluble salts, but deficient in organic matter.	Generally unsuitable for cultivation, but with irrigation useful for cultivation of drought-resistant lime, millets, barley, cotton, maize and pulses.
<i>Mountain</i>	Hills of Jammu and Kashmir, Uttarakhand and Assam hills.	Rich in iron and humus, but deficient in lime.	with fertilisers, tea, fruits and medicinal plants can be grown.
<i>Saline (Reh, Kallar, Usar, Thur, Rukar) and Alkaline</i>	Drier parts of Bihar, Jharkhand, Uttar Pradesh, Haryana, Punjab, Rajasthan and Maharashtra.	Many salts such as sodium, magnesium and calcium.	Unfit for agriculture.
<i>Peaty and Marshy</i>	Kerala, coastal regions of Odisha, Tamil Nadu and Sunderbans of West Bengal.	Contain large amount of soluble salts and organic matter, but lack in potash and phosphates.	Useful for rice and jute cultivation.

Forests of India

Forest Type	Distribution	Climatic Conditions	Characteristics	Species
<i>Tropical Evergreen Forests</i>	<ul style="list-style-type: none"> ▪ Rainy slopes of Western Ghats. ▪ NE India except Arunachal Pradesh. ▪ Eastern part of West Bengal and Odisha. ▪ Andaman and Nicobar Islands. 	<ul style="list-style-type: none"> ▪ Rainfall > 200 cm ▪ Relative Humidity > 70% ▪ Average temperature is about 24°C. ▪ Hot and humid climate. 	<ul style="list-style-type: none"> ▪ Height of trees is 40 to 60 m. ▪ Leaves are dark green and broad. 	<ul style="list-style-type: none"> ▪ Mahogany, Mahua, Bamboo, Cones, Ironwood, Kadam, Iru, Jamun, Hopea, Rubber tree, Toon, Telsur etc.
<i>Tropical Moist Deciduous Forests</i>	<ul style="list-style-type: none"> ▪ Eastern parts of Sahyadris (Western Ghats). ▪ North Eastern part of Peninsula. ▪ Middle and lower Ganga valley. ▪ Foothills of Himalayas in Bhabar and Tarai region. ▪ These cover about 20% India's forest area. 	<ul style="list-style-type: none"> ▪ 100 to 200 cm rainfall per annum. ▪ Moderate temperature. 	<ul style="list-style-type: none"> ▪ 30 to 40 m high trees. ▪ Due to deficiency of water, they shed their leaves in spring (onset of summer). 	<ul style="list-style-type: none"> ▪ Sal, Teak, Arjun, Mulberry, Kusum, Sandalwood, Siris, Haldi, Khair, Mango, Banyan tree etc.
<i>Tropical Dry Deciduous Forests</i>	<ul style="list-style-type: none"> ▪ Large parts of Maharashtra and Andhra Pradesh. ▪ Parts of Punjab, Haryana and Eastern parts of Rajasthan. ▪ Northern and Western parts of Madhya Pradesh. ▪ Tamil Nadu. ▪ Southern parts of Uttar Pradesh. 	<ul style="list-style-type: none"> ▪ 50 to 100 cm rainfall. ▪ Moderate humidity. 	<ul style="list-style-type: none"> ▪ 6 to 15 m high. ▪ Roots are thick and long. 	<ul style="list-style-type: none"> ▪ Teak, Sal, Bamboo, Mango, Acacia, Neem, Shisham etc.
<i>Dry Forests or Arid Forests</i>	<ul style="list-style-type: none"> ▪ Rajasthan and adjoining areas of Haryana, Gujarat and Punjab. ▪ Rainshadow area of peninsular India. 	<ul style="list-style-type: none"> ▪ Low rainfall (less than 50 cm per annum). ▪ Relative humidity is less. 	<ul style="list-style-type: none"> ▪ Thorny vegetation. ▪ Roots are very long. ▪ Leaves are small. 	<ul style="list-style-type: none"> ▪ Cactus, Thorny bushes, Kikar, Babool, Date palm, Acacia, Khair, Euphorbias etc.

CLIMATE

Monsoon

A type of wind system, in which there is almost complete reversal of prevailing wind direction.

Types

1. South West Monsoon (*June and July*)
2. North East Monsoon (*Sept. to Dec.*)

Climatic Regions of India

Type	Area	Characteristic
<i>Tropical Rain Forests</i>	Western Ghats, West Coastal Plains, Parts of Assam	High temperature throughout the year, heavy seasonal rainfall, annual rainfall 200 cm annually (May to November)
<i>Tropical Savana Climate</i>	Most of Peninsular region (except leeward side of Western Ghats)	Dry winters, annual rainfall varies from 76 cm to 150 cm.
<i>Tropical Semi-Arid- Steppe Climate</i>	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.
<i>Tropical and Sub-tropical Steppes</i>	Punjab, Haryana and Kachchh region	Temperature varies from 12°-35°C.
<i>Tropical Desert</i>	Western parts of Barmer, Jaisalmer and Bikaner districts of Rajasthan and parts of Kachchh	Scanty rainfall (mostly in form of cloud burst), high temperature.
<i>Humid Sub-tropical Climate with dry winters</i>	South of Himalayas	Mild winters and extremely hot summers.
<i>Mountain Climate</i>	Mountainous region (above 6000 m or more)	Rainfall varies from 63.5 cm to 254 cm. (Mostly during South-West Monsoon)

Seasons of India

- Winter Season Mid December to Mid March
- Summer Season Mid March to May
- Rainy Season June to September
- Season of Retreating Monsoon October to Mid December

AGRICULTURE

India is essentially an agricultural land. Two-thirds of its population still lives on agriculture. It includes farming, animal rearing and fishing.

Agricultural Seasons in India

There are three major 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, sesame.

Zaid

Sown in February/March harvested in May/June, e.g., urad, moong, melons etc.

Green Revolution

It is the phrase generally used to describe the spectacular increase that took place during 1968 and is continuing in the production of foodgrains in India.

The components of Green Revolution are

High Yield Variety Seeds, Irrigation, Use of Fertilisers, Use of Insecticide and Pesticide, Command Area Development, Programme Consolidation of Holdings etc.

Chief Crops and Producing States

Type	Name	Major Producers
Cereals	Wheat	Uttar Pradesh, Punjab and Madhya Pradesh
	Rice	West Bengal and Uttar Pradesh
	Gram	Madhya Pradesh, Maharashtra and Rajasthan
	Barley	Maharashtra, Uttar Pradesh and Rajasthan
	Bajra	Rajasthan, Maharashtra and Gujarat
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	Gujarat, West Bengal and Karnataka
Fibre Crops	Sunflower	Karnataka, Andhra Pradesh and Maharashtra
	Cotton	Maharashtra and Gujarat
	Jute	West Bengal and Bihar
	Silk	Karnataka and Kerala
	Hemp	Madhya Pradesh and Uttar Pradesh
Plantations	Coffee	Karnataka and Kerala
	Rubber	Kerala and Karnataka
	Tea	Assam and Kerala
	Tobacco	Gujarat, Maharashtra and Madhya Pradesh
Spices	Pepper	Kerala, Karnataka and Tamil Nadu
	Cashewnuts	Kerala, Tamil Nadu and Andhra Pradesh
	Ginger	Kerala and Uttar Pradesh
	Turmeric	Andhra Pradesh and Odisha

MINERAL RESOURCES

Types of Minerals

Metallic Iron ore, copper, aluminium, tin, lead, gold and silver.

Non-metallic Coal, mica, manganese, petroleum and sulphur.

Radioactive Uranium and thorium

Gondwana rocks (Chhotanagpur Plateau) are the richest mineral deposits in India.

Mineral Resources of India

Mineral	States
Coal	West Bengal, Jharkhand, Odisha, Madhya Pradesh and Chhattisgarh
Copper	Madhya Pradesh, Rajasthan, Jharkhand, Karnataka
Gold	Karnataka, Andhra Pradesh
Iron	Karnataka, Chhattisgarh and Jharkhand
Bauxite	Odisha, Jharkhand, Gujarat and Madhya Pradesh
Mica	Jharkhand, Andhra Pradesh and Rajasthan
Petroleum	Assam, Gujarat, Mumbai High, Bassein (South of Mumbai High)
Uranium	Jharkhand, Rajasthan, Andhra Pradesh and Karnataka
Thorium	Kerala Coast, Rocks of Aravalli in Rajasthan
Silver, Zinc and Lead	Rajasthan, Andhra Pradesh, Karnataka (Kolar mines)
Diamond	Panna (Madhya Pradesh), Banda (Uttar Pradesh)

TRANSPORTATION IN INDIA

Railways

- Indian Railway system is the second largest in Asia and the fourth largest in the world.
- The longest railway platform in India is now **Gorakhpur** with a stretch of around **1.3 km**.

Railway Zone	Headquarters
Central	Mumbai (CST)
Eastern	Kolkata
Northern	New Delhi
North-Eastern	Gorakhpur
North-East Frontier	Maligaon-Guwahati
Southern	Chennai
South Central	Secunderabad
South-Eastern	Kolkata
Western	Mumbai Churchgate
East Coast	Bhubaneswar
East Central	Hajipur
North Central	Prayagraj
North-Western	Jaipur
South-Western	Hubli
West Central	Jabalpur
South-East Central	Bilaspur
Kolkata Metro	Kolkata
South Coast Railway	Visakhapatnam

- The first train** ran in India between Bombay and Thane, a stretch of 34 km on 16th April, 1853.
- The second train** ran between Howrah and Hooghly in 1854.
- The first electric train in India was **Deccan Queen**. It was introduced in 1929 between Bombay and Poona.
- The longest train** route is 'Vivek Express' from Dibrugarh in Assam to Kanyakumari in Tamil Nadu. It covers a distance of 4273 km (2655 miles).
- The first Metro train was introduced in Kolkata (West Bengal) on **24th October, 1984**. The two stations connected were Dumdum and Belgachhia.
- In 1990, Konkan Railway has been started between Goa, Maharashtra and Karnataka.
- Delhi metro rail was started in 2002 on 25th December between Shahdara and Tees Hazari.
- Rapid metro train has been started in Gurgaon (Haryana) on 14th November 2013.

- The newest metro opened is Nagpur Metro on March 8, 2019.
- Vande Bharat Express also known as Train 18, is an Indian semi-high speed electric (India's fastest train) train made by Integral Coach Factory, Chennai, under make in India Programme.
- Delhi-Meerut Regional Rapid Transit System (RRTS) is an 82.15 km long, under-construction, semi-high speed rail corridor connecting Delhi, Ghaziabad and Meerut.
- The Lucknow-New Delhi Tejas Express is the first Indian train operated by private operators, IRCTC, a subsidiary of Indian Railway.
- As of January, 2021 there are 13 operational rapid transit (Metro rail) in India. Delhi Metro is the largest and busiest metro in India.
- The Indian Railways operate in three different gauges i.e. Broad Gauge (distance between rails is 1.676 m), Metre Gauge (distance between rail is 1.00 mm) and Narrow Gauge (distance between rails is 0.762 or 0.610 m).

Road Transport

- India has one of the largest road networks in the world (48 lakh km approx). It consists of National highways, State highways; major/other district roads and rural roads.
- NH 44** (3745 km) is the longest highway of India (Srinagar to Kanyakumari).
- NH 548** is the shortest National Highways with the length of 5 km.
- The **North-South** and **East-West Corridor** (NS-EW) is the largest ongoing expressway project in India. It is the **second phase** of the National Highways Development Project (NHDP) and involves building **7300 km** of six lane expressway connecting Srinagar, Kanyakumari, Porbandar and Silchar.
- Maharashtra** has the maximum length of surfaced roads in India.
- Eastern Peripheral Expressway or Kundli-Ghaziabad-Palwal Expressway is a 6-lane expressway passing through the states of Haryana and Uttar Pradesh.
- India's longest greenfield 6 lane expressway, named as Agra-Lucknow expressway has been inaugurated in Uttar Pradesh.

Bharat Mala

It is a major highway, economic corridor and expressway development scheme of Government in India, launched in 2015, it is the biggest road Construction Plan in the country (approximately 83,677 km). Government of India has decided to construct a greenfield major port at Vadhaven in Gujarat under Sugarmala Project.

Important National Highways
(New numbering)**NH Connects**

NH 1	Uri-Baramula-Srinagar-Kargil-Leh
NH 4	Mayabandar-Port Blair-Chiriyatapu
NH 7	Fazilka-Patiala-Rudraprayag-Mana
NH 10	Siliguri-Gangtok
NH 21	Jaipur-Agra-Bareilly
NH 32	Chennai-Puducherry-Nagapatinam
NH 40	Kurnool-Chittoor-Ranipet
NH 44	Srinagar-Ludhiana-Agra-Sagar-Hyderabad-Kanyakumari

Water Transport

As per the National Waterways Act, 2016, 111 Waterways have been declared as National Waterways including the five existing NWs given below:

NW1	Allahabad to Haldia on Ganga river	1620 km
NW2	Sadia to Dhubri on Brahmaputra river	891 km
NW3	Kollam to Kottapuram (along Champakara and Udyogmandal Canal)	168 km
NW4	Kakinada to Marak-kanam along Godavari and Krishna river	1095 km
NW5	Mangalgarhi to Paradeep and Talcher to Dhamara along Mahanadi and Brahmini	623 km
NW6	Lakhipur to Bhanga on Barak river	121 km

13 Major Ports in India

Western Coast	Eastern Coast
Kandla (<i>child of partition</i>) Gujarat	Paradip (<i>exports raw iron to Japan</i>) Odisha
Mumbai (<i>busiest and biggest</i>) Maharashtra	Vishakhapatnam (<i>deepest port</i>) Andhra Pradesh
JL Nehru (<i>fastest growing</i>) Maharashtra	Chennai (<i>oldest and artificial</i>) Tamil Nadu
Marmugao (<i>naval base also</i>) Goa	Ennore (<i>most modern in private hands</i>) Tamil Nadu

Mangalore (<i>exports Kudremukh iron-ore</i>) Karnataka	Tuticorin (<i>Southernmost</i>) Tamil Nadu
Cochin (<i>natural harbour</i>) Kerala	Port Blair (<i>strategically important</i>) Andaman and Nicobar Islands
	Enayam Port (Tamil Nadu)

Note Kandla port was renamed as Pt. Deen Dayal Upadhyay port in 2017.

Air Transport

- In 1935, the 'Tata Air Lines' started its operation between Mumbai and Thiruvananthapuram and in 1937 between Mumbai and Delhi.
- In 1953, all the private airline companies were nationalised and Indian Airlines and Air India came into existence.
- Vayudoot Limited started in 1981 as a private air carrier and later on it merged with Indian Airlines.
- International Airports Authority of India and National Airports Authority were merged on 1995 to form Airports Authority of India.
- The Authority manages the Civil Aviation Training College at Allahabad and National Institute of Aviation Management and Research at Delhi.

Major international airports in India

International Airports	City
Rajiv Gandhi International Airport	Hyderabad
Calicut International Airport	Calicut
Chhatrapati Shivaji International Airport	Mumbai
Kempe Gowda International Airport	Bengaluru
Goa Airport in Vasco di Gama City	Goa
Netaji Subhash Chandra Bose International Airport	Kolkata
Thiruvananthapuram International Airport	Thiruvananthapuram
Lokpriya Gopinath Bordoloi International Airport	Guwahati
Sardar Vallabhbhai Patel International Airport	Ahmedabad
Indira Gandhi International Airport	Delhi
Chennai International Airport	Chennai
Shri Guru Ram Dass Jee International Airport	Amritsar
Pakyong Airport (First green field airport in Northeast region)	Sikkim



ENVIRONMENT AND ECOLOGY

Environment All external conditions, factors, matter and energy living and non-living that affect any living organism or other specified system.

Ecology Biological science that studies the relationships between living organisms and their environment; study of the structure and functions of nature.

Ecosystem It is defined as a unit which include all the organisms (biological components) in a given area interacting with the environment (physical component), so that the flow energy leads to a clearly defined trophic structure, biotic diversity and material cycles.

Biome Terrestrial regions characterised by certain types of vegetation and other forms of life. Examples include various types of deserts, grasslands and forests.

Wetland Land that is covered all part of the time with saltwater or freshwater, excluding streams, lakes and the open ocean.

Biodiversity Variety of different species (species diversity), genetic variability among individuals within each species (genetic diversity), variety of ecosystems (ecological diversity) and functions such as energy flow and matter cycling needed for the survival of species and biological communities (functional diversity).

Biosphere Zone of the Earth where life is found. It consists of parts of the atmosphere (the troposphere), hydrosphere (mostly surface water and groundwater) and lithosphere (mostly soil and surface rocks and sediments on the bottoms of oceans and other bodies of water) where life is found.

Wildlife All free, undomesticated species. Sometimes the term is used to describe animals only.

Threatened Species Wild species that is still abundant in its natural range but is likely to become endangered because of a decline in numbers.

Ozone (O_3) Colourless and highly reactive gas and a major component of photochemical smog. Also found in the ozone layer in the stratosphere and protect us from ultra violet rays.

Smog Originally, a combination of smoke and fog but now used to describe other mixtures of pollutants in the atmosphere.

Acid Rain When fossil fuel is burnt, oxides are formed in the atmosphere. The oxides formed of sulphur and nitrogen get dissolve in water and cause acid rain.

Global Warming Warming of the Earth's lower atmosphere (troposphere) because of increases in the concentrations of one or more greenhouse gases. It can result in irreversible climate change that can last for decades to thousands of years.

Ecomarks The Ministry of Environment Forest and Climate change, Government of India instituted a scheme, that is operating on a national basis and provides accreditation and labelling for household and other consumer products which meet certain environmental criteria.

Coral Bleaching Coral bleaching occurs when the relations between the coral host and zooxanthallae, which give coral much of their colour, breaks down. Without the zooxanthallae, the tissue of the coral animal appears transparent and the coral's bright white skelton is revealed.

Sustainability Ability of Earth's various systems, including human cultural systems and economies, to survive and adapt to changing environmental conditions indefinitely.

Important Sanctuaries and National Parks

<i>Name</i>	<i>Location</i>	<i>Reserve For</i>
Kaziranga National Park	Assam	One-horned rhinoceros, gaur, elephant, leopard and wild buffalo
Sonai Rupai Wildlife Sanctuary	Assam	Elephant, sambhar, wild boar and one-horned rhinoceros
Namdapha National Park	Arunachal Pradesh	Elephant, panther, sambhar, tiger, cheetal and king cobra
Gautam Buddha Sanctuary	Bihar	Tiger, leopard, sambhar, cheetal and barking deer (Indian Muntjac)
Achanakmar Sanctuary	Chhattisgarh	Tiger, boar, cheetal, sambhar and bison
Velvadore National Park	Gujarat	Wolf and black buck
Wild Ass Sanctuary	Gujarat	Wild ass, wolf, nilgai and chinkara
Gir Forest	Gujarat	India's biggest wildlife sanctuary famous for Gir lions
Dachigam National Park	Jammu and Kashmir	Kashmiri stag, Long tailed marmot, Himalayan serow
Banerghatta National Park	Karnataka	Elephant, cheetal, deer and grey partridge and green pigeon
Bhadra Sanctuary	Karnataka	Elephant, cheetal, panther, sambhar and wild boar
Bandipur National Park Dandeli Sanctuary	Karnataka and Tamil Nadu	Elephant, tiger, panther, sambhar, deer and birds
Tungabhadra Sanctuary	Karnataka	Tiger, panther, elephant, cheetal, sambhar and wild boar
Nagarhole National Park	Karnataka	Panther, cheetal, sloth bear and four-horned antelope
Pachmarhi Sanctuary	Madhya Pradesh	Tiger, leopard, wild bear, cheetal, sambhar, resus macaque
Gandhi Sagar Sanctuary	Madhya Pradesh	Tiger, panther, boar, sambar, nilgai and barking deer
Bandhavgarh National Park	Madhya Pradesh	Cheetal, sambhar, chinkara and wild birds
Simlipal Sanctuary	Odisha	Tiger, panther, cheetal, nilgai and wild boar
Ghana Bird Sanctuary	Rajasthan	Water birds, black buck, cheetal and sambar
Khangchendzonga National Park	Sikkim	Snow leopard, musk deer and Himalayan boar
Vedanthangal Bird Sanctuary	Tamil Nadu	Important bird sanctuary
Chandraprabha Sanctuary	Uttar Pradesh	Gir lions, cheetal and sambhar
Dudhwa National Park	Uttar Pradesh	Tiger, panther, sambar, cheetal, nilgai and barking deer
Corbett National Park	Uttarakhand	Tiger, leopard, elephant and sambhar (named in memory of Jim Corbett)
Jaldapara Sanctuary	West Bengal	Rhinoceros, Elephant
Sunderban Tiger Reserve	West Bengal	Tiger, deer, wild boar, crocodile and Gangetic dolphin

Biosphere Reserves of India

<i>Name</i>	<i>States</i>	<i>Type</i>	<i>Area (km²)</i>
Manas	Assam	East Himalayas	2837
Dibru-Saikhowa	Assam	East Himalayas	765
Seshchalam Hills	Andhra Pradesh	Eastern Ghats	4755.997
Great Nicobar (UNESCO)	Andaman and Nicobar Islands	Islands	885
Dihang-Dibang	Arunachal Pradesh	East Himalayas	5112
Great Rann of Kachchh	Gujarat	Desert	12454
Cold Desert	Himachal Pradesh	Western Himalayas	7770
Agasthyamalai (UNESCO)	Kerala, Tamil Nadu	Western Ghats	1828
Pachmarhi (UNESCO)	Madhya Pradesh	Semi-Arid	4926
Achanakamar- Amarkantak (UNESCO)	Madhya Pradesh, Chhattisgarh	Maikala Range	3835
Nokrek (UNESCO)	Meghalaya	East Himalayas	820
Simlipal (UNESCO)	Odisha	Deccan Peninsula	4374
Khangchendzonga (UNESCO)	Sikkim	East Himalayas	2620
Nilgiri (UNESCO)	Tamil Nadu, Kerala and Karnataka	Western Ghats	5520
Gulf of Mannar (UNESCO)	Tamil Nadu	Coasts	10500
Nanda Devi (UNESCO)	Uttarakhand	West Himalayas	5860
Sunderbans (UNESCO)	West Bengal	Gangetic Delta	9630
Panna (UNESCO)	Madhya Pradesh	Semi-Arid	2998

Environment Related Important International Agreement/Conference

UN Conference on the Human Environment	Stockholm (1972)
Convention on Migratory Species	Bonn (1979)
Convention for the Protection of the Ozone Layer	Vienna (1985)
Pototocol on Substances that Deplete the Ozone Layer	Montreal (1987)
Convention on the Transboundary Movement of Hazardous Wastes	Basel (1989)
Earth Summit (UN Conference on Environment and Development)	Rio-de-Janeiro (1992)
Convention on Prior Informed Consent	Rotterdam (1998)
UN Conference on Sustainable Development	Rio-de-Janeiro (2012)
Nagoya Protocol on Genetic Resources (Nagoya Protocol)	Nagoya (2010)
Convention on Biological Diversity (CBD-CoP-11)	Hyderabad (2012)
Lima Climate Change Conference (CoP-20)	Lima (2014)
Paris Agreement (CoP-21)	Paris (2015)
Marrakech Conference (CoP-22)	Marrakech, Morocco (2016)
Bonn Conference (CoP-23)	Bonn (2017)
Katowice Conference (CoP-24)	Katowice, Poland (2018)
Madrid Conference (CoP-25)	Madrid, Spain (2019)
CoP-26	Scheduled in Glasgow (2021)

Wildlife Conservation in India

<i>Project</i>	<i>Year</i>
Project Hangul	1970
Project Gir	1972
Project Tiger	1973
Project Olive Ridley Turtles	1975
Crocodile Breeding Scheme	1975
Project Manipur Thamin	1977
Project Rhino	1987
Project Elephant	1992
Project Red Panda	1996
Project Sea Turtle	1999
Project Vulture	2006
Project Snow Leopard	2009
Project Dolphin	2020
Project Asiatic Lion	2020

Endangered Species of India

Birds	Great Indian Bustard, Forest Owlet, Vulture, Bengal Florican, Himalayan Quail, Siberian Crane
Mammals	Flying Squirrel, Red Panda, Pygmy Hog, Kondana Rat, Snow Leopard, Asiatic Lion, One-Horned Rhinoceros
Reptiles	Gharial, Hawksbill Turtle, River Terrapin, Sispara Day Gecko
Amphibians	Flying Frog, Tiger Toad



INDIAN POLITY

CONSTITUTION

Framing of the Indian Constitution

- The idea to have a Constitution was first given by **MN Roy** (A pioneer of Communist Movement in India).
- The Constitution was framed by the **Constituent Assembly** of India, set-up on 16th May 1946, in accordance with the Cabinet Mission Plan, under the Chairmanship of Sachchidanand Sinha, initially. **Dr Rajendra Prasad** and HC Mukherjee were elected as the President and Vice-President respectively on 11th December 1946. BN Rau was appointed as the Constitutional Advisor.
- The total membership of the Constituent Assembly was 389, of these 292 were representatives of British States; 93 were representatives of Princely States and 4 were from the Chief Commissioners Provinces of Delhi, Ajmer-Merwara, Coorg and British Baluchistan.
- The Chairman of the Drafting Committee was **Dr BR Ambedkar**, also known as the Father of the Indian Constitution.

Enactment of the Constitution

- The Constituent Assembly took **2 years, 11 months and 18 days** to complete the Constitution.
- Some of the provisions related to citizenship, elections, provisional Parliament etc were given immediate effect.
- The Constitution, is adopted on 26th November, 1949, contained a Preamble, **395** Articles divided into 22 Parts and **8** Schedules. Presently, it has 448 Articles divided into 25 Parts and **12** Schedules.

- The enforcement of Constitution was delayed till 26th January because, in 1929, on this day Indian National Congress demanded **Poorna Swaraj** in Lahore Session, Chaired by JL Nehru.
- The Constitution came into force on 26th January, 1950, known as Republic Day of India. The Constituent Assembly adopted our National Flag on 22nd July, 1947. It was designed by **Pingali Venkayya**.

Interim Government (1946)

Members	Portfolios Held
Jawaharlal Nehru	External Affairs & Commonwealth Relations
Sardar Vallabhbhai Patel	Home, Information & Broadcasting
Dr Rajendra Prasad	Food & Agriculture
Dr John Mathai	Industries & Supplies
Jagjivan Ram	Labour
Sardar Baldev Singh	Defence
CH Bhabha	Works, Mines & Power
Liaquat Ali Khan	Finance
Abdur Rab Nishtar	Posts & Air
Asaf Ali	Railways & Transport
C Rajagopalachari	Education & Arts
II Chundrigar	Commerce
Ghaznafar Ali Khan	Health
Joginder Nath Mandal	Law

Note Interim government was formed from the newly elected Constituent Assembly.

Preamble

- It is the preface or the introduction of the Constitution. It is an integral part of the Constitution. The interpretation of the Constitution is based on the spirit of the Preamble.
- The **Objective Resolution**, drafted and moved by Pandit Jawaharlal Nehru and adopted by the Constituent Assembly, ultimately became the Preamble.

- The idea of the Preamble was borrowed from the Constitution of USA.
- The words, **Socialist**, **Secular** and **Integrity** were added by the 42nd Constitutional Amendment Act in 1976.

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 its 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 this twenty-sixth day of November, 1949 do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

Sources of the Indian Constitution

UK	<ul style="list-style-type: none"> ▪ Rule of Law ▪ Cabinet System ▪ Prerogative Writs ▪ Parliamentary Government ▪ Bicameral Parliament ▪ CAG Office ▪ Single Citizenship ▪ Law making procedures
USA	<ul style="list-style-type: none"> ▪ Written Constitution ▪ Vice-President as the Ex-officio Chairman of Upper House ▪ Fundamental Rights ▪ Supreme Court ▪ Independence of Judiciary and Judicial Review ▪ Preamble
Erstwhile USSR	<ul style="list-style-type: none"> ▪ Fundamental Duties
Australia	<ul style="list-style-type: none"> ▪ Concurrent List ▪ Joint sitting of Parliament
Japan	<ul style="list-style-type: none"> ▪ Procedure established by law
Germany	<ul style="list-style-type: none"> ▪ Suspension of Fundamental Rights during the Emergency
Canada	<ul style="list-style-type: none"> ▪ Scheme of federation with a strong Centre ▪ Distribution of powers between the Centre and the States and placing Residuary Powers with the Centre

Ireland	<ul style="list-style-type: none"> ▪ Concept of Directive Principles of State Policy. ▪ Method of election of the President
South Africa	<ul style="list-style-type: none"> ▪ Procedure for amendment of the constitution and election of member of Rajya Sabha
France	<ul style="list-style-type: none"> ▪ Republic and the ideals of Liberty equality and fraternity in the Preamble.

Main Features

- Bulkiest written Constitution in the World.
- Combination of Rigidity and Flexibility
- Parliamentary System of Government
- Federal System with a Unitary bias
- Fundamental Rights and Duties
- Directive Principles of State Policy
- Integrated and Independent Judiciary
- Single Citizenship
- Emergency Powers
- Universal Adult Franchise

Important Articles

Part I

Union and its Territories (Article 1-4)

1. The Constitution says, “India, that is Bharat, shall be a Union of States”.
2. Admission or establishment of new States.
3. The Constitution empowers the Parliament to form new States and to alter the areas, boundaries or names of existing States.

Note Through J & K Reorganisation Act of 2019, the state of Jammu and Kashmir was divided into two Union Territories i.e. Union Territory of Ladakh and the Union Territory of Jammu and Kashmir.

Part II

Citizenship (Article 5-11)

The Citizenship Act of 1955 prescribes five ways to acquire citizenship of India

1. By birth
2. By descent
3. By registration
4. By naturalisation
5. By incorporation

Three modes of losing citizenship

1. Renunciation
2. Termination
3. Deprivation

Through Citizenship (Amendment) Act 2019 members of Hindu, Sikh, Buddhist, Jain, Parsi and Christian religions minorities from Afghanistan, Bangladesh and Pakistan who entered India before 31st December, 2014 will be given Indian citizenship.

Part III

Fundamental Rights (Article 12-35)

Rights to Equality (Article 14-18)

- Equality before Law (Article 14).
- Prohibition of discrimination on grounds of religion, race, caste, sex or place of birth. (Article 15)
- Equality of opportunity in matters of public employment. (Article 16)
- Abolition of untouchability (Article 17).
- Abolition of titles. (Article 18)

Rights to Freedom (Article 19-22)

- Protection of certain rights regarding; Speech and expression, assembly, association, movement, residence, and profession (Article 19)
- Protection in respect of conviction for offences. (Article 20)
- Protection of life and personal liberty (Article 21).
- Protection against arrest and detention in certain cases (Article 22).

Right to Education

Article 21A states that the state shall provide free and compulsory education to all children of the age of 6-14 years.

Rights against Exploitation (Article 23-24)

- Prohibition of human trafficking and forced labour (Article 23).
- Prohibition of employment of children in any factories, etc (Article 24).

Rights to Freedom of Religion (Article 25-28)

- Freedom of conscience and right to profess, practice and propagate one's religious beliefs. (Article 25)

- Freedom to manage religious affairs (Article 26).
- Freedom from taxation for promotion of any particular religion (Article 27).
- Freedom from attendance of religious instructions or religious worship in certain educational institutions (Article 28).

Cultural and Educational Rights

- Protection of interest of minorities (Article 29).
- Right of minorities to establish and administer educational institutions (Article 30).

Freedom of Press is implicit in the Article 19. Article 20 and 21 cannot be suspended even during *National Emergency*. (Article 352)

Right to Property under Article 19 (1) (f) was repealed by the 44th Amendment Act, 1978, and was made a legal right under Article 300A.

Rights to Constitutional Remedies

- Right to move to the Supreme Court (Article 32) and the High Courts (Article 226) in case of violation of the Fundamental Rights BR Ambedkar called Article 32 as the **Heart and Soul of the Constitution**.
- 5 Writs of habeas corpus, mandamus, prohibition, certiorari and quo-warranto can be issued under this.

Types of Writs

<i>Writ</i>	<i>Meaning</i>	<i>Intended Purpose</i>
Habeas Corpus	You may have the body	To release a person who has been detained unlawfully whether in prison or in private custody.
Mandamus	We Command	To secure the performance of public duties by lower court, tribunal or public authority.
Certiorari	To be certified	To quash the order already passed by an inferior court, tribunal or quasi judicial authority.
Prohibition	The act of stopping something	To prohibit an inferior court from continuing the proceedings in a particular case where it has no jurisdiction to try.
Quo Warranto	What is your authority	To restrain a person from holding a public office to which he is not entitled.

Part IV

Directive Principles of State Policy (Article 36-51)

Directive principles are broad guiding principles that state shall keep in mind while formulating policies and enacting laws. *These are non-justiciable in nature*

Articles 36-37 Definition and application of the principles contained in this part.

Article 38 To secure and protect a social order, which stands for the welfare of the people.

Article 39 Certain principles of policy to be followed by the State.

Article 40 To organise village Panchayats as units of self- government.

Article 41 Right to work, to education and to public assistance in certain cases.

Article 42 To secure just and humane conditions of work and maternity relief.

Article 43 Living wage etc for workers, to promote cottage industries.

Article 44 Uniform Civil Code for the citizens.

Article 45 Provision of early childhood care and education to children below the age of 6 years.

Article 46 To promote the educational and economic interests of the weaker sections of the people, especially the Scheduled Castes and Scheduled Tribes.

Article 47 Improvement of public health and the prohibition of intoxicating drinks and drugs.

Article 48 Organisation of agriculture and animal husbandry on modern lines.

Article 49 To protect all monuments of historic interest and national importance.

Article 50 To bring about the separation of the judiciary from the executive.

Article 51 Promotion of international peace and security.

Part IV (A)

Fundamental Duties (Article 51A)

It was inserted by the **42nd Amendment Act** in 1976 on the recommendations of Swaran Singh Committee it was inspired by the Constitution of erstwhile USSR.

It shall be the duty of every citizen of India

- (a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem.
- (b) to cherish and follow the noble ideals which inspired our national struggle for freedom.
- (c) to uphold and protect the sovereignty, unity and integrity of India.
- (d) to defend the country and render national service, when called upon to do so.
- (e) to promote harmony and the spirit of common brotherhood amongst all the people of India, transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women.
- (f) to value and preserve the rich heritage of our composite culture.
- (g) to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures.
- (h) to develop scientific temper, humanism and the spirit of enquiry and reform.
- (i) to safeguard public property and to abjure violence.
- (j) to strive towards excellence in all spheres of individual and collective activity, so that the nation constantly rises to higher levels of endeavour and achievement.

The **86th Amendment Act, 2002** inserted Article 51A (K), "each parent or guardian to provide opportunities for education to his child or ward between the age of 6 and 14 years."

Part V

Union (Article 52-151)

THE PRESIDENT

- Executive Head of the State and the first citizen of India.
- The 42nd Amendment of the Constitution has made it obligatory on

the part of the President to accept the advice of the Council of Ministers. However, 44th Amendment Act amended the word 'obligatory' and added that 'President can send the advice for reconsideration'.

Qualifications Must be a citizen of India; of 35 years in age; eligible to be a member of the Lok Sabha and must not hold any office of profit.

Election Indirectly elected through Electoral College consisting of elected members of both the Houses of the Parliament and elected members of the Legislative Assemblies of the States and elected members of the Legislative Assemblies of Union Territories of Delhi and Puducherry.

- Members of the Legislative Councils have no right to vote in the Presidential election.
- Supreme Court decides all disputes regarding President's election.

Tenure The term is 5 years though there is no upper limit on the number of times a person can become the President (Article 57). He can give resignation to the Vice-President before the full-term.

- The salary of the President is ₹ 5,00,000 per month.
- In case, the office of the President falls vacant due to death, resignation or removal, the Vice-President acts as the President.
- If he is not available then Chief Justice of India, if not then the senior most Judge of the Supreme Court shall act as the President of India.
- The first President who died in the office, was Dr Zakir Hussain. Fakhruddin Ali Ahmed was the second president to die in office.
- Justice M Hidayatullah was the first Chief Justice of India to be appointed as the President (July 1969-August 1969).

Impeachment Procedure

- It is a quasi-judicial procedure. President can be impeached only on the grounds of violation of the Constitution. (Article 61)
- The impeachment procedure can be initiated in either House of the Parliament.

Powers of President

- He is the formal head of the administration.
 - The President shall have the power to appoint and remove high authorities like the Prime Minister, other Ministers of the Union, Judges, Governors of States and appoints Chiefs of Army, Navy and Air Force.
 - He nominates 12 members of the Rajya Sabha from persons of literature, art, science and social work and 2 members in the Lok Sabha of the Anglo-Indian Community.
- Note** Parliament has passed (126th) Amendment Bill in December 2019, doing away with the provision of Anglo-Indians to Lok Sabha and Some State Assemblies.
- Declares wars and concludes peace subject to the approval of the Parliament.
 - President has the **Veto** power.
 - **Under Article 72**, the President has the power to grant pardons, reprieves, respites or remission of punishment or to suspend, remit or commute the sentence of any person convicted with death sentence.
 - **Under Article 123**, President can promulgate Ordinances, when the Parliament is not in session.

Types of Vetoes

Absolute Veto Withholding the assent to the Bill.

Qualified Veto Can be overridden by the Legislature with a higher majority.

Suspensive Veto Can be overridden by the Legislature with an ordinary majority.

Pocket Veto Delay in giving assent to the Bill. *The Veto Power has been exercised only twice (a) by Dr Rajendra Prasad and (b) by R.Venkata ramani. President of India is vested with three vetos absolute veto, suspensive veto and pocket veto. There is no qualified veto in the case of Indian President.*

Emergency Powers

- To declare National Emergency. (Article 352)
- To impose President Rule in a State. (Article 356)
- To declare Financial Emergency. (Article 360)

VICE-PRESIDENT

- **Article 63** of the Constitution stipulates a Vice-President for India.
- He is elected by both the Houses of Parliament.
- The Vice-President is the Ex-officio **Chairman** of the Council of States (Rajya Sabha) as mentioned in the **Article 64**.
- Present salary of the Vice-President is ₹ 4,00,000 per month.
- The first Vice-President of India was Dr S Radhakrishnan.
- The first and only Vice-President who died in the office, was Shri Krishna Kant (1997-2002).

COUNCIL OF MINISTERS

- Article 74 of the Constitution states that there shall be a Council of Ministers, with the **Prime Minister** at its head, to aid and advise the President.
- It is composed of all Union Ministers—the Prime Minister, Cabinet Ministers, Ministers of State and Deputy Ministers.
- The other Ministers shall be **appointed by the President** on the advice of the Prime Minister under Article 75(1).
- A Minister must be a member of either House of Parliament or be elected within 6 months of assuming office under Article 75(5).
- The Council of Ministers is **collectively responsible** to the Lok Sabha, It means the Lok Sabha can remove the Council of Ministers from office by passing a No-confidence Motion. [Article 75 (3)].
- Ministers are also responsible for their departments and can be removed from the office by the President on the advice of the Prime Minister. This is essentially an individual responsibility under Article 75 (2).

PRIME MINISTER

- The Prime Minister is the head of the Government and the head of the Council of Ministers.
- The Prime Minister is appointed by the President on the basis of his being the leader of the majority party in the Lok Sabha.

- If no party gets an **absolute majority** in the Lok Sabha or a Prime Minister resigns or dies, the President can use his own discretion in the choice of the Prime Minister.
- Article 78 stipulates that it is the duty of the Prime Minister (a) to communicate to the President all the decisions taken by the Cabinet and (b) to furnish such information relating to the administration of the Union or any Legislation as the President may call for. The Prime Minister serves in the office for five years though he can be re-appointed.
- When the Lok Sabha is dissolved, He can continue in office upon the request of the President until new government is formed.
- If the Government is defeated in the Lok Sabha, the Prime Minister and the entire cabinet must resign, however, if defeated in the Rajya Sabha, resignation is not obligatory.

Tit-Bits

- **Jawaharlal Nehru** was the first Prime Minister and the longest serving Prime Minister so far.
- The first and the 'only' acting Prime Minister was **Gulzarilal Nanda**.
- **Lal Bahadur Shastri** was the first PM who died abroad, while in office at Tashkent. Gulzarilal Nanda has acted twice as the acting Prime Minister.
- **Chaudhary Charan Singh** was the only PM who did not face Parliament, while being in office.
- The youngest Prime Minister was **Rajeev Gandhi** and the oldest Prime Minister was **Morarji Desai**.
- **AB Vajpayee** (May 1996–June 1996) government had the shortest tenure (13 days).

UNION LEGISLATURE

- Legislature of the Union is called the Parliament and consists of the Rajya Sabha (Council of States), the Lok Sabha (House of the People) and the President (Article 79).

- The business of Parliament is transacted either in Hindi or in English. However, the Presiding Officers of the two Houses may permit any member to address the House in his/her mother tongue too.

Rajya Sabha (Council of States)

- Rajya Sabha is the Upper House of the Parliament. First sitting of the Rajya Sabha was held on 3rd April, 1952.
- The maximum permissible strength of the Rajya Sabha is 250. Of these, 238 members are elected indirectly from the States and Union Territories, and 12 are nominated by the President for their expertise in art, literature, science, sports and social services (Article 80).
- Currently, the strength of the Rajya Sabha is 245. Of these, 229 members are elected from States and 4 members represent Union Territories while 12 members are nominated by the President.
- The Rajya Sabha is a **Permanent House** and is not subject to dissolution and members enjoy a tenure of six years. However, one-third of the members retire every second years (Article 83).
- It shares legislative powers with the Lok Sabha, except in the case of Money Bill where the Lok Sabha has overriding powers.

Lok Sabha (People's House)

- The Lok Sabha is the Lower House of the Parliament and its first sitting took place on 13th May, 1952. The current Lok Sabha is the 17th constituted Lok Sabha.
- Three Sessions of the Lok Sabha are held every year, namely Budget Session (February to May); Monsoon Session (July to September); and Winter Session (November to December).

Members 530 from States, 20 from Union Territories and 2 nominated by the President, from the Anglo Indian Community (now abolished).

Election The representatives of the states are directly elected by the people of the states on the basis of adult suffrage.

Qualifications Article 84 provides for the eligibility for membership of the Parliament. *The conditions are*

- (a) citizen of India;
- (b) Not less than 25 years of age for the Lok Sabha and 30 years of age for the Rajya Sabha; and
- (c) possess such other qualifications as may be prescribed by the Parliament.

Bills It may be classified as Ordinary, Money, Financial and Constitutional Amendments.

- **The Ordinary Bills** can be introduced in either House of the Parliament, but **Money Bill** can be initiated only in the House of the People i.e. Lok Sabha.
- After a Money Bill has been passed by the Lok Sabha, it is sent to the Rajya Sabha for deliberations. The Rajya Sabha is given 14 days to make recommendations, which can be accepted or not by the Lok Sabha.
- Article 111 stipulates that a Money Bill cannot be returned to the House by the President for reconsideration.

Speaker of the Lok Sabha

- As soon as a new Lok Sabha is constituted, the President appoints a Speaker pro-tem, who is generally the senior most member of the House. (It is a temporary office that ceases to exist after new speaker is elected by the house.)
- **Speaker** is the head of Lok Sabha. He/She is elected from amongst the members of Lok Sabha. The Speaker of the Lok Sabha conducts the business in the House. A Deputy Speaker is also elected to officiate in the absence of the Speaker.

Facts about Speaker

- **GV Mavlankar** was the first Speaker of the Lok Sabha (1952-1956).
- **MA Ayyangar** was the first Deputy Speaker (1952-1956).
- **Dr Balram Jakhhar** was the longest serving Speaker (1980-1989).
- **GMC Balyogi** is the first Speaker to die in the office (1998-2002).
- **Meira Kumar** is the first woman speaker of the Lok Sabha (2009-2013).

SUPREME COURT

The Supreme Court of India was inaugurated on 28 January, 1950. Presently, Supreme Court is functioning at full strength (sanctioned strength 34). A small Bench, with two to three Justices, is called a Division Bench. A large Bench, with five or more Justices, is called a Constitutional Bench.

Tenure and Qualification

- Judges of the Supreme Court are appointed by the President and retire at the age of 65.
- The **qualifications** are (a) must be a citizen of India; (b) a Judge of a High Court for at least 5 years; or (c) an advocate of a High Court for at least 10 years; or he should be a distinguished jurist in the opinion of the President.
- The Constitution has not prescribed a minimum age for appointment as a judge of the Supreme Court.

Independence of Judges (Article 125)

The salaries and allowances of Judges are charged upon the Consolidated Fund of India (Present salary of the CJI is ₹ 2.8 Lakh and of other Judges is ₹ 2.5 Lakh).

Removal of Judges Judges can be removed only on the grounds of proved **misbehaviour** or **incapacity**.

Judges can be removed only by a resolution of both Houses of Parliament supported by a majority of total membership of both the Houses and 2/3 of members present and voting. The first Judge against whom the proceedings were initiated was **V Ramaswami** (1993) and the second one was **Soumitra Sen** (2011).

Jurisdiction

The Supreme Court has original, appellate, advisory and writ jurisdictions.

- Original Jurisdiction means that certain types of cases can originate with the Supreme Court only. The Supreme Court has original jurisdiction in (a) disputes between the centre and one or more States; (b) disputes between the Centre and any State(s) on one side and one or more States on the other side;

(c) disputes between two or more States; and (Article 131).

- Appellate Jurisdiction means that appeals against judgements of lower courts can be referred to it. The Supreme Court is the highest court of appeal in the country. Four types of cases fall within its appellate jurisdiction, namely, constitutional cases, civil cases, criminal cases and appeals by special leave.

- The first Chief Justice of India was **HJ Kania** (1950–51).
- The shortest tenure so far is of **KN Singh** (25th November, 1991—12th December, 1991).
- The longest tenure, so far is of **YV Chandrachud** (1978–85).
- The first woman Judge of the Supreme Court was Justice **Fatima Beevi** in 1987 and the second woman Justice was **Gyan Sudha Mishra** in 2010.

- Advisory Jurisdiction refers to the process where the President seeks the court's advice on legal matters (Article 143). The Supreme Court is a court of record (Article 129).
- Under Article 139 (A) (inserted by the 44th Amendment), the Supreme Court may transfer to itself, cases from one or more High Court if these questions involve a significant question of law.

Comptroller and Auditor General (CAG) (Article 148-151)

- The Comptroller and Auditor General is appointed by the President under **Article 148** of the Constitution.
- The CAG audits all receipts and expenditures of the Union and State Governments.
- The CAG also acts as the external auditor for the government-owned companies.
- The CAG submits its reports to the President (in case of accounts relating to the Union Government) or to the concerned State Governors (for State Government Accounts).
- The CAG is also the head of the Indian Audits and Accounts Service (IA & AS). The office of the CAG was established in 1860.

- The first CAG of India was **V Narahari Rao** (1948-1954).
- The CAG can only be removed from office in manner similar to a Judge of the Supreme Court.
- The salary and benefits of the CAG cannot be changed to his disadvantage during his tenure.
- The CAG is not eligible for further office under the Union or State Governments. The expenses of the office of the CAG is charged upon the Consolidated Fund of India.
- **Article 171** states that the States where Legislative Councils exists, the Governor can **nominate some members** from amongst those distinguished in literature, science, art, cooperative movement and social service.
- **Article 213** empowers the Governor to issue the **ordinances** during the recess of the State Legislature.

Qualifications

- Must be a citizen of India.
- Completed 35 years of age.
- Shouldn't be a member of either House of Parliament or State Legislature.
- Must not hold any office of profit.

Attorney General of India

- The Attorney General is the **highest law officer** in the country appointed by the President under **Article 76** of the Constitution.
- The first Attorney General of Independent India was **MC Setalvad** (1950-1963). The 15th and Current Attorney General of India is **KK Venugopal**.
- To be appointed as Attorney General, a candidate must be qualified to be appointed as a Judge of the Supreme Court.
- The Attorney General can participate in proceedings of the Parliament without the Right to Vote (Article 88).

Part VI

The States (Article 152-237)

THE GOVERNOR

- The Governor is the **Constitutional Head** of the State and the same Governor can act as Governor of more than one State (Article 153).
- The Governor is appointed by the **President** (Article 155) and Article 156 states that the Governor holds office during the pleasure of the President.
- **Article 161** gives the Governor the power to grant pardons, reprieves, remission of punishment to persons convicted under the state law.
- **Article 163** talks of **discretionary powers** of the Governor, which is not even provided to the President. Moreover, the courts cannot question his discretion.

STATES LEGISLATURE

Article 163 Council of Ministers to aid and advise the Governor.

Article 165 An Advocate General for each of the State.

Article 169 Abolition or creation of Legislative Councils in States.

Most of the states have unicameral system, only 6 states have legislative council. These states are Andhra Pradesh, Bihar, Karnataka, Maharashtra, Uttar Pradesh and Telangana.

Legislative Assembly Legislative Assembly consists of Representatives directly elected by the people. The strength of assembly varies from 60 to 500 members. However assembly of Sikkim, Goa, Mizoram, Arunachal Pradesh, Nagaland and Puducherry have less than 60 members.

Composition of Legislative Council Unlike the members of the Legislative Assembly, the members of Legislative Council are indirectly elected. The maximum strength of the Council is fixed at one-third of the total strength of assembly and the minimum strength is fixed at 40.

HIGH COURTS (ARTICLE 214-232)

There are **25** High Courts in India. The Calcutta High Court, established in 1862, is the oldest High Court in India. The Bombay and Madras High

Courts were also established in the same year. The newest High Courts are the Tripura, Meghalaya and Manipur High Courts, all were established in the year 2013. High Court of Andhra Pradesh (25th High Court of India) came into existence from January 1, 2019.

Part IX

The Panchayats (Article 243-243 O)

- Introduced by the 73rd Amendment Act, 1992 which envisaged a three tier system of local government.

These are

1. Gram Panchayat at the village level
2. Panchayat Samiti at the block level
3. Zila Parishad at the district level

Jurisdiction and Seats of High Courts

Court Name	Estd. in the Year	Territorial Jurisdiction	Seat
Mumbai	1862	Maharashtra, Dadra and Nagar Haveli, Goa, Daman and Diu	Mumbai (Bench at Nagpur, Panaji and Aurangabad)
Kolkata	1862	West Bengal, Andaman and Nicobar Islands	Calcutta (Circuit Bench at Port Blair)
Chennai	1862	Tamil Nadu and Puducherry	Chennai (Bench at Madurai)
Allahabad	1866	Uttar Pradesh	Prayagraj (Bench at Lucknow)
Karnataka	1884	Karnataka	Bangalore (Circuit Benches at Hubli Dharwad and Gulbarga)
Patna	1916	Bihar	Patna
Madhya Pradesh	1956	Madhya Pradesh	Jabalpur (Benches at Gwalior and Indore)
Jammu & Kashmir	1928	Jammu and Kashmir	Srinagar and Jammu
Punjab and Haryana	1875	Punjab, Haryana and Chandigarh	Chandigarh
Orissa	1948	Odisha	Cuttack
Guwahati	1948	Assam, Nagaland, Mizoram and Arunachal Pradesh	Guwahati (Bench at Kohima, Aizwal and Itanagar)
Rajasthan	1949	Rajasthan	Jodhpur (Bench at Jaipur)
Kerala	1958	Kerala and Lakshadweep	Ernakulam
Gujarat	1960	Gujarat	Ahmedabad
Delhi	1966	National Capital Territory of Delhi	New Delhi
Himachal Pradesh	1971	Himachal Pradesh	Shimla
Sikkim	1975	Sikkim	Gangtok
Chhattisgarh	2000	Chhattisgarh	Bilaspur
Uttarakhand	2000	Uttarakhand	Nainital
Jharkhand	2000	Jharkhand	Ranchi
Tripura	2013	Tripura	Agartala
Manipur	2013	Manipur	Imphal
Meghalaya	2013	Meghalaya	Shillong
Andhra Pradesh	2019	Andhra Pradesh	Amaravati
Telangana	2019	Telangana	Hyderabad

- The Panchayat system exists in all states except Nagaland, Meghalaya and Mizoram. It also exists in all Union Territories except Delhi.
- Panchayat system is provided for all states having a population more than 2 million. Every Panchayat can continue for 5 years from the date of its first meeting.

Part IXA

The Municipalities (Article 243 P-243 ZG)

- Introduced by the 74th Amendment Act, 1992 which envisages three types of urban local bodies, namely, Nagar Panchayat, Municipal Council and Municipal Corporation.

Committees to Study Panchayat System

Name	Established	Recommendation
Balwantrai Mehta	1957	Establish local bodies, devolve power and authority, basic unit of decentralised government to be Block/Samiti. Conceptualised PRIs as 3-tier system.
K Santhanam	1963	Panchayats to have powers to levy tax on land revenue etc, Panchayati Raj Finance Corporation to be set-up.
Ashok Mehta	1978	District to be a viable administrative unit for planning, PRIs as two-tier system with Mandal Panchayat and Zila Parishad.
GVK Rao	1985	PRIs to be activated and supported, Block Development Office (BDO) to be central to rural development.
LM Singhvi	1986	Local self-governments to be constitutionally recognised, non-involvement of political parties.

- The first Municipal Corporation in India was introduced in Madras in 1688. The Madras Municipal Corporation is the first municipal body in the whole commonwealth outside the UK. The Bombay and Calcutta Corporations were established in 1726.
- Municipal Corporations are established in cities with population greater than 1 million.
- Nagar Panchayat administers urban areas having population greater than 30000 and less than 100000.
- A Municipal Council administers an urban area of population 200000 or less.

Part XI

Relations between the Union and the States (Article 245-263)

- Legislative Relations
- Administrative Relations
- Financial Relations

Article 262 Adjudication of disputes relating to waters of inter-state rivers or river valleys.

Article 263 Inter-state council.

Part XII

Finance, Property, Contracts and Suits (Article 264-300 A)

Article 266 Consolidated Fund of India.

Article 267 Contingency Fund of India.

Part XIV

Services Under the Union and the States (Article 308-323)

Article 312 All India Services.

Article 315 Public Service Commissions for the Union and for the States.

- The first Public Service Commission was set-up in 1926, on the recommendations of the Lee Commission.
- The Government of India Act, 1935 provided for the establishment of a Federal Public Service Commission and Provincial Public Service Commissions.

Union and State Public Service Commissions

- Constitution provides a Public Service Commission for the Union, a Public Service Commission for each state or a Joint Public Service Commission for a group of states.
- The appointment is done by the President in case of the Union or Joint Commission and by the Governor of the State in the case of a State Commission.
- At least half of the members of these commissions should be civil servants with at least 10 years experience in central or state services.
- Age of retirement for a member of UPSC is 65 years and for a member of PSC of a State or a Joint Commission is 62 years.

Functions

- To conduct exams for appointment to services under the Union and the States.
- Maintains continuity in administration.
- Members of the UPSC and State Commissions can be removed by the President on the charges of misbehaviour, if these charges are upheld by the Supreme Court.

Elections (Article 324-329)

Article 324 stipulates that the superintendence, direction and control of elections shall be vested in the Election Commission.

Article 325 provides for a single electoral roll for every constituency. Also stipulates that no person shall be eligible or ineligible for inclusion in electoral rolls on the basis of race, religion, caste or sex.

Article 326 stipulates that elections shall be held on the basis of adult suffrage. Every person, who is a citizen of India and is not less than 18 years of age shall be eligible for inclusion.

Political Parties

Registration of the People Act, 1951 provides for registration of political parties with the election commission.

There are eight (8) National Parties in India, namely BJP, Congress, BSP, NCP, CPI, CPM, Trinamool Congress and National People's Party.

A political party shall be eligible to be recognised as a **National party** if

- It secures at least 6% of the valid votes polled in any four or more states, at a general election to the House of the People or to the State Legislative Assembly; and
 - In addition, it wins at least four seats in the House of the People from any State or States.
- or*
- It wins at least 2% seats in the House of the People (*i.e.*, 11 seats in the existing House having 543 members) and these members are elected from at least three different States.

Likewise, a political party shall be entitled to be recognised as a **State party**, if

- It secures at least 6% of the valid votes polled in the State at a general election, either to the House of the People or to be Legislative Assembly of the State concerned; and
- In addition, it wins at least two seats in the Legislative Assembly of the State concerned.

or

It wins at least 3% of the total number of seats in the Legislative Assembly of the State or at least three seats in the Assembly, whichever is more.

For elections of President and Vice-President, election petitions can only be filed with the Supreme Court.

Election Commission

- The Election Commission is an autonomous, quasi-judiciary constitutional body. Its function is to conduct free and fair elections in India.
- The Election Commission was established on 25th January, 1950 under **Article 324** of the Constitution.
- The first Chief Election Commissioner was **Sukumar Sen**.

Planning Commission

- The Planning Commission was established in March, 1950 by an executive resolution of the Government of India (*i.e.*, Union Cabinet) on the recommendation of the Advisory Planning Board constituted in 1946 under the Chairmanship of KC Neogi.
- Now, the Planning Commission has been replaced by NITI Aayog.

NITI Aayog

- NITI Aayog or National institution for transforming India Aayog is a policy think-tank of Union Government of India that replaces Planning Commission of India and aims to involve the states in economic policy-making in India. It will be providing strategic and technical advice to the central and the State Governments.
- Prime Minister of India heads the Aayog as its Chairperson.

National Development Council (NDC)

- Functions of the NDC was to review the working of national plan. The NDC was formed in **1952**, to associate the states in the formulation of the plans.
- The PM is the ex-officio chairman of NDC.
- It is an extra-constitutional and extra legal body.
- Since establishment of NITI Aayog, NDC has been proposed to be abolished.

Finance Commission

- **Article 280** of the Constitution of India provides for a Finance Commission as a quasi-judicial body. It is constituted by the President of India every fifth year.
- It consists of Chairman and 4 other members.

Functions The Finance Commission is required to make recommendation to the President of India in the following matters: The distribution of the net proceeds of taxes to be shared between the centre and the states and the allocation between the states, the respective shares of such proceeds. The 15th Finance Commission was appointed on 2nd January, 2017 under the Chairmanship of NK Singh.

AMENDMENTS OF THE CONSTITUTION (ARTICLE 368)

There are two categories of Amendment under Article 368 which are:-

1. By special majority of Parliament that is (more than 50 percent) of the total membership of each House and a majority of two-thirds of the members of each House present and voting.
2. By special majority of Parliament and with the consent of half of the State Legislature by a simple majority. Provisions related to Federal structure can be amended through this procedure. There is a third category of the Amendment which is done by simple majority though these amendments do not come under ambit of **Article 368**.

It has been held by the Supreme Court in the **Keshavananda Bharati Case** (1973) that every provision of the Constitution is amendable under the meaning of Article 368 except the basic structure of the Constitution.

e-GOVERNANCE

The word **electronic** in the terms e-Governance implies technology driven governance.

The perspective of the e-governance is "the use of the technology that both governing and have to be governed.

Generally five basic models are given in e-Governance

- G2C (Government to Citizens)
- G2B (Government to Business)
- G2E (Government to Employees)
- G2G (Government to Governments)
- C2G (Citizens to Governments)

The National e-Governance Plan (NeGP) takes a holistic view of e-governance initiatives across the country, integrating them into a collective vision.

Impacts of e-Governance

e-Governance brings about two major impacts **firstly**, making the government offices work smart. **Secondly**, e-governance makes services available to the citizen at his doorstep through the internet.

Some of the most successful citizen oriented e-governance projects are the Railways Reservation System, MCA 21 is the Ministry of Corporate Affairs and Bhoomi Project in Andhra Pradesh, etc.

E-districts

It is a mission mode under e-governance. Its objective under National E-Governance Policy is to computerisation of services. Under it, different programmes are conducted in following states

- Jandoot Project - Madhya Pradesh
- Compact 2020 - Andhra Pradesh
- Land Programme - Karnataka
- Friends - Kerala
- Disha - Haryana

PARLIAMENTARY TERMS

Quorum It is the minimum number of members required to transact the business of the House. **Article 100** of the Constitution specifies that the Quorum of either House shall be 10% of the strength of the House.

Question Hour The first hour of every sitting of Parliament is called the Question Hour. Questions usually need a 10 day notice before being answered by the concerned minister.

Starred Questions To be answered orally on the floor of the House. Supplementary questions can be asked.

Unstarred Questions To be answered in writing. No supplementary questions may be asked.

Zero Hour Does not formally exist in the Parliamentary procedure. The hour after Question Hour is popularly known as Zero Hour. Members raise matters which they feel urgent.

Adjournment Motion Motion to adjourn the proceedings of the House, so as to take up a matter of urgent public importance. It can be moved by any member. Requires support from at least 50 members.

Calling Attention Motion A member may call the attention of a Minister to an urgent matter and the Minister may make a statement regarding it.

No Confidence Motion A No Confidence Motion indicates lack of confidence of the Lok Sabha in the Council of Ministers. It can be introduced in the Lok Sabha only. If the Motion is passed, the government must resign.

CONSTITUTIONAL AMENDMENTS

First Amendment Act, 1951 Added Ninth Schedule.

Seventh Amendment Act, 1956 Necessitated on account of reorganisation of States on a linguistic basis.

Fifteenth Amendment Act, 1963 Age of retirement of the Judges of High Court has been extended from 60 to 65 years.

Twenty Sixth Amendment Act, 1971 Abolished the titles and special privileges of former rulers of princely states.

Thirty Sixth Amendment Act, 1975 Made Sikkim a State.

Forty Fourth Amendment Act, 1978 The Right to Property was deleted from Part III. Article 352 was amended to provide 'Armed Rebellion' as one of the circumstances for declaration of emergency.

Seventy Third Amendment Act, 1992 The institution of Panchayati Raj receive constitutional guarantee, status and legitimacy. XIth Schedule was added to deal with it. It also inserted Part IX, containing Articles, 243, 243 A to 243 O.

Eighty Ninth Amendment Act, 2003 The Act adds Article 338 A and provides for the creation of National Commission for Scheduled Tribes.

Ninety First Amendment Act, 2003 Amended the Anti-Defection Law and also made a provision that the number of ministers in the Centre and State Government, cannot be more than 15% of the strength of Lok Sabha and the respective Vidhan Sabha.

Ninety Third Amendment Act, 2005 To reserve seats for socially and educationally backward classes, besides the Scheduled Castes and the Scheduled Tribes, in private unaided institutions other than those run by minorities.

Ninety Seventh Amendment, 2011 Amend- ment of Article 19(1)(i), Insertion of Article 43B, Insertion of Part IXB. This amendment gives constitutional status to cooperatives.

Ninety-Ninth Amendment Act, 2014 deals with replacing the collegium system for the appointments of the Judges of the Supreme Court and the 24 High Courts. But Supreme Court of India has declared this unconstitutional and void.

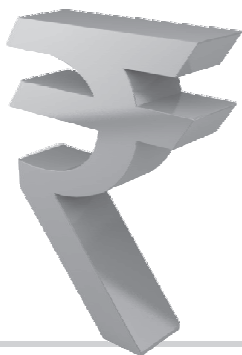
One Hundredth Amendment Act, 2015 to give effect to the acquiring of territories by India and transfer of certain territories to Bangladesh in pursuance of the agreements and its protocol.

One Hundredth One Amendment Act, 2016 with deals Goods and Services Tax (GST)

One Hundredth Two Amendment Act, 2018 provides the Constitutional status to National Commission for Backward Classes.

One Hundredth Three Amendment Act, 2019 provides 10% reservation to the economically backward classes of society.

One Hundredth Fourth Amendment Act, 2020 extended the reservation of seats for SCs and STs in Lok Sabha and State Assemblies from seventy years to eighty years and removed the reserved seats for Anglo-Indian community in Lok Sabha and State Assemblies.



INDIAN ECONOMY

OUTLINE OF INDIAN ECONOMY

The economy of India is the 5th largest in the world by nominal GDP and 3rd largest by Purchasing Power Parity (PPP).

Nature of the Indian Economy

- (i) **Mixed Economy** Existence of both public and private sectors. This term was coined by Pat Mullins and Supported by JM Keynes.
- (ii) **Agrarian Economy** Even after six-decades of independence 58% of the workforce of India is still agriculturist and its contribution to **GDP** is around 17% at current prices.

Features

Following are the features of Indian economy

- (i) Slow growth of national and per capita income.
- (ii) Capital deficiency and low rate of capital formation, hence low rate of investment, low production, etc; poor quality of human capital.
- (iii) Over- dependence on agriculture alongwith low productivity in agriculture; heavy population pressure.
- (iv) Unequal distribution of income and wealth.
- (v) Mass poverty, chronic inflation and chronic unemployment.

Broad Sectors of Indian Economy

Primary Sector Agriculture, forestry and fishing, mining etc.

Secondary Sector manufacturing, electricity, gas and water supply and construction.

Tertiary Sector (also called service sector) business, transport, telecomm- unication, banking, insurance, real estate, community and personnel services.

Economic Planning in India

Planning Commission (1950) was set-up under the Chairmanship of Pandit Jawaharlal Nehru (Gulzarilal Nanda was the first Deputy Chairman).

Basic aim of Economic Planning is to bring rapid economic growth through agriculture, industry, power and all other sectors of the economy.

NITI Aayog

NITI Aayog or *National Institution for Transforming India Aayog* came into existence on 1st January, 2015; policy-making think-tank of government that replaces Planning Commission and aims to involve states in economic policy making. It will provide strategic and technical advice to the Central and the State Governments. The Prime Minister heads the Aayog as its chairperson. Rajiv Kumar is the Vice-Chairperson of NITI Aayog of India.

Historical Milestones

Planned Economy for India (1934)

M Visvesvaraya

National Planning Committee (1938)

Jawaharlal Nehru

Bombay Plan (1944)

Gandhian Plan (1944) SN Agarwal

People's Plan (1945) MN Roy

Sarvodaya Plan (1950) JP Narayan

Five Year Plans At a Glance

Plan	Growth Rate		Important Sector
	Target	Achieved	
First Plan (1951-56) (Based on Harrod Domar Model)	2.1%	3.6%	Agriculture, irrigation, electricity
Second Plan (1956-61) (Based on PC Mahalanobis two sector model)	4.5%	4.2%	Heavy industries
Third Plan (1961-66)	5.6%	2.8%	Foodgrains, heavy industries
Plan Holiday (1966-69)			
Fourth Plan (1969-74)	5.7%	3.3%	Agriculture
Fifth Plan (1974-78)	4.4%	4.8%	Removal of poverty
Rolling Plan (1978-80)			
Sixth Plan (1980-85)	5.2%	5.4%	Agriculture, industries
Seventh Plan (1985-90)	5.0%	6.0%	Energy, foodgrains
Two Annual Plans (1990-92)			
Eighth Plan (1992-97)	5.6%	6.6%	Human resource education
Ninth Plan (1997-2002)	6.5%	5.4%	Social justice
Tenth Plan (2002-07)	8.1%	7.5%	Income, energy
Eleventh Plan (2007-2012)	8.0%	7.9%	Inclusive growth
Twelfth Plan (2012-2017)	8%	—	Faster, sustainable and more inclusive growth

National Income in India

National Income refers to the aggregate value of goods and services produced in an economy in one year. Following are the measures of National Income in India

- Gross Domestic Product (GDP) is the final value of the goods and services produced within the geographical boundaries of a country during a year.
- Net Domestic Product (NDP) equals to the GDP minus depreciation (value loss of an asset) on country capital goods.
- Gross National Product (GNP) is an estimate of the total value of all the final products and services produced in a given period (usually a year) by the nationals of a country.
- The Net National Product (NNP) is obtained by subtracting depreciation value from GNP.
- When NNP is obtained at factor cost it is called National Income. It is calculated by deducting indirect taxes and adding subsidies in NNP at market price.

Indian Tax Structure

Direct Tax The term direct tax generally means a tax paid directly to the government by the persons on whom it is imposed. *e.g.* income tax, Corporate income tax, capital gain tax, stamp duty, land tax, estate duty, wealth tax, petroleum revenue tax. The government earns maximum from corporate income tax.

Indirect Tax An indirect tax is a tax collected by an intermediary from the person who bears the ultimate economic burden of the tax. *e.g.* sales tax or VAT, customs duty, insurance premium tax, excise duties, landfill tax, electricity duty, climate change levy.

Goods and Service Tax (GST)

The GST as it is more commonly referred to is a system of taxation where there is a single tax in the economy for goods as well as services. Indian GST was first proposed in India in the Union Budget speech in 2006-07. This tax came into effect from 1 July, 2017.

The main feature of the GST is that there is a tax credit available at each stage of the value chain.

Inclusive Development

Human Development Index (HDI)

- HDI measure was given by Pakistani Nobel Prize Winner, Mehabub-ul-Haq
- Level of Human development is measured by Human Development Index (HDI), published by UNDP since, 1990.
- Three dimensions
 - Life expectancy at birth;
 - Education Index comprising means year of schooling and expected year of schooling;
 - GNI per capita (PPP US \$) Index.
- India has been ranked 131 out 189 countries on 2020's HDI.

Programmes/Measures

- NRHM** (National Rural Health Mission) was launched on 2nd April, 2005 to reduce Infant Mortality Rate and Maternal Mortality Rate.
- NUHM** (National Urban Health Mission) launched on 2013. Education programmes like Sarva Shiksha Abhiyan, Mid-Day Meal Scheme etc were launched.
- Rural development programmes like **MGNREGA** and **Bharat Nirman**.

POVERTY

- The erstwhile Planning Commission** estimated poverty rate based on data collected by National Sample Survey Organisation (NSSO).
- Main Reasons for Rural Poverty** Rapid population growth, lack of capital, lack of alternate employment other than poor agriculture, illiteracy and lack of proper implementation of PDS.
- Main Reasons for Urban Poverty** Migration from rural areas, lack of skilled labour, lack of housing facilities, limited job opportunities in cities.
- Based on **2400 calories** (rural) and **2100 calories** (urban) and monthly per capita consumption expenditure of ₹ 454 (rural) and ₹ 540 (urban), Planning Commission (Now NITI Aayog) estimated poverty ratio in India in 2004-05 was 27.5% and according to the Suresh Tendulkar Committee was 37.2%.

- The Tendulkar Committee stipulated a benchmark of daily per capita expenditure of ₹ 27 and ₹ 33 in rural and urban areas, respectively.

Socio-Economic Programmes

<i>Programme/Measure</i>	<i>Year of Launch</i>
Twenty Point Programme	1975
Indira Awaas Yojana	1985
Jawahar Rozgar Yojana	1989
Nehru Rozgar Yojana	1989
Swarna Jayanti Shahri Rozgar Yojana	1997
Pradhan Mantri Gramodaya Yojana	2000
Pradhan Mantri Gram Sadak Yojana	2000
Sampoorna Grameen Rozgar Yojana	2001
Bharat Nirman	2005
Jawaharlal Nehru National Urban Renewal Mission	2005
Prime Minister Employment Generation Programme	2008
Mahatma Gandhi National Rural Employment Programme	2009
National Rural Livelihood Mission (NRLM)	2011
Nirmal Bharat Abhiyan	2012
Swachh Bharat Abhiyan	2014
Pradhan Mantri Jan Dhan Yojana	2015
Atal Pension Yojana	2015
Digital India Programme	2015
National Skill Development Mission	2015
HRIDAY (Heritage City Development and Augmentation Yojana)	2015
Smart City Mission	2015
AMRUT (Atal Mission for Rejuvenation and Urban Transformation)	2015
Pradhanmantri Jeevan Jyoti Beema Yojana	2015
Pradhanmantri Suraksha Beema Yojana	2015
Pradhan Mantri Krishi Sinchayee Yojana	2015
Start-up and Stand-up Yojana	2016
Pradhan Mantri Fasal Bima Yojana	2016
Ujala Yojana	2016
SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds)	2016
Pradhan Mantri Garib Kalyan Yojana	2016
Pradhan Mantri Vaya Vandana Yojana	2017
Pradhan Mantri Matritva Vandana Yojana	2017
Pradhan Mantri Sahaj Bijli Har Ghar Yojana	2017
Rashtriya Vayoshri Yojana	2017

<i>Programme/Measure</i>	<i>Year of Launch</i>
Saubhagya Yojana	2017
UDAN Scheme	2017
Ayushman Bharat	2018
Pradhan Mantri Kisan Samman Nidhi	2019
Pradhan Mantri Shram Yogi Man-dhan Yojna	2019
SVAMITVA Scheme	2020
One Nation One Card Scheme	2020
Ghar Tak Fibre Scheme	2020
PM SVANidhi	2020
Atmanirbhar Bharat Scheme	2020
Kisan Suryodaya Yojana	2020
Pradhan Mantri Matsya Sampada Yojana	2020
PM-WANI Scheme	2020

UNEMPLOYMENT

It refers to a situation, when a person is able and willing to work at the prevailing wage rate, but does not get the opportunity to work.

Estimation of Unemployment

Since 1973 on the recommendation of **B Bhagwati Committee**, three estimates of unemployment have been brought about by Planning Commission, viz

1. **Usual Principal Status** Persons who remained unemployed for a major part of the year.
2. **Current Weekly Status** Persons who did not find even an hour of work in a week preceding the date of survey.
3. **Current Daily Status** Persons who did not find work even for 1 hour in a day.

Women Empowerment and Child Development

<i>Programme/Measure</i>	<i>Year</i>
Mid-Day Meal Scheme	1995
Swadhar	1995
Swayam Sidha	2001
SSA	2001
Support to Training and Employment Programme for Women (STEP)	2003-04
Ujjwala	2007
Dhanlaxmi	2008
Integrated Child Protection Scheme	2009-10
Sabla Scheme	2010
National Mission for Empowerment of Women	2010

<i>Programme/Measure</i>	<i>Year</i>
Bal Bandu Scheme	2011
Nai Roshni	2012
Beti Bachao, Beti Padhao	2015
PM Ujjwala Yojna	2016
PM Matri Vandana Yojna	2017
Suposhit Maa Abhiyan	2020

AGRICULTURE

- Agriculture is the mainstay of Indian economy. It makes important contribution in GDP, National Income, employment, trade and industry.
- **Green Revolution** is associated with the use of **HYVS** (High Yielding Variety Seeds), chemical, fertilisers and new technology, which led to a revolutionary results in agricultural production.
- Dr. MS Swaminathan has been called the 'Father of Green Revolution' in India.

Major Agricultural Revolutions

<i>Revolution</i>	<i>Production</i>
Blue	Fish Production
Golden Fibre	Jute
Pink	Onion
Red	Meat
White	Milk
Yellow	Oilseed

Tricolour Revolutions

Tricolour revolution has 3 components

- Saffron revolution–Solar energy
- White revolution–Cattle welfare
- Blue revolution–fisherman's welfare

INDUSTRIES

Industrial Policies

- Industrial policies were launched in 1948, 1956, 1977, 1980 and 1991.
- Industrial Policy 1956 is called **Economic Constitution of India** and gave public sector the strategic edge.
- Industrial Policy 1991 opened up the economy. *Its main aims were*
 - (a) to end license-permit raj;
 - (b) to integrate Indian economy with the outer world;
 - (c) to remove restrictions on FDI and
 - (d) to reform public sectors.

Public Sector Enterprises (PSEs)

- Industries requiring **compulsory licensing** (a) distillation and brewing of alcoholic drinks; (b) cigar and cigarettes of tobacco; (c) electronic aerospace and defence equipment; (d) industrial explosives; (e) specific hazardous chemicals.
- Areas reserved for public sector are (a) atomic energy—production, separation and enrichment of fissionable materials and (b) railways.
- Present Policy** on PSEs is to (a) not to privatise profit-making companies and to modernise and revive sick companies; (b) not to bring government stake in PSEs below 51%; (c) to adopt initial public offering route to disinvestment.

Maharatnas, Navratnas, and Miniratnas

- To impart greater managerial and commercial autonomy to the PSEs, the concept of Maharatna, Navratna and Miniratna was started.
- Maharatnas** were started in 2009. Ten Maharatnas are ONGC, SAIL, IOC, NTPC, Coal India Ltd, BHEL, GAIL (India) Ltd, and BPCL, HPCI and Power Grid Corporation.
- Navratnas** Bharat Electronics Ltd, HAL, MTNL, NALCO, National Mineral Development Corporation, Neyveli Lignite Company Ltd, Oil India Ltd, Power Finance Company Ltd, Rashtriya Ispat Nigam Ltd, Rural Electrification Corporation Ltd, Shipping Corporation of India Ltd, CCIL, EIL and NBCCL.
- Miniratnas** Public Sector Enterprises (PSEs) that have made profit continuously for the last three years and have positive net worth.
- At present there are 61 in category I and 12 in Category II.

Industrial Committees

- Hazari Committee** on Industrial Policy.
- Subimal Dutt Committee** on Industrial licensing.
- Abid Hussain Committee** on Small Scale Industry.
- C Rangarajan Committee** on disinvestment.
- Memorandum of Understandings (MoU) Arjun Sengupta.

Small Scale Industry

- A new thrust to Small Scale Industry, given in Industrial Policy of 1977.
- MSMED Act, was enacted in 2006.
- Contributes 8% to GDP, 45% to all manufactures and 42% to exports.
- According to the 4th census (2009) of SSIs, 67% of the MSME are in manufacturing and 33% are in services sector.

Classification of MSMEs

Category	Annual turnover
Micro	Not exceeding ₹ 5 crores
Small	Between ₹ 5 crores to ₹ 75 crores
Medium	₹ 75 to ₹ 250 crores

Major Industries in India

Iron and Steel

- First Steel Industry at Kulti, West Bengal—Bengal Iron Works Company was established in 1874.
- First large scale steel plant—TISCO at Jamshedpur (1907) was followed by IISCO at Burnpur (1919), West Bengal.
- The first public owned steel plant was Rourkela integrated steel plant. Presently, India is the 3rd largest producer of steel and comes 1st in the production of sponge iron.

Location (Plants)	Assistance
Rourkela (Odisha)	Germany
Bhilai (Chhattisgarh)	Russia
Durgapur (West Bengal)	Britain
Bokaro (Jharkhand)	Russia
Visakhapatnam (Andhra Pradesh)	Russia

Jute Industry

- India ranks no 1 in jute production and no 2 in raw jute exports after Bangladesh.
- More than two third jute industry is concentrated in West Bengal.

Cotton and Textile Industry

- Largest organised and broad-based industry accounting for 4% of GDP, 20% of manufacture value added and one third of total exports earning.

Cement Industry

- First cement producing unit was set-up at Chennai in 1904 but modern manufacturing unit of cement started at Porbandar (Gujarat) in 1914.
- India is the second largest producer of cement in the world.

Sugar Industry

- India is the second largest producer of sugar in the world with a 22% share. It is the second largest agro-based industry in the country.

Committees on Various Sectors of Indian Economy

AC Shah Committee	Non-Banking Financial Company
Bimal Jalan Committee	Market Infrastructure Instruments
Malegam Committee	Functioning of Micro Finance Institutions
Birla Committee	Corporate Governance
Kirit Parikh Committee	Rationalisation of Petroleum Product Prices
Chaturvedi Committee	Improving National Highways in India
SR Hashim Committee	Urban Poverty
Abhijit Sen	Wholesale Price Index

Abid Hussain Committee	Development of Capital Markets
Damodaran Committee	Customer Service in Banks
Khandelwal Committee	Human Resource in Commercial Banks
Patil Committee	Corporate Debt
VK Sharma Committee	Credit to Marginal Farmers
Sarangi Committee	Non-Performing Assets
Khanna Committee	Regional Rural Banks
Dantawala Committee	Lead Bank Scheme
Gadgil Committee	Financial Inclusion

BANKING AND FINANCE

- **Bank of Hindustan** was the first bank, established in India in 1770.
- First bank with limited liability managed by an Indian Board was the **Oudh Commercial Bank** in 1881.
- First purely Indian bank was **Punjab National Bank** (1894).

Nationalisation of Bank

- A step towards **social banking** was taken with the nationalisation of **14 commercial banks** on 19th July, 1969. Six more banks were nationalised on 1980, total number of public sector banks are 27.
- Later on, in the year 1993, the government merged New Bank of India with Punjab National Bank.
- **Bhartiya Mahila Bank**, India's first bank exclusively for women, headquarters in New Delhi was Inaugurated on 19th November, 2013. It has been merged with SBI in 2017.
- **IDBI Bank** is an Indian financial service company, formerly known as Industries Development Bank of India, head quartered in Mumbai, India.
- In September, 2004, the RBI incorporated IDBI as a scheduled bank under the RBI Act, 1934.

- In 2019, Oriental Bank of Commerce and United Bank got merged with Punjab National Bank. Syndicate Bank is merged with Canara Bank while Union Bank of India, Andhra Bank and Corporation Bank got merged. Similarly Indian Bank got merged with Allahabad Bank.

Reserve Bank of India (RBI)

RBI was established in 1935, under RBI Act, 1934. RBI is the Central Bank of India. The main purpose of creating RBI was to regulate money supply and credit in the country. RBI was nationalised in 1949 and its first Indian Governor was **CD Deshmukh**. Its headquarter is in Mumbai.

Functions of the RBI

- Monetary policy, regulation and supervision of the banking and non-banking financial institutions.
- Debt and cash management for Centre and State Governments.
- Foreign exchange management, current and capital account management.
- Management of foreign exchange reserves.
- Currency management; oversight of the payment and settlement systems.
- Development role.
- Research and statistics.

The RBI and Credit Control

Quantitative Credit Control

It is used to control the volume of credit and indirectly to control the inflationary and deflationary pressures. *The quantitative credit control consists of*

- **Bank Rate** It is the rate, at which the RBI gives finance to Commercial Banks.
- **Cash Reserve Ratio (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 government approved securities with itself.

- **Repo Rate** It is the rate, at which RBI lends short-term money to the banks against securities.
- **Reverse Repo Rate** It is the rate, at which banks park short-term excess liquidity with the RBI. This is always 100 base point, 1% less than Repo rate.

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.

New Bank Licence

In April 2015, Reserve Bank of India provided licence for operation to two new private banks namely Bandhan Financial Services and Infrastructure Development Finance Company (IDFC).

MUDRA Bank

Micro Units Development and Refinance Agency Bank (MUDRA Bank) was launched on 8th April, 2015. Bank set up under SIDBI (Small Industries Development Bank of India). Bank has launched 3 loan instruments

- Shishu—Cover loans upto ₹ 50,000
- Kishore—Cover loan above ₹ 50,000 and upto ₹ 5 lakh.
- Tarun—Cover loans above ₹ 5 lakh and upto ₹ 10 lakh.

Indradhanush Scheme 2015

This is for the banking reforms in India. The 7 key reforms of Indradhanush Mission includes. appointments de-stressing, capitalisation, empowerment, framework of accountability, governance reforms and bank board bureau.

15th Finance Commission

The 15th Finance Commission was constituted in accordance with the **Article 280** of the Indian Constitution.

The first finance commission was headed by **KC Neogi** and the 15th Finance Commission is headed by NK Singh.

Stock Exchange of India

- Capital market is the market for long-term funds while money market is the market for short-term funds.
- Capital market of India is regulated by SEBI (Securities and Exchange Board of India, 1988).
- **A Stock Exchange** provides services for brokers and traders to trade stocks, bonds, and other securities.
- **The Bombay Stock Exchange (BSE)** is a stock exchange located on Dalal Street, Mumbai and is the oldest stock exchange in Asia. The BSE has the largest number of listed companies in the world established in 1875.
- **The National Stock Exchange (NSE)** is the 16th largest stock exchange in the world. It is situated in Mumbai.

Insurance

- Insurance industry includes two sectors, life Insurance and General Insurance.
- LIC was established on 1st September, 1956.
- **Insurance Regulatory and Development Authority of India (IRDAI)** was set-up on 19th April, 2000 to regulate the Insurance Sector. IRDA has changed its name to Insurance Regulatory and Development Authority of India in December 2014.

Foreign Trade

Balance of Trade (BoT)

The difference between a nation's imports of goods and services and its exports of them is known as **Balance of Trade**. There are three possibilities in the Balance of Trade (BoT) which are as follows

1. Balance BoT *i.e.* Exports = Imports
2. Adverse BoT *i.e.* Exports < Imports
3. Favourable BoT *i.e.* Exports > Imports

Balance of Payment (BoP)

BoP records the transactions in goods, services and assets between residents of a country with the rest of the world for a specified time period typically a year. There are two main accounts in the BoP : the *current account* and the *capital account*. In addition to that BoP includes errors and omissions and change in foreign exchange reserves.

Foreign Direct Investment (FDI)

It is an investment in a foreign country through the acquisition of a local company or the establishment of an operation on a new greenfield site. Direct investment implies control and managerial and perhaps technical, input.

FDI Limits

<i>Sector/Activity</i>	<i>% of FDI/Equity</i>
Multi Brand Retail (food)	100%
Telecom Services	100%
Tea Plantation	100%
Asset Reconstruction Company	100%
Petroleum and Natural Gas	49%
Commodity Exchanges	49%
Insurance	74%
Power Exchanges	49%
Stock Exchanges/Clearing Corporations	49%
Credit Information Companies, Pharma	100% (Green Field), 74 % (Brown Field)
Courier Services	100%
Single Brand Product Retail Trading	100%
Defence Sector	100%
Airlines	100%

CENSUS 2011

Population Trend in India

- 1891-1921** Stagnant population
1921-1951 Steady growth
1951-1981 Rapid high growth (stage of population explosion)
1981-2001 High growth rate with definite signs of slowing down

Total Population	1210569573
Male	623121843 (51.47%)
Female	587447730 (48.53%)
Density	382 per sq km
Sex Ratio	943
Child Sex Ratio	914

Largest and the Smallest States/UTs (in Population)

Top States/UTs

Uttar Pradesh	199281477
Maharashtra	112372972
Bihar	103804637
West Bengal	91347736
Andhra Pradesh	84665533

Bottom States/UTs

Lakshadweep	64,429
Ladakh	2,74,000
Andaman and Nicobar Islands	3,79,944
Dadra and Nagar Haveli and Daman and Diu	5,85,764
Sikkim	6,07,688

Effective Literacy Rate (2001-2011)

	2001 (%)	2011 (%)	Difference
Persons	64.83	74.04	10.21
Males	75.26	82.14	6.9
Females	53.67	65.46	11.8

States/UTs (according to Literacy)

Top States/Uts	(in %)	Bottom States/Uts	(in %)
Kerala	93.91	Bihar	63.82
Lakshadweep	92.28	Arunachal Pradesh	66.95
Mizoram	91.58	Rajasthan	67.06
Tripura	87.75	Jharkhand	67.63
Goa	87.40	Andhra Pradesh	67.66

Sex Ratio

	2001		2011	
	Population (in mn)	Proportion (in %)	Population (in mn)	Proportion (in %)
■ Males	532.2	51.74	623.7	51.51
■ Females	496.5	48.26	586.4	48.46
Adult Sex Ratio	933		943	
■ Males	85.0	51.89	82.9	52.24
■ Females	78.8	48.11	75.8	47.76
Child Sex Ratio	927		914	

ECONOMIC TERMS

Assets Property of any kind.

Balance of Trade (BoT) The difference between the exports and imports of two countries in trade with each other is called Balance of Trade.

Balance Sheet It is a statement of accounts, generally of a business concern, prepared at the end of a year.

Banker's Cheque A cheque by one bank to another.

Bank Rate It is the rate of interest charged by the Reserve Bank of India for lending money to commercial banks.

Barter To trade by exchanging one commodity for another.

Bearer This term on cheques and bills denotes that any person holding the same, has the same right in respect of it, as the person who issued it.

Black Money It means unaccounted money, concealed income and undisclosed wealth. The money which thus remains unaccounted for, is called the black money.

Bond A legal agreement to pay a certain sum of money (called principal) at some future date and carrying a fixed rate of interest.

Budget An estimate of expected revenues and expenditure for a given period, usually a year, item by item.

Budget Deficit When the expenditure of the government exceeds the revenue, the balance between the two is the budget deficit.

Bulls Speculators in the stock markets who buy goods, in some cases without money to pay with, anticipating that prices will go up.

Buyer's Market An area in which the supply of certain goods exceeds the demands so that purchasers can drive hard bargains.

Commercial Banks Financial institutions that create credit accept deposits, give loans and perform other financial functions.

Call Money Loan made for a very short period. It carries a low rate of interest.

Deflation It is a state in monetary market when money in circulation has decreased.

Depreciation Reduction in the value of fixed assets due to wear and tear.

Devaluation Official reduction in the foreign value of domestic currency. It is done to encourage the country's exports and discourage imports.

Dividend Earning of stock paid to shareholders.

Dumping Sale of a commodity at different prices in different markets, lower price being charged in a market where demand is relatively elastic.

Exchange Rate The rate at which Central Banks will exchange one country's currency for another.

Excise Duty Tax Imposed on the manufacture, sale and consumption of various commodities, such as taxes on textiles, cloth, liquor, etc.

Fiscal Policy Government's expenditure, tax policy and borrowing.

Gross Domestic Product (GDP) A measure of the total flow of goods and services produced by the economy over a specific time period, normally a year.

Repo Rate The rate at which banks borrow from RBI. It injects liquidity into the market.

Inflation A sustained and appreciable increase in the price level over a considerable period of time.

Monopoly Single seller selling single product.

Monopolistic Competition Existence of too many sellers selling differentiated products.

Bilateral Monopoly Existence of single buyer and single seller.

Monopsony Single buyer buying product being unique.

Oligopoly Existence of few sellers and few products. Price war is a common feature.

Reverse Repo Rate The rate at which RBI borrows from banks for a short-term. It withdraws liquidity into the market.



GENERAL SCIENCE

PHYSICS

In Physics, we study about a large number of physical quantities, which can be broadly classified into two categories : scalars and vectors.

Scalar Quantities Physical quantities which have magnitude only. e.g. Mass, speed, volume, work, time, distance, power, energy, etc. are scalar quantities.

Vector Quantities Physical quantities, which have magnitude and direction both, e.g., Displacement, velocity, acceleration, force, momentum, torque, etc.

For a quantity to be a vector, it is necessary that it follows the triangle rule of addition of two vectors.

NEWTON'S LAWS OF MOTION

First Law Every body maintains its initial state of rest or uniform motion on a straight line unless any external force acts on it. It is also called **Galileo's law of inertia**.

Example While jumping from a slowly moving train/bus one must run for a short distance, in the direction of motion.

Second Law The force acting on an object is directly proportional to the product of the mass of the object and the acceleration produced on it.

Third Law To every action, there is an equal and opposite reaction.

Example Bogies of the trains are provided with buffers to avoid severe jerks during shunting of trains.

Rocket moves up due to reaction of downward ejection of gas.

CIRCULAR MOTION

- When an object moves along a circular path, its motion is called circular motion.
- The direction of motion at any point in circular motion is given by the tangent to the circle at that point.
- The external force required to act radially inward over the circular motion of the body is called **centripetal force**.
- In the death well, the walls of well exert an inward force over the motorcycle and as a reaction, the motorcycle exert an outward force on the walls of the well.
- **Centrifugal force** is such a pseudo force that is equal and opposite to centripetal force.
- Cream separator, centrifugal dryer work on the principle of centrifugal force.

FRICTION

It is the opposing force that is set-up between the surfaces of contact of two bodies when one body slides or rolls or tends to do so on the surface of another body.

- Due to friction we are able to move on the surface of Earth.
- On applying brakes in automobiles, it stops only due to friction.

WORK

- Work is said to be done, if force acting on a body is able to actually move it through some distance in the direction of the force. Its SI unit is **joule**.

$$\text{Work} = Fs \cos \theta$$

where, F = force, s = displacement and θ is the angle between the direction of force and displacement.

- If $\theta > 90^\circ$, then work will be negative.
- If $\theta < 90^\circ$, then work will be positive.
- If $\theta = 90^\circ$, then work will be zero.

If a coolie carrying a load on his head is moving on a horizontal platform, then theoretically he is not doing any work because $\theta = 90^\circ$, $W = FS \cos 90^\circ = 0$

ENERGY

Capacity of doing work by a body is called its energy. Energy is a scalar quantity and its unit is **joule**. Mechanical energy is of two types.

- **Kinetic Energy (K)** Energy possessed by a body due to its motion.

$$K = \frac{1}{2}mv^2$$

where, m is mass and v is the velocity.

- **Potential Energy (U)** The capacity of doing work developed in a body due to its position or configuration.

$$U = mgh$$

where, m is mass, g is acceleration due to gravity and h is height.

- The sum of all kinds of energies in an isolated system remains constant at all times. This is the law of conservation of energy.

POWER

Rate of doing work is called power. Its unit is **watt**.

$$\text{Power} = \frac{\text{Work done}}{\text{Time taken}}$$

- 1 watt hour = 3600 joule
- 1 kilowatt hour = 3.6×10^6 joule
- 1 HP = 746 watt

GRAVITATION

- Everybody in the universe attracts other body by a force called force of gravitation.
- The gravitational force of the earth is called **gravity**.
- The acceleration produced in a body due to force of gravity is called **acceleration** due to gravity (g) and its value is **9.8 m/s^2** .
- Acceleration due to gravity is independent of shape, size and mass of the body.
- Escape velocity is the minimum velocity with which an object just crosses the Earth's gravitational field and never returns. Escape velocity at the Earth's surface is **11.2 km/s** .
- Escape velocity at the Moon's surface is **2.4 km/s** . Due to low escape velocity there is no atmosphere on the Moon.
- 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.
- The acceleration due to gravity at the **Moon** is one-sixth that of the Earth. So, the weight of a person on the surface of the Moon will be one-sixth of his actual weight on the Earth.

SATELLITES

- Satellites are natural or artificial bodies revolving around a planet under its gravitational force of attraction.
- **Moon** is a natural satellite, while INSAT-B is an artificial satellite of Earth.
- The period of revolution of satellite revolving near the surface of Earth is 1 hour 24 minutes (84 minutes).
- Geo-stationary satellite revolves around the Earth at a height of 36000 km (approx). The orbit of geo-stationary satellite is called parking orbit. Geo-stationary satellite revolves in equatorial plane from West to East. Time period of rotation of geo-stationary satellite is **24 h**.
- The **Earth** rotates on its axis from **West** to **East**. This rotation makes the Sun and the stars appears to be moving across the sky from East to West.

- Geo-stationary satellite is used to telecast TV programmes from one part of the world to another, in weather forecasting, in predictions of floods and droughts.
- **Polar satellite** revolves around the Earth in polar orbit at a height of **800 km** (approx). Time period of these satellites is **84 min**.
- These are used for weather forecasting, mapping, etc.

GENERAL PROPERTIES OF MATTER

Elasticity

Elasticity is the property of material of a body by virtue of which the body acquires its original shape and size after the removal of **deforming force**.

- A force, which changes the configuration of a body, is called a **deforming force**.
- Steel is more elastic than rubber.

Pressure

Pressure is defined as force acting normally on a unit area of the surface.

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

Its unit is **N/m²**. It is a scalar quantity.

- Atmospheric pressure is measured by an instrument called the **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 weather.
- The pressure exerted by liquid column at the surface given as **p = h ρ g**, where ρ is the density of liquid and h is height of liquid column. In a static liquid at same horizontal level, pressure is same at all points.

Atmospheric pressure decreases with altitude.

That is why

- It is difficult to cook on the mountain.
- The fountain pen of a passenger leaks in aeroplane.
- Bleeding occurs from the nose.
- It is difficult to breathe on higher altitude due to less amount partial pressure of oxygen in air.
- Water starts to boil below 100°C.

Pascal's Law of Pressure

- If gravitational attraction is negligible in equilibrium condition, (approx) pressure is same at all points in a liquid.
- The pressure exerted anywhere at a point of confined liquid is transmitted equally and undiminished in all directions throughout the liquid.
- Hydraulic lift, hydraulic press and hydraulic brakes are based on the Pascal's law of pressure.

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.

- The weight of water displaced by an iron ball is less than its own weight whereas water displaced by the immersed portion of a ship is equal to its weight. So, small ball of iron ball sink in water, but large ship float.
- A fat person will quickly learn the swimming as compared to a slim person because he will displace more water. So, he will be more balanced.
- Hydrogen filled balloon float in air because hydrogen is lighter than air.
- A person can lift more weight in water.

Laws of Floatation

A body floats in a liquid if

- The density of material of the body is less than or equal to the density of liquid.
- When the density of material of the 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 for this condition.

Density

- Density is defined as mass per unit volume.
- Relative density is measured by **hydrometer**.
- The density of sea water is more than that of normal water.
- When a ship enters in a sea from a river, it raises a bit because the density of saline water (salt water) is higher.
- The density of iron is more than that of water, but less than that of mercury. So, a solid chunk of iron sink in water but float in mercury.
- If ice floating in water in a vessel melts, the level of water in the vessel does not change.

Surface Tension

- It is the force (F) acting normally on unit length (l) of imaginary line drawn on the surface of liquid i.e., $T = \frac{F}{l}$, its unit is N/m.
- The property of a liquid by virtue of which it tries to minimise its free surface area is called the surface tension.
- Surface tension decreases with rise in temperature and becomes zero at the critical temperature.
- The surface tension of clean water is higher than that of a soap solution.
- Formation of lead shots, spraying result in coldness, floatation of needle on water, dancing of camphor on water, are based on surface tension.
- Rain drop form spherical shape due to surface tension.
- When kerosene oil is sprinkled on water, its surface tension decreases, due to which the excess of mosquitoes floating on the surface of water die due to sinking.

Cohesive and Adhesive Forces

Force of attraction applied between molecules of same substance is called **cohesive force** while attractive force between molecules of different substances is called **adhesive force**.

Capillarity

The phenomenon of rise or depression of liquids in a capillary tube is called capillarity.

- A piece of blotting paper soaks ink because the pores of the blotting paper serve as capillary tubes.
- The oil in the wick of a lamp rises due to capillary action of threads in the wick.
- The root hairs of plants draws water from the soil through capillary action.

Viscosity

Viscosity is the property of a fluid by virtue of which an internal frictional force acts between its layers, when it is in motion.

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) is constant.

Venturimeter, Atomizer, filter pump, motion of aeroplane are based upon the Bernoulli's theorem.

HEAT AND THERMODYNAMICS

Heat

- Heat is a form of energy, which measures the sensation or perception of warmth or coldness of a body or environment.
- Its units are calorie, kilocalorie or joule.
- 1 calorie = **4.18** joule.

Temperature

- Temperature is the measurement of hotness or coldness of a body.
- When two bodies are placed in contact, heat always flow from a body at higher temperature to the body at lower temperature.

- An instrument used to measure the temperature of a body is called a **thermometer**.
- The **normal temperature** of a **human body** is 37°C or 98.4°F .
- -40° is the temperature at which **Celsius** and **Fahrenheit** thermometers read same.
- The **clinical thermometer** reads from 96°F to 110°F .
- White roof keeps the house cooler in summer than black roof because white roof reflects more and absorbs less heat rays whereas black roof absorbs more and reflects less heat rays.
- Ice wrapped in a blanket does not melt away quickly because woollen blanket is a bad conductor of heat.
- Silver is the best conductor of heat.
- Cooking utensils are made of aluminum, brass and steel because these substances have low specific heat and high conductivity.

Thermal Expansion

- Thermal expansion is the increase in size on heating.
- *A solid can undergo three types of expansions*
 - (i) Linear expansion
 - (ii) Superficial expansion
 - (iii) Cubical expansion
- Telephone wires are kept loose to allow the wires for contraction in winter.
- A gap is provided between two iron tracks of the railway track, so that rails can easily expand during summer and do not bend.

Specific Heat

- The amount of heat required to raise the temperature of unit mass of a substance through 1°C , is called its specific heat.
- When temperature of water is increased from 0°C , then its volume decreases upto 4°C , becomes minimum at 4°C and then increases.
- This behaviour of water around 4°C is called anomalous expansion of water.

Latent Heat

- The heat energy absorbed or released at constant temperature per unit mass for change of state is called the latent heat.
- Latent heat of fusion of ice is **80 cal/g**.
- Latent heat of vaporisation of steam is **536 cal/g**.
- Hot water burns are less severe than that of steam burns because steam has high latent heat.

Evaporation

- It is the slow process of conversion of liquid into its vapour even below its boiling temperature.
- The amount of water vapour in air is called **humidity**.
- Relative humidity is measured by hygrometer.
- Relative humidity increases with the increase of temperature.

Transmission of Heat

- Transfer of heat from one place to other place is called transmission of heat.
- In solids, transmission of heat takes place by **conduction process**.
- In liquids and gases, transmission of heat takes place by **convection process**. In room, ventilators are provided to escape the hot air by convection.
- Heat from the Sun reaches the Earth by **radiation**.

Simple Pendulum

- Simple pendulum is a heavy point mass suspended from a rigid support by means of an elastic and inextensible string.
- The maximum time period of a simple pendulum is **84.6 min**.
- The time period of a simple pendulum does not depend upon the mass, shape and size of the bob and its amplitude of oscillation. A pendulum clock goes slow in summer and fast in winter.
- 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 is infinite.

WAVES

A wave is a disturbance, which propagates energy from one place to the other without the transportation of matter.

Waves are broadly of two types

- (i) Mechanical wave (longitudinal wave and transverse wave)
- (ii) Electromagnetic wave

Longitudinal Waves

In this wave, the particles of the medium vibrate in the direction of propagation of wave.

Waves on springs or sound waves in air are examples of longitudinal waves.

Transverse Waves

In this wave, the particles of the medium vibrate perpendicular to the direction of propagation of wave.

Waves on strings under tension, waves on the surface of water are the examples of transverse waves.

Electromagnetic Waves

- The waves, which do not require medium for their propagation i.e., which can propagate even through the vacuum are called electromagnetic waves.
- Light radio waves, X-rays, etc. are the examples of electromagnetic waves. These wave propagate with the velocity of light in vacuum.

Sound Waves

Sound waves are longitudinal mechanical waves. Based on their frequency range sound waves are divided into following categories.

- The sound waves which lie in the frequency range **20 Hz to 20000 Hz** are called audible waves.
- The sound waves having frequencies less than **20 Hz** are called infrasonic waves.
- The sound waves having frequencies greater than **20000 Hz** are called ultrasonic waves.
- Ultrasonic waves are used for sending signals, measuring the depth of sea, cleaning machinery parts located in hard to reach places, such as spiral tubes, etc.

Speed of Sound

- Speed of sound is maximum in solids and minimum in gases.
- When sound goes from one medium to another medium, its speed and wavelength changes, but frequency remains unchanged.
- The speed of sound remains unchanged by the increase or decrease of pressure.
- The speed of sound increases with the increase of temperature of the medium.
- The speed of sound is more in humid air than in dry air because the density of humid air is less than the density.

Echo The repetition of sound due to reflection of sound waves, is called **echo**.

Intensity It is defined as the amount of energy passing per unit time through a unit area that is perpendicular to the direction in which sound waves are travelling.

Pitch The sensation of a frequency is commonly referred to as the pitch of a sound.

SONAR It stands for sound navigation and ranging. It is used to measure the depth of a sea, to locate the enemy submarines and shipwrecks.

Doppler's Effect

- If there is a relative motion between source of sound and observer, the apparent frequency of sound heard by the observer is different from the actual frequency of sound emitted by the source. This phenomenon is called **Doppler's effect**.
- When the distance between the source and observer decreases, then apparent frequency increases and *vice-versa*.

LIGHT

- Light is a form of energy, which is propagated as electromagnetic wave.
- It is the radiation which makes our eyes able to see the object. Its speed is 3×10^8 m/s. It is the form of energy. It is a transverse wave. It takes 8 min 19 s to reach on the Earth from the Sun and the light reflected from Moon takes 1.28 s to reach Earth.

Reflection of Light

When a ray of light falls on a boundary separating two media comes back into the same medium, then this phenomenon is called reflection of light.

Laws of Reflection

- The incident ray, reflected ray and the normal to the reflecting surface at the incident point all lie in the same plane.
- The angle of reflection is equal to the angle of incidence.

Reflection from Plane Mirror

- The image is virtual and laterally inverted.
- The size of image is **equal** to that of object.
- If an object moves towards a plane mirror with speed v , relative to the object the image moves towards it with a speed $2v$.
- To see his full image in a plane mirror, a person requires a mirror of atleast half of his height.
- The number of images formed by two plane mirrors, inclined by an angle θ ,

$$n = \left(\frac{360^\circ}{\theta} - 1 \right).$$

Spherical Mirror

- *Spherical mirrors are of two types*
 (i) Concave mirror (ii) Convex mirror
- Image formed by a convex mirror is always virtual, erect and diminished.
- Image formed by a concave mirror is generally real and inverted.

Uses of Concave Mirror

(i) As a shaving glass. (ii) As a reflector for the headlights of a vehicle, search light. (iii) In ophthalmoscope to examine eye, ear, nose by doctors. (iv) In solar cookers.

Uses of Convex Mirror

(i) As a rear view mirror in vehicle because it provides the maximum rear field of view and image formed is always erect. (ii) In sodium reflector lamp.

Refraction of Light

The bending of the ray of light passing from one medium to other medium is called refraction. When a ray of light enters from one medium to other medium, its frequency and phase do not change, but wavelength and velocity change. Due to refraction from Earth's atmosphere, the stars appear to twinkle.

$$\text{Refractive index } (\mu) = \frac{\text{Speed of light in vacuum}}{\text{Speed of light in the medium}}$$

Critical Angle

The angle of incidence in a denser medium for which the angle of refraction in rarer medium becomes 90° , is called the critical angle.

Total Internal Reflection (TIR)

If light is travelling from denser medium to rarer medium and the angle of incidence is more than the critical angle, then the light is reflected back into the denser medium. This phenomenon is called total internal reflection.

Sparkling of diamond, mirage and looming, shinning of air bubble in water and optical fibre are examples of total internal reflection.

Optical Fibre

It works on the principle of TIR. It is used for telecommunication and various medical purposes like endoscopy.

Lens

- *Lens is generally of two types*
 (i) Convex lens (ii) Concave lens
- When lens is dipped in a liquid of higher refractive index, the focal length increases and convex lens behave as concave lens and *vice-versa*.
- An air bubble trapped in water or glass appears as convex, but behaves as concave lens.

Dispersion of Light

- When a ray of white light is passed through a prism, it gets splitted into its constituent colours. This phenomenon is called **dispersion of light**.

- The different colours appeared in the spectrum are in the following order, violet, indigo, blue, green, yellow, orange and red (**VIBGYOR**).
- Rainbow is formed due to dispersion of sunlight by water droplets.
- Wavelength of red colour is maximum and for violet colour is minimum.
- Red, green and blue are **primary** colours. Green and magenta, blue and yellow, red and cyan are **complementary** colours.

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 striking on these particles deviated in different directions. Scattering of light is maximum in case of violet colour and minimum in case of red colour.
- Blue colour of sky is due to scattering of blue and violet light. The brilliant red colour of rising and setting sun is also due to scattering of light.

HUMAN EYE

- It is an optical instrument like camera. It forms the real image of the object on retina of the eye. Least distance of distinct vision is 25 cm.

Defects of Eye

Myopia (<i>Short sightedness</i>)	A short-sighted eye can see only nearer objects. Distant objects are not seen clearly. This defect can be removed by using concave lens of suitable focal length.
Hypermetropia (<i>Long sightedness</i>)	A long sighted eye can see distant objects clearly but nearer object are not clearly visible. This defect can be removed by using a convex lens.
Presbyopia	In this defect both near and far objects are not clearly visible. It can be removed by using bi-focal lens.
Astigmatism	In this defect eye cannot see horizontal and vertical lines clearly. This defect can be removed by using suitable cylindrical lenses.

Microscope

- **Simple** microscope is a convex lens of small focal length.
- **Compound microscope** is a combination of two convex lenses, called objective lens and eyepiece, separated by a distance.
- **Astronomical Telescope** is also a combination of two lenses in which objective lens is a convex lens of large aperture and large focal length while eye-piece is a convex lens of small aperture and small focal length.

ELECTRICITY AND MAGNETISM

Charge

Charge is the basic property associated with matter due to which it produces and experiences electric and magnetic effects. Similar charges repel each other and opposite charges attract each other. The SI unit of charge is **coulomb**.

Conductor Conductors are those materials, which allow electricity to pass through themselves. Metals like silver, iron, copper and earth acts like a conductor. **Silver** is the best conductor.

Insulator Insulator are those materials which do not allow electricity to flow through themselves. Wood, paper, mica, glass, ebonite are insulators.

Electric Current

- Electric current is defined as the rate of flow of charge or charge flowing per unit time. Its unit is **ampere**. It is a scalar quantity.
- A lightning conductor is fixed on tall buildings to protect them from the destructive effects of the lightning.
- An electric bulb produces a bang when it is broken because there is a vacuum inside the electric bulb, when the bulb is broken air rushes at great speed from all sides to fill the vacuum. The rushing of air produces a noise generally referred to as the **bang**.

Ohm's Law

At the constant physical conditions of any conductor, the current flowing through the conductor is directly proportional to the potential difference across it.

$$I = \frac{V}{R}, \text{ where } R \text{ is the resistance.}$$

- If a wire is stretched, its resistance will change but its specific resistance will remain unaffected.
- On increasing the temperature of the metal, its resistance increases.
- On increasing the temperature of semiconductor, its resistance decreases.
- On increasing the temperature of electrolytes, its resistance decreases.
- The reciprocal of resistivity of a conductor is called its **conductivity**. Its unit is **mho m⁻¹**.
- The heating effect of electric current is known as **Joule's law of heating**.
- Electric bulb, electric kettle, heater, etc devices work on the bases of heating effect of electric current.

Ammeter It is a device which is used to measure electrical current. It is connected in series. The resistance of an ideal ammeter is zero.

Voltmeter It 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.

Fuse Wire It is a small conducting wire of alloy of copper, tin and lead having low melting point. So, it is protective device used in series.

MAGNETS

- Magnet is a piece of iron or other materials that can attract iron containing object and points toward North when suspended.
- When a magnet is freely suspended, its one pole always direct towards the North. This pole is called North pole. The other pole is called South pole.
- Like poles of a magnet repel each other and unlike poles attract each other.
- A current carrying coil containing a soft iron core, is called an electromagnet, which is utilised in electric bell, telegraph receiver, telephone, transformer, dynamo, etc.

ATOMIC AND NUCLEAR PHYSICS

Cathode Rays

Cathode ray was discovered by **Sir William Crooke** and its properties are

- These rays travel in straight lines.
- These rays produce fluorescence.
- These rays can penetrate through thin foils of metal and deflected by both electric and magnetic fields.
- These rays have velocity ranging **1/30th** to **1/10th** of the velocity of light.

Positive or Canal Rays

- These rays were discovered by **Goldstein**.
- The positive rays consists of positively charged particles.
- These rays travel in straight line.
- These rays are deflected by electric and magnetic fields.
- These rays are capable of producing physical and chemical changes.
- These rays can produce ionisation in gases.

X-Rays

- X-rays are electromagnetic waves with wavelength range **0.1 Å–100 Å**. X-rays were discovered by **Roentgen**.
- X-rays travel in straight line. These rays show reflection, refraction, interference, diffraction and polarisation and do not deflected by electric and magnetic fields.
- Long exposer of X-rays is injurious to the human body.
- X-rays shows **photoelectric effect**.

Uses of X-Rays

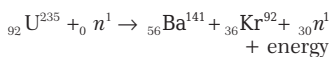
- **In Medical Sciences** X-rays are used in surgery for the detection of fractures, diseased organs, foreign matter like bullet, stones, etc. They are used in treatment of cancer and in skin diseases.
- **In Engineering** X-rays are used in detecting faults, cracks, flaws and gas pockets in the finished metal products and in heavy metal sheets.
- **In Scientific Work** X-rays are used in studying crystal structure and complex molecules.
- **In Custom Department** X-rays are used in custom department for detection of banned materials kept hidden.

Radioactivity

- Radioactivity was discovered by **Henry Becquerel**, **Madame Curie** and **Pierre Curie** for which they jointly won Nobel Prize.
- The nucleus having protons 83 or more are unstable. They emit α , β and γ particles and become stable. The elements of such nucleus are called **radioactive** elements and the phenomenon of emission of α , β and γ particles is called **radioactivity**.
- **Robert Pierre** and his wife **Madame Curie** discovered a new radioactive element radium.
- The end product of all natural radioactive elements after emission of radioactive rays is lead.
- With the emission of an α -particle, atomic number is decreased by 2 and mass number is decreased by 4.
- With the emission of a β -particle, atomic number is increased by 1 and mass number does not change.

Nuclear Fission

- The nuclear reaction, in which a heavy nucleus splits into two nuclei of nearly equal mass is nuclear fission.



- **Atom Bomb** is based on nuclear fission. U^{235} and Pu^{239} are used as fissionable material.
- Nuclear fission was first demonstrated by **Hatim** and **Fritz Strassmann**.

Nuclear Fusion

- When two or more light nuclei combined together to form a heavier nucleus is called as nuclear fusion.
- For the nuclear fusion, a temperature of the order of 10^8 K is required.
- **Hydrogen Bomb** was made by the American Scientist in 1952. This is based on nuclear fusion. It is 1000 times more powerful than atom bomb.

Nuclear Reactor or Atomic Pile

- Nuclear reactor is an arrangement, in which controlled nuclear fission reaction takes place.
- First nuclear reactor was established in Chicago University under the supervision of Prof **Enrico Fermi**.
- Heavy water, graphite and beryllium oxide are used to slow down the fast moving neutrons. They are called **moderator**.
- The cold water, liquid oxygen, etc. are used as coolant to remove heat generated.
- Cadmium or boron rods are good absorber of neutrons and called the control rods.

Uses of Nuclear Reactor

- To produce electrical energy from the energy released during fission.
- To produce different isotopes, which can be used in medical, physical and agriculture science.

There 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 a gas like He or CO_2 .

LASER (Light Amplification by Stimulated Emission of Radiation)

It is a device that produces an intense, coherent and highly directional beam of the single frequency. It can be transmitted over a great distance without being spread.

LASER Technology in India

In 1964, the first laser as Gallium Arsenide (GaA) semi-conductor laser was designed and fabricated by Bhabha Atomic Research Centre (BARC).

Various Institutions as CAT (Centre for Advanced Technology), DRDO (Defence Research and Development Organisation) and Indian Institute of Science (IISc) work on the laser plasma, quantum optics, etc., are going to work with American collaboration.

MASER (Microwave Amplification by Stimulated Emission of Radiation)

It was invented by three American scientist **Gordon, Gieyer** and **H Townes** in 1952.

It uses microwaves in amplified form of longer wavelength of the light, while ordinary laser uses light.

Units of Measurement

<i>Quantity</i>	<i>Unit (SI)</i>	<i>Quantity</i>	<i>Unit (SI)</i>
Length	Metre	Viscosity	Newton.sec/m ²
Time	Second	Surface tension	Newton/metre
Mass	Kilogram	Heat	Joule
Area	Square metre	Temperature	Kelvin
Volume	Cubic metre	Absolute temperature	Kelvin
Velocity	Metre/second	Resistance	Ohm
Acceleration	Metre/second ²	Electric current	Ampere
Density	Kilogram/metre ³	Electromotive force	Volt
Momentum	Kilogram-metre/second	Electrical conductivity	mho/metre
Work	Joule	Electric energy	Kilowatt-hour
Energy	Joule	Electric power	Kilowatt or watt
Force	Newton	Magnetic intensity	Oersted
Pressure	Pascal or Newton/metre ²	Charge	Coulomb
Frequency	Hertz	Magnetic induction	Gauss
Power	Watt	Luminous flux	Candela
Weight	Newton or Kilogram	Intensity of sound	Decibel
Impulse	Newton-second	Power of lens	Dioptre
Angular velocity	Radian /second	Depth of sea	Fathom

CHEMISTRY

Chemistry, a branch of physical science, is the study of the composition, properties and behaviour of matter.

Physical and Chemical Changes

- Physical changes are the changes which only affect the physical properties like colour, hardness, density, melting point etc, of matter, but do not affect the composition and chemical properties of matter.
- A physical change is temporary, while a chemical change is permanent.
- Crystallisation, sublimation, boiling, melting, vaporisation, cutting of trees, dissolving sugar or salt in water etc are physical changes.
- Chemical changes affect the composition as well as chemical properties of matter and result in the formation of a new substance.
- Burning of fuel, burning of candle and paper, electrolysis of water, photo-synthesis, ripening of fruits etc, are examples of chemical changes.

MATTER

- Anything which occupies space and has mass is called matter. In general, it exists in three states i.e., solid, liquid and gas.
- Now-a-days there is a discussion on two more states of matter i.e., Plasma (Ionised gases containing super energetic and super excited particles) and Bose-Einstein Condensates or BEC (a gas at super low temperature with extremely low density).

Boiling Point

- The temperature at which liquid converts into vapour is called its boiling point.
- Boiling point of water is 100°C.
- The boiling point increases in the presence of impurities that's why boiling point of sea water is more than the boiling point of pure water (as the former contains impurity).

- It usually decreases at high altitudes. That's why at high altitudes, the boiling point of water is less than 100°C and more time is required to cook a food.

Melting Point

- It is a temperature at which a substance converts from its solid state to liquid state. Melting point of ice is 0°C. It decrease in the presence of impurity.

ATOM, MOLECULE AND ELEMENT

- An atom is the smallest particle of the element that can exist independently and retain all its chemical properties.
- Atom is made up of electrons, protons and neutrons.
- Protons and neutrons reside in the nucleus (at the centre of atom) whereas electrons revolve around the nucleus.
- A molecule is the smallest part of an element or a compound capable of independent existence under ordinary conditions.
- Element contains only one type of atoms. e.g. carbon (C), sulphur (S), diamond, graphite etc.
- Oganesson, with symbol Og and atomic number 118 is recent element synthesized.
- **Ununseptium** (a superheavy chemical element with atomic number 117) is a member of group-17 in the periodic table below the five halogens (fluorine, chlorine, bromine, iodine and astatine). Its synthesis was claimed in Dubna, Russia by a joint Russian-American collaboration.
- In 2014, the GSI Helmholtz Centre for Heavy Ion Research in Germany also claimed to have successfully repeated original experiment.

Isotopes and Isobars

- Isotopes have the same number of protons (i.e. atomic number), but different number of neutrons and mass number (atomic number + number of neutrons), e.g. ${}_1\text{H}^1$, ${}_1\text{H}^2$, ${}_1\text{H}^3$.
- Isobars have the same mass number but different atomic number. e.g. ${}_{18}\text{Ar}^{40}$, ${}_{19}\text{K}^{40}$ and ${}_{20}\text{Ca}^{40}$.

Dating Techniques

- Radiocarbon dating is used to determine the age of carbon bearing materials like wood, animal fossils etc.
- Uranium dating is used to determine the age of Earth, minerals and rocks.

Colloids

- These are heterogeneous solutions, containing two phases : dispersed phase and dispersion medium.
- These show Tyndall effect (i.e. scattering of light by colloidal particles) and Brownian motion (zig-zag motion).
- Colloids can be dispersion medium loving (i.e. lyophilic) or dispersion medium repelling (i.e. lyophobic).

Some Colloids and their Example

<i>Dispersed Phase</i>	<i>Dispersion Medium</i>	<i>Type of Colloid</i>	<i>Example</i>
Liquid	Gas	Aerosol	Fog, clouds, mist
Solid	Gas	Aerosol (<i>solid</i>)	Smoke, automobile exhaust
Gas	Liquid	Foam	Shaving cream
Liquid	Liquid	Emulsion	Milk, face cream
Solid	Liquid	Sol	Mud, milk of magnesia
Gas	Solid	Foam	Foam, rubber, sponge, pumice
Liquid	Solid	Gel	Jelly, cheese, butter
Solid	Solid	Solid sol	Milky glass, coloured gem stone

Battery

Battery is a device, used to convert chemical energy into electrical energy and is of two types :

- **Primary batteries** (non-rechargeable) act as galvanic cell, e.g. dry cell, mercury cell etc.
- **Secondary batteries** (rechargeable) act as galvanic as well as voltaic cell e.g. lead storage battery, nickel cadmium battery etc.

In electrolytic refining, anode is made by impure metal and a strip of pure metal acts as cathode.

Types of Batteries

<i>Battery</i>	<i>Anode</i>	<i>Cathode</i>	<i>Electrolyte</i>	<i>Used in</i>
Leclanche cell	Zinc	Graphite	Paste of ammonium chloride and zinc chloride	Transistors, clocks
Mercury cell	Zinc-mercury amalgam	Paste of HgO (Mercuric oxide) and carbon	Paste of KOH and ZnO	Hearing aids and camera
Lead storage battery	Lead	Lead packed in lead dioxide	38% solution of sulphuric acid	Automobiles, invertors

Corrosion

- The oxidative deterioration of a metal surface by the action of environment is called corrosion, it is an electrochemical process.
- When iron is exposed into air, iron surface turns red due to the formation of hydrated ferric oxide ($\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$) which is also called rust, silver surface turns black due to the formation of silver sulphide (Ag_2S) and copper or bronze surfaces turn green due to the formation of basic copper carbonate, $\text{Cu}(\text{OH})_2 \cdot \text{CuCO}_3$.
- Corrosion of iron is called rusting and is accelerated by the presence of impurities, H^+ , electrolyte such as NaCl and gases like CO_2 , SO_2 , NO_2 etc.
- Corrosion is prevented by electroplating, oiling, greasing, painting, varnishing and by galvanisation (i.e. deposition of zinc layer over iron articles).

- A sliced apple, when exposed to air, turns brown after sometime. This is because apple contains iron, which gets oxidised and gives a brownish colour to apple.

Renewable and Non-renewable Natural Resources

- Renewable resources are available in large excess, i.e. never ends, e.g. air, sunlight etc.
- Non-renewable resources are available in limited quantity and end, if used excessively, after a limited period of time. e.g. mineral, coal, petroleum, natural gas etc.

Coal

Coal is obtained by carbonisation of vegetable matter and is available in different varieties : Peat (60% C), lignite or brown coal (70% C), bituminous coal (60% to 80% C), anthracite coal (90% C). Out of these, bituminous is the most common form.

Flame

Flame contains three parts

1. **Innermost part** which is black due to the presence of unburnt carbon particles and has lowest temperature.
2. **Middle part** is yellow due to incomplete combustion of fuel.
3. **Outermost part** is blue due to complete combustion of fuel, which is the hottest part and used by goldsmith to heat the gold.

Fire Extinguishers

- Water extinguishes fire because as it evaporates the vapours surround the burning substance, cutting off the oxygen supply, thus inhibiting burning process.
- In case of electrical or oil (petrol) fires, water cannot be used as extinguisher. This is because water is a conductor of electricity and heavier than oil. Thus, oil floats over it and continues to burn. Carbon dioxide, which is generated by the reaction of baking soda with acid, is used to extinguish electrical or oil fires.
- Quality of petrol is measured in terms of octane number and that of diesel in terms of cetane number. TEL (Tetra Ethyl Lead) is an antiknock compound. Higher the octane number better is the quality of fuel.

Fuels

- The substance, which produce heat and light on combustion are called fuels.
- A strong foul smelling substance, called ethyl mercaptan, C_2H_5SH , is added to LPG to detect its leakage as LPG is an odourless gas.
- The amount of heat obtained, when 1g of a fuel is burned in excess of oxygen is called **calorific value**.
- Vehicle carrying inflammable substances have metallic ropes, touching the ground during motion in order to provide earthing for lightning.
- Fuels used in rocket are called rocket propellants. A mixture of liquid hydrogen and liquid oxygen, is most common rocket propellant.

Some Important Fuels and their Compositions

<i>Fuel</i>	<i>Composition</i>	<i>Sources</i>
Water Gas	Carbon monoxide (CO) + Hydrogen (H_2)	By passing steam over red hot coke
Producer Gas	Nitrogen (N_2) + Carbon monoxide (CO) (2 : 1 ratio)	By passing insufficient air over red hot coke
Coal Gas	Hydrogen + Methane + Ethylene (C_2H_4) + Acetylene (C_2H_2) + CO + Nitrogen	By fractional distillation of wood
Natural Gas	Methane (83%) + Ethane (16%)	From petroleum
Liquified Petroleum Gas (LPG)	Butane (C_4H_{10}) + Propane (C_3H_8)	From oil wells
Compressed Natural Gas (CNG)	Methane (CH_4) 95%	From petroleum
Biogas or Gobar Gas	Methane (CH_4) + Carbon dioxide (CO_2) + Hydrogen (H_2) + Nitrogen (N_2)	From organic wastes

Calorific Value of Some Substances

<i>Fuel</i>	<i>Calorific Value (kJ/g)</i>
Coal	25-32
Kerosene oil	48
Petrol	50
Diesel	45
Biogas	35-40
LPG	50
Cow dung	6-8
Hydrogen	150
Natural gas	35-50

Safety Matches

In safety matches, the stick consists of a mixture of antimony trisulphide and potassium chlorate at its one end. The box side contains a mixture of powdered glass and red phosphorus.

ACIDS, BASES AND SALTS**Acids**

- These are the substance, which have a sour taste and turn blue litmus red.
- These are good conductor of electricity in aqueous solution.
- Pickles are always kept in glass jar because acid present in them reacts with metal to produce hydrogen gas.

Bases

- These are the substances, which have bitter taste, soapy to touch and turn red litmus blue.
- Bases like NaOH, KOH, etc. are good conductors of electricity in their aqueous solution and in molten state.
- Base react with acid to form salt and water.

Salts

- These are the product of neutralisation reaction between an acid and a base.
- pH is the measure of acidity/basicity.

Some Important Compounds in Everyday Life**Carbon Dioxide**

It is an acidic oxide of carbon and is used by green plants for photosynthesis. It does not help in burning.

Air and our breath contain carbon dioxide. Thus, when lime water is kept in air or we pass our breath into it, the lime water turns milky.

Carbon Monoxide

It is a neutral oxide of air and has more affinity towards haemoglobin than oxygen (about 200 times more). That's why in the environment of carbon monoxide (which is a non-poisonous gas) people die for the need of oxygen.

It is dangerous to sleep in an unventilated room with fire burning inside because the fire produce carbon monoxide and carbon dioxide gases.

Plaster of Paris

- It is chemically calcium sulphate hemihydrate ($\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$) and is prepared by heating gypsum which is calcium sulphate dihydrate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) at 373 K.
- On mixing with water, Plaster of Paris further sets into a hard solid, called gypsum. Thus, it is used to plaster fractured bones, for making toys, materials for decoration and for making surfaces smooth.

Portland Cement

- It is a complex mixture of silicates and aluminates of calcium with small amount of gypsum. Raw material used for the manufacture of Portland cement are limestone and clay.
- The composition of Portland cement is calcium oxide (50-60%), alumina (5-10%), and magnesium oxide (2-3%) Gypsum is added to cement to decrease its rate of setting.
- In cement, if lime is in excess, cement cracks during setting and if lime is less, cement is of weak strength.
- Mortar a mixture of sand, cement and water is used for joining bricks and plastering walls.
- Concrete, a mixture of gravel, sand, cement and water is used for flooring and making roads.

- Reinforced Concrete Cement (RCC) which is concrete with steel bars and wires is used for constructing roofs, bridges and pillars.

Soaps

These are sodium and potassium salts of higher fatty acids, e.g. sodium palmitate, sodium stearate, etc.

Glass

- Glass, an amorphous solid or super-cooled liquid contains mainly silica (SiO_2).
- Different substances are added to obtain glass of different colours e.g.

Colour	Substance Added
Red	Copper oxide (CuO)
Green	Chromium oxide (Cr_2O_3)
Ruby Red	Goldchloride (AuCl_3)
Blue	Cobalt oxide (CoO)
Brown	Iron oxide (Fe_2O_3)

Pesticides

These chemicals are used to destroy the organisms that harm the crop.

These are of following types

Insecticides e.g. DDT, gammaxene, aluminium phosphate.

Fungicides e.g. Bordeaux mixture, organo-mercury compounds.

Herbicides e.g. Benzipram, sodium chlorate.

Rodenticides e.g. Aluminium phosphide.

Heavy Water

Heavy water is **deuterium oxide** (D_2O), molecular mass = 20) which used as moderator in nuclear reactors. It is called heavy due to the presence of deuterium, the heavy hydrogen.

Hard Water

- The water in which soluble bicarbonates of calcium and magnesium are present, is called **temporary hard water** and in which soluble sulphates and chlorides of magnesium and calcium are present is called **permanent hard water**.
- The temporary hardness of water is removed by boiling or by adding calcium hydroxide, $\text{Ca}(\text{OH})_2$ —the **Clark's process**.
- The permanent hardness of water is removed by adding sodium carbonate (Na_2CO_3), or calgon (sodium hexametaphosphate, $\text{Na}_2[\text{Na}_4(\text{PO}_3)_6]$).

Hardening of Oil (Hydrogenation)

Oil, an unsaturated fat when heated with nickel catalyst and hydrogen, gets converted into a solid mass called ghee, a saturated fat. This process is called hardening of oil and is carried out through hydrogenation in the presence of nickel as a catalyst.

Medicines

These are the chemicals used for treating diseases and reducing suffering from pain.

Different Medicines and their Examples

Medicine	Used to	Example
Analgesics	Reduce pain	Aspirin, paracetamol, morphine, phenacetin
Tranquilizers	To treat stress, mild and severe mental diseases	Equanil, valium, chlorodiazepoxide, serotonin and meprobamate
Antiseptic	Prevent the growth of micro-organisms or kill them (applied to living tissues)	Dettol (a mixture of chloroxylenol—the antiseptic and α -terpineol), savlon, iodine tincture (solution of I_2 in alcohol water mixture), boric acid (antiseptic for eyes), hydrogen peroxide, iodoform
Antibiotic	Destroy microorganisms (These are obtained from microorganisms.)	Penicillin (discovered by A Fleming in 1929, ampicillin, amoxicillin, ofloxacin, chloramphenicol)
Antimalarial	Cure malaria	Chloroquine
Sulphadrgugs	Alternative for antibiotics	Sulphanilamide, sulphadiazine
Antacids	Reduce acidity	Baking soda, magnesium hydroxide

Polymers

- A polymer is a compound of high molecular weight formed by the combination of a larger number of molecules of one or two types of low molecular weight (known as monomers) and the process is called polymerisation.
- Polymers are the backbones of four major industries; plastics, fibres, paints and varnishes.

Some Fibres and their Monomers

<i>Fibre</i>	<i>Monomers</i>	<i>Uses</i>
<i>Nylon-6,6</i>	Adipic acid + hexamethylene diamine	In making bristles for brushes, synthetic fibres, parachutes, as a substitute for metal in bearings.
<i>Nylon-6 or perlon</i>	Caprolactum	In making fibres, plastic tyre cords and ropes.
<i>Terylene</i>	Ethylene glycol and terephthalic acid	For making wash and wear fabrics, tyre cords, safety belts, tents etc .
<i>Kevlar</i>	Terephthalic acid + 1,4-diamino benzene	For making bulletproof vests.
<i>Lexan or polycarbonate</i>	Diethyl carbonate + bis-phenol-A	In making bulletproof windows and safety helmets.
<i>Polyurethanes</i>	Toluene diisocyanate + ethylene glycol	For making washable and long lasting mattresses, cushions.

Some Important Industrial Compounds

<i>Industrial Name</i>	<i>Chemical Name</i>	<i>Chemical Formula</i>
<i>Alum</i>	Potassium aluminium sulphate	$KAl(SO_4)_2 \cdot 12H_2O$
<i>Alcohol</i>	Ethyl alcohol	C_2H_5OH
<i>Baking soda</i>	Sodium bicarbonate	$NaHCO_3$
<i>Bleaching powder</i>	Calcium oxychloride or calcium hypochlorite	$CaOCl_2$
<i>Brine (or common salt)</i>	Sodium chloride	$NaCl$
<i>Borax</i>	Sodium tetraborate decahydrate	$Na_2B_4O_7 \cdot 10H_2O$
<i>Caustic potash</i>	Potassium hydroxide	KOH
<i>Caustic soda</i>	Sodium hydroxide	$NaOH$
<i>Chalk (marble) or pearl</i>	Calcium carbonate	$CaCO_3$
<i>Chilli salt petre</i>	Sodium nitrate	$NaNO_3$
<i>Chloroform</i>	Trichloro methane	$CHCl_3$
<i>Epsom salt</i>	Magnesium sulphate	$MgSO_4 \cdot 7H_2O$
<i>Glauber's salt</i>	Sodium sulphate decahydrate	$Na_2SO_4 \cdot 10H_2O$
<i>Gypsum</i>	Calcium sulphate dihydrate	$CaSO_4 \cdot 2H_2O$
<i>Hypo</i>	Sodium thiosulphate pentahydrate	$Na_2S_2O_3 \cdot 5H_2O$
<i>Laughing gas</i>	Nitrous oxide	N_2O
<i>Lunar caustic</i>	Silver nitrate	$AgNO_3$
<i>Marsh gas</i>	Methane	CH_4
<i>Quick lime</i>	Calcium oxide	CaO
<i>Sal ammonia (Nausadar)</i>	Ammonium chloride	NH_4Cl
<i>Sapphire (Ruby)</i>	Aluminium oxide	Al_2O_3
<i>Slaked lime</i>	Calcium hydroxide	$Ca(OH)_2$
<i>Soda ash</i>	Sodium carbonate	Na_2CO_3
<i>Spirit</i>	Methyl alcohol	CH_3OH
<i>Washing soda</i>	Sodium carbonate decahydrate	$Na_2CO_3 \cdot 10H_2O$

BIOLOGY

Biology (coined by **Lamarck** and **Treviranus** 1802), is a branch of science which deals with study of living organisms. It mainly includes Botany (Study of plants) and Zoology (Study of animals).

The scientist who gave this thoughts for the first time about the life of plants and animals was **Aristotle**, that's why he is known as the father of Biology. He is also known as the father of Zoology.

LIVING WORLD

In 18th Century, **Carolus Linnaeus** developed **binomial nomenclature** for living organisms, i.e., scientific name consisting of **genus** and **species**.

- **Whittaker** (1969) classified living organisms into five kingdoms— Monera, Protista, Fungi, Plantae and Animalia.
- Monera includes bacteria and *Mycoplasma*, while Protista includes Protozoa (unicellular Eukaryotes).
- **Viruses** are sub-microscopic, obligate, intracellular parasite consisting of nucleoprotein. **WM Stanley** firstly crystallised TMV (Tobacco Mosaic Virus).
- **Viroids** are smallest infectious single stranded RNA molecules discovered by **TO Diener**.

THE CELL

- According to cell theory proposed by **Schleiden** and **Schwann** (1838) cell is the structural and functional unit of living organisms.
- An organism may be composed of single cell (unicellular) or many cells (multicellular).
- Cells are of two types i.e., **prokaryotic** (which lacks nucleus and membrane bound organelles) and **eukaryotic** (which have nucleus and membrane bound organelles).
- Prokaryotic cell is found in bacteria, mycoplasma and blue-green algae while eukaryotic cell in plants, animals and fungi.

Nucleic Acids

- These contain the genetic instructions used in the development and functioning of all known living organisms. These are of two types namely DNA and RNA. **Deoxyribo Nucleic Acid** (DNA) It is a long polymer made from repeating units called nucleotides. It has four bases i.e. adenine, guanine, cytosine and thymine.
- **Ribo Nucleic Acid** (RNA) It is also made up of a long chain of nucleotides. It contains uracil in place of thymine.

HUMAN SYSTEMS

The cells of human and other multicellular animals are organised into **tissues**. Two or more tissues grouped together to form organs. An organ system is a group of organs that function together to carry out the principal activities of the body.

Digestion

Digestion is the process by which complex food is converted into simple components with the help of digestive enzymes, i.e. hydrolysis process.

Respiratory System

Respiration in an oxidative process involving oxidation of food substances such as carbohydrate, fat and proteins to form CO_2 , water and to release energy.

Respiration may be anaerobic, (i.e. without O_2) and aerobic (i.e. with O_2).

Respiratory Organs of Animals

Organ	Animal
Lungs	Reptiles and mammals
Skin	Frog, earthworm and leeches
Gills	Fishes, tadpoles and prawns
Tracheae	Insects, centipedes and millipedes
Body surface	Protozoans, porifera and coelenterates
Book lungs	Spider and scorpion
Book gills	King crab, prawn, cray fish and <i>Daphnia</i>
Mental	Mollusca (<i>Unio</i>)
Air bladder	Long fish and bony fishes (e.g. <i>Labeo</i>)
Airsacs/lungs	Birds

Vitamins

Fat Soluble Vitamins

<i>Vitamin (Name)</i>	<i>Rich Food Source</i>	<i>Function</i>	<i>Deficiency Disease</i>
A (<i>Retinol</i>)	Fish liver oils, dairy products, liver, most leafy vegetables and carrots contain carotene that can be converted into retinol	Needed for healthy epithelial cells and regeneration of rhodopsin in rod cells of the eye	Dry skin and night blindness (Nyctalopia)
D (<i>Calciferol</i>)	Fish oils, egg yolk and butter. It can be made by the action of sunlight on skin	Promotes absorption of calcium from intestines. Necessary for formation of normal bone and reabsorption of phosphate from urine	Rickets in children ('soft' bones that bend easily) Osteomalacia (painful bones) in adults
E (<i>Tocopherol</i>)	Vegetable oils, cereal products and many other foods	Formation of red blood cells, affects muscles and reproductive system.	Mild anaemia and sterility Deficiency is rare in humans
K (<i>Phylloquinone</i>)	Fresh and dark green vegetables. Also made by gut bacteria	Formation of prothrombin (involved in blood clotting)	Delayed clotting time. May occur in new-born babies before their gut bacteria become established

Water Soluble Vitamin

<i>Vitamin (Name)</i>	<i>Rich Food Source</i>	<i>Function</i>	<i>Deficiency Disease</i>
B ₁ (<i>Thiamine</i>)	Yeast, cereals, nuts, seeds and pork	Co-enzyme in cell respiration, necessary for complete release of energy from carbohydrates.	Beri-beri (muscular dystrophy, stunted growth and nerve degeneration)
B ₂ (<i>Riboflavin</i>)	Liver, milk, eggs and green vegetables	Co-enzyme in cell respiration. Precursor of FAD	Cracked skin and blurred vision
B ₃ (<i>Niacin</i>)	Liver, yeast, whole cereals and beans	Co-enzyme in cell respiration. Precursor of NAD/NADP	Pellagra (severe skin problems, diarrhoea and dementia)
B ₅ (<i>Pantothenic acid</i>)	Animal tissue, whole grain cereals and legumes	Needed to manufacture adrenal hormone	Pellagra, Dermatitis and Diarrhoea
B ₆ (<i>Pyridoxine</i>)	Meat, fish, eggs, cereals bran and some vegetables	Interconversion of amino acids.	Skin problems and nerve disorder
B ₁₀ (<i>Folic acid</i>)	Liver, raw green vegetables, yeast and gut bacteria	Formation of nucleic acids and red blood cells	Anaemia (especially during pregnancy)
B ₁₂ (<i>Cyanocobalamin</i>)	Liver, milk, fish and yeast. None in plant foods	Maturation of red blood cells in bone marrow. Maintenance of myelin sheath of nerves	Pernicious anaemia and nerve disorders
C (<i>Ascorbic acid</i>)	Blackcurrants, peppers, sprouts and citrus fruits	Formation of collagen and intercellular cement	Scurvy and poor wound healing

Major Enzymes of Digestion

Enzyme	Source	Where Active	Substrate	Main Breakdown Product
Carbohydrate Digestion				
Salivary amylase	Salivary glands	Mouth	Polysaccharides	Disaccharides
Pancreatic amylase	Pancreas	Small intestine	Polysaccharides	Disaccharides
Disaccharidases	Small intestine	Small intestine	Disaccharides	Monosaccharides (e.g., glucose)
Protein Digestion				
Pepsin	Stomach mucosa	Stomach	Proteins	Peptide fragments
Trypsin and chymotrypsin	Pancreas	Small intestine	Proteins and polypeptide	Peptide fragments
Carboxypeptidase	Pancreas	Small intestine	Peptide fragments	Amino acids
Amino peptidase	Intestinal mucosa	Small intestine	Peptide fragments	Amino acids
Fat Digestion				
Lipase	Pancreas	Small intestine	Triglycerides	Free fatty acids and monoglycerides
Nucleic Acid Digestion				
Pancreatic nucleases	Pancreas	Small intestine	DNA and RNA	Nucleotides
Intestinal nucleases	Intestinal mucosa	Small intestine	Nucleotides	Nucleotides bases and monosaccharides

Blood (Lymphatic System)

- Fluid connective tissue composed of plasma and blood cells.
- An adult person has 5-6 litre blood.
- It is slightly alkaline having pH 7.3-7.4.
- Plasma is pale yellow transparent and constitute about 60% volume of blood.
- Plasma is composed of 90-92% water, 7% organic substances (albumin, globulin and fibrinogen protein) and 1% inorganic substances.
- Red blood corpuscles (Most abundant) are non-nucleated and contains haemoglobin (the respiratory pigment).
- White blood cells are colourless, nucleated and granular or agranular.
- **Eosinophils** are also called acidophils. (2-8%) are phagocytic granulocytes and play important role in hypersensitivity.
- **Basophils** (2%) are non-phagocytic granulocytes and increases during chickenpox.
- **Neutrophils** (65%) are phagocytic granulocytes and increase during bacterial infection.

Blood Groups, Genotypes and their Transfusion Possibility

Blood Group (phenotype)	Antigen in Red Blood Cells	Antibodies in Plasma	Can Give Blood to Groups	Can Receive Blood from Group	Genotype
O	None	Anti-a, Anti-b	O, A, B and AB	O	I ^o I ^o
A	A	Anti-b	A and AB	O and A	I ^A I ^A or I ^A I ^o
B	B	Anti-a	B and AB	O and B	I ^B I ^B or I ^B I ^o
AB	A and B	None	AB	O, A, B and AB	I ^A I ^B

- **Monocytes** (0.5%) are agranulocytes called policeman of blood and increase during tuberculosis.
- **Lymphocytes** (26%) are agranulocytes producing antibodies and increase during viral infection.
- **Platelets** (thrombocytes) are non-nucleated. Platelets have a life span of about 8 to 10 days.
- **Rh factor** discovered by **Landsteiner** and **Veiner** in **Rhesus** monkey, which is responsible for **erythroblastosis foetalis disease**.
- Important component of blood clotting are fibrinogen, prothrombin, thromboplastin, calcium ions and Vitamin-K.

Heart

- Human heart is **myogenic** i.e., contraction is initiated by a pulse produced by **Sino-atrial node** (SA node) located in right atrium. It is also called **pacemaker**. First heart sound is **lub** and second heart sound is **dub**.
- Contraction of heart is called **systole**. 120 mm Hg, while relaxation is called **diastole** (80 mm Hg).

Excretion

- It is the process elimination of harmful waste products from the animal body to regulate the composition of the body fluids and tissues.
- Human excretory system is composed of two kidneys. **Nephron** is the structural and functional unit of kidneys.
- Colour of urine is pale yellow. It is due to pigment **urochrome**.
- Human urine contains about 95% water, 2% salts, 2.6% urea and 0.3% uric acid.

Important Functions of Brain

Forebrain

<i>Olfactory region</i>	Smell
<i>Cerebrum</i>	Thinking, intelligence, memory, ability to learn from experience, will power, skilled work, reasoning knowledge, consciousness and speech.
<i>Control</i>	Laughing, weeping, micturition (<i>passing of urine</i>), defecation voluntary forced breathing and voluntary muscular co-ordination.
<i>Diencephalon (sensation of)</i>	Heat, cold and pain control centre of autonomic nervous system, control hunger, thirst, sweating, sleeping and sex.
<i>Hypothalamus</i>	Regulated body temperature so 'thermostat' of body. Appetite and safety control emotions like love, anger, pleasure and satisfaction. Control metabolism of carbohydrate, fat and water.

Main Excretory Organs

<i>Excretory Organ</i>	<i>Animal</i>
Contractile vacuole	Amoeba
Flame cells/solenocytes	Tapeworm
Renette cell	Ascaris
Nephridia	Earthworm
Malpighian tubules	Cockroach
Coxal glands	Scorpion
Green glands	Prawn

- pH of urine is about 6.0 (mildly acidic).
- The urine on standing gives a pungent smell. It is due to the conversion of urea into ammonia.
- Specific gravity of urine is 1.015-1.025.
- Volume of urine is 1 to 2 L per day.

Main Excretory Products

<i>Product</i>	<i>Animal</i>
<i>Ammonia</i>	Most invertebrates, fishes etc.
<i>Urea</i>	Ascaris, earthworm, cartilaginous fishes, amphibian and mammals
<i>Uric acid</i>	Insects, land reptiles and birds

Central Nervous System

The brain is the organising and processing centre of the body. It is the site of consciousness, sensation, memory and intelligence.

The brain receives impulses from the spinal cord and from 12 pairs of cranial nerves coming from it and extending to the senses and to other organs. In addition, the brain initiates activities without environmental stimuli.

Three major portions of the brain are recognised as the **hindbrain**, **midbrain** and the **forebrain**.

<i>Midbrain and Hindbrain</i>	Reflex centre of visual and auditory sensation.
<i>Cerebellum</i>	Involuntary muscular co-ordination, maintain posture, orientation and equilibrium of the body.
<i>Medulla oblongata</i>	Regulate heart rate, involuntary breathing, respiratory centre, blood pressure, (vasoconstriction and vasodilation) gut peristalsis, food swallowing and vomiting gland secretion.

Some Human Diseases Caused by Viruses and Bacteria

<i>Disease</i>	<i>Pathogen</i>	<i>Incubation</i>	<i>Symptoms</i>	<i>Prevention/ Vaccine</i>
<i>Chickenpox (Varicella)</i>	Herpes zoster virus	12-20 days	Dark red coloured rash or pox changing into vesicles, crusts and falling	Varicella vaccine
<i>Smallpox</i>	Variola virus	12 days	Appearance of rash changing into pustules, scaps and falling pockmarks are left	Smallpox vaccine
<i>Poliomyelitis</i>	Polio virus	7-14 days	Damages motor neurons causing stiffness of neck, convulsion, paralysis of limbs generally legs	Salk vaccine and Oral Polio Vaccine (OPV)
<i>Measles (Rubella disease)</i>	Rubella virus	10 days	Rubella (<i>skin eruptions</i>), coughing, sneezing, etc	Measles-mumps-rubella-Varicella Combo (MMRV vaccine)
<i>Mumps</i>	Mumps virus	12-26 days	Painful enlargement of parotid and salivary glands	Mumps-vaccine, isolation
<i>Rabies (Hydrophobia)</i>	Rabies virus	10 days to 1-3 months	Spasm in throat and chest muscles, fears from water, paralysis and death	Immunisation of dogs
<i>Tuberculosis</i>	<i>M tuberculosis</i>	2-10 weeks	Coughing, chest pain and bloody sputum with tuberculin	BCG vaccine
<i>Diphtheria</i>	<i>C diphtheriae</i>	2-6 days	Inflammation of mucosa of nasal chamber, throat, etc, respiratory tract blocked	DPT vaccine
<i>Cholera</i>	<i>Vibrio cholerae</i>	6 h to 2-3 days	Acute diarrhoea and dehydration	Sanitation, boiling of water and oral cholera vaccine
<i>Leprosy</i>	<i>Mycobacterium leprae</i>	2-5 years	Skin hypopigmentation, nodulated skin, deformity of fingers and toes.	BCG also offers variable amount of protection against leprosy. Lepromin skin tests
<i>Tetanus (Lock jaw)</i>	<i>Clostridium tetani</i>	3-21 days	Degeneration of motor neurons, rigid jaw muscles, spasm and paralysis	ATS and DPT vaccines
<i>Typhoid</i>	<i>Salmonella typhi</i>	1-3 weeks	Classic typhoid fever	TAB vaccine and screening of food and water
<i>Plague</i>	<i>Pasteurella pestis</i>	2-6 days	Bubonic plague affects, lymph nodes, pneumonic plague affects lungs and septicemic plague causes anaemia	Killing of rats and rat fleas, plague vaccine
<i>Gonorrhoea</i>	<i>Neisseria gonorrhoeae</i>	2-10 days	Inflammation of urinogenital tract	Avoid prostitution
<i>Pneumonia</i>	<i>Streptococcus pneumoniae</i>	1-3 days	Decrease in respiratory efficiency	PCV 13

Disease	Pathogen	Incubation	Symptoms	Prevention/ Vaccine
Salmonellosis	<i>Salmonella enteritidis</i>	48 h	Diarrhoea	RASV vaccine
Swine Flu	H1N1 flu virus (Orthomy)	1-4 days	Fever with or without chill, sore throat, dyspnea, myalgia, diarrhea, vomiting and dizziness	Oseltamivir (Tamiflu), Zanamivir (Relenza) are antiviral drugs vaccines are available against this disease.
Ebola Virus Disease (EVD)	Ebola virus (Filovirus)	2-21 days	Haemorrhagic fever, muscle pain, headache, sore throat, diarrhoea, kidney and liver dysfunction, internal and external bleeding.	No licensed vaccine available, immune therapies are done currently.
Dengue	RNA virus of genus Flavivirus	3-14 days	muscle pain, swollen lymph nodes, fever, headache and rash	No specific antiviral drug is available, however symptoms based treatment is done.
Chikunguniya	RNA virus of genus Alphavirus	1-12 days	Headache, fatigue, digestive complaints and conjunctivitis	No specific treatment, however supportive care through drugs like naproxen, paracetamol is done.
COVID-19	Novel Corona Virus	5-14 days	Fever, dry cough, tiredness, aches, pains, nasal congestion, headache, conjunctivitis, sore throat, diarrhoea, loss of taste or smell or a rash on skin or discoloration of fingers or toes.	—

Human Diseases Caused by Fungi

Disease	Fungus
Aspergillosis	<i>Aspergillus flavus</i> , <i>A fumigatus</i> and <i>A niger</i>
Blastomycosis	<i>Blastomyces dermatitidis</i>
Candidiasis	<i>Candida albicans</i>
Chromomycosis	<i>Cladosporium corionii</i>
Coccidiomycosis	<i>Coccidioides immitis</i>
Cryptococcosis	<i>Lipomyces neoformans</i>
Geotrichosis	<i>Geotrichum candidum</i>
Histoplasmosis	<i>Histoplasma capsulatum</i>
Neuritis	<i>Mucor pusillus</i>
Onychomycosis	<i>Trichophyton purpureum</i>

Animal/Human Diseases Caused by Fungi

Disease	Fungus
Athelete foot	Trichophyton
Ringworm	Trichophyton, Microsporium and Epidermophyton
Mucormycosis	<i>Mucor</i> and <i>Rhizopus</i>
Penicilliosis	<i>Penicillium</i>

Important Vaccines Discoverer

Vaccine	Discovered By
Small pox	Edward Jenner (1786)
Cholera	Louis Pasteur (1880)
Diphtheria and Tetanus	Emil Adolf Von Behring and Shibasaburo Kitasato
Tuberculosis	Leon Calmette and Camille Guérin (1992)
Polio	Jonas E Salk (1954)
Oral polio	Albert Bruce Sabin (1995)
Measles	John F Enders (1960)
Rabies	Charles Nicolle (1909)

Some Antibiotics Developed through Biotechnology

Antibiotic	Microbial Source
Penicillin	<i>Penicillium notatum</i> and <i>P chrysogenum</i>
Bacitracin	<i>Bacillus subtilis</i>
Cephalosporin	<i>Cephalosporium acremonium</i>
Griseofulvin	<i>Penicillium griseofulvum</i>
Streptomycin	<i>Streptomyces griseus</i>
Tetracycline	<i>S erythraeus</i>
Erythromycin	<i>S aureofaciens</i>
Chloramphenicol	<i>S venezuelae</i>

Ebola Virus

According to World Health Organisation WHO's **19th August, 2015 Situation Report**, there were three confirmed cases of Ebola reported in the week up to 16th August all of which were reported from **Guinea**. For the first time since the beginning of the outbreak in **Sierra Leone**, a full epidemiological week has passed with no confirmed cases reported. A total of 72 cases remain under monitoring in Sierra Leone.

On 29th, June 2015, a confirmed case of Ebola was reported in a 17 year old male who had died in **Liberia**.

Apart from Africa, ebola virus has spread to USA, Spain, Mali and to an extent in Italy and UK.

- **Chernobyl disaster** occurred in Ukraine (USSR) 26th April, 1986 due to explosion of nuclear power station.
- Nitrate fertilisers cause **blue baby syndrome** or **methemoglobinemia**.
- Noise pollution is measured in decibels (Generally sound beyond 80 dB is termed as noise).

BIOTECHNOLOGY

- **Biotechnology** is a field of applied biology that involves the use of living things in engineering, technology, medicine and other useful applications.
- **Genetic Engineering** Insertion of a foreign gene fragment into another DNA molecule to produce DNA clones.
- **Gene Therapy** It is the insertion of genes into an individual cells and tissue to treat diseases especially hereditary diseases.

ECOLOGY

- **Ecology** (term used by **Reiter**) deals with various principles which govern the relationship between organisms and their environment. **Pyramid of number** is upright in grassland and pond ecosystem, while inverted in tree ecosystem.
- **Pyramid of biomass** is upright in grassland and forest ecosystem whereas, inverted in pond ecosystem.
- **Pyramid of energy** is always upright.

Pollution

- Motor vehicle contribute 60% of air pollution in major cities. Photochemical smog comprising of O_3 , H_2O_2 , PAN, etc.
- CO has 250 times more binding affinity with haemoglobin as compared to O_2 .
- **Acid rain** is composed of H_2SO_4 and HNO_3 .
- Chlorofluorocarbons released into stratosphere release free chlorine atom that causes **depletion of ozone**.
- **Sewage** is major source of water pollution.
- **Bioremediation** is the process of using micro-organisms to remove environmental pollutant, e.g. using oil-zapper developed by TERI to prevent oil spills.
- **Biomagnification** The increase in concentration of persistent chemicals in organisms in successive trophic levels.
- Endosulfan is an organic pollutant used as a pesticide in Southern states for cashew crops, which is now banned world over.

Test Tube Baby

- Test tube baby is a fusion of ovum and sperm outside body followed by implantation in uterus at 32 celled stage and further normal development to birth.
- The IVF (In Vitro Fertilisation) technology is a boon to childless couples.
- First attempt to produce a test tube baby was made by an Italian scientist Dr. Petrucci in 1959.
- But this human embryo survived for only 29 days.
- **The World's first test tube baby** (a baby girl) named as Louise Joy Brown was born on 25th July, 1978 in Great Britain.
- **India's first test tube baby** was born in Mumbai on 6th August 1986. Her name is Harsha.

Cloning

- Cloning in biology is the process of producing similar populations of genetically identical individuals that occurs in nature when organisms

such as bacteria, insects or plants reproduce asexually.

- **Dolly** a sheep, the first mammal clone was developed by Dr Ian Wilmut, UK.

Bt Crops

- Crop plants that contain genes for *Bt* toxins. *Bt* toxin gene has been cloned from the bacteria (*Bacillus thuringiensis*) and been expressed in plants to provide resistance from insects without the need of insecticides e.g. *Bt*-cotton (first GM crop), *Bt*-corn, golden rice, etc.

Seed Village Concept

It is the starting point of agriculture and dictates ultimate productivity of other inputs. It was organised by **Dr Swaminathan** in the Jounti village of Delhi state in 1965, which was designed to convert the entire village into a high quality seed producing centre.

Over the years, this concept have grown and been refined which aims to import **techniracy** (technical literacy or imparting the latest skills to farmers solely) for quality seed production and thereby to make available quality seed to others at appropriate time and affordable cost.

Some smallest in their categories

Bacteria	<i>Dialister Pneumosintes</i>	Flower	<i>Wolffia microscopica</i> (Angiosperm)
Bird	Humming bird (<i>Cuba</i>)	Mammal	Shrew (<i>Suncus etruscus</i>)
Bone	Stapes	Muscles	Stapedius or arrector pili
Endocrine gland	Pituitary	Virus	Foot and mouth disease virus

Some largest in their categories

Mammal (<i>on land</i>)	African elephant (<i>Loxodonta africana</i>)
Mammal (<i>in the biosphere</i>)	Blue whale
Flower	<i>Rafflesia</i>
Flower in India	<i>Sapria</i>
Vertebral	Lumbar vertebrae
Bone	Femur
Bone (<i>in frog</i>)	Tibia-fibula
Muscles	Gluteus maximus (<i>buttock muscle of hip</i>)
Tooth	Tusk of elephant (<i>upper incisor modification</i>)
Tallest angiosperm	<i>Eucalyptus</i>
Tallest gymnosperm	<i>Sequoia sempervirens</i> (<i>Sequoia gigantea</i>)
Coral reef	In Australia, great barrier reef
Egg or cell	Ostrich
Vein	Inferior vena cava
Artery	Abdominal aorta
Cell of the body	Neuron or nerve cell
Virus	Parrot fever virus

Some Important Branches of Biology

Branch	Concerned Field
Agriculture	Study of producing crops from the land
Anatomy	Study of the animal forms with an emphasis on human bodies.
Anthology	Study of flowers.
Anthropology	Study of apes and man.
Apiculture	Honey industry (<i>Bee keeping</i>).
Biochemistry	Deals with the study of chemical reactions in relation to life activities.
Cardiology	Study of heart.
Cryogenics	Study concerning with the application and uses of very low temperature.
Cytology	Study of cells.
Dermatology	Study of skin.
Floriculture	Study of flower yielding plants.
Genetics	Study of heredity and variations.
Gerontology	Study of growing old.
Horticulture	Study of garden cultivation.
Myology	Study of muscles.
Nephrology	Study of kidneys
Obstetrics	Branch of medicine dealing with pregnancy.
Ornithology	Study of birds
Phycology	Study of algae.

Branch	Concerned Field	Branch	Concerned Field
<i>Pedology</i>	Study of soils	<i>Sericulture</i>	Silk industry (<i>culture of silk moth and pupa</i>).
<i>Pathology</i>	Study of disease causing organisms.	<i>Serpentology</i>	Study of snakes.
<i>Physiology</i>	Science dealing with the study of functions of various parts of organisms.	<i>Taxonomy</i>	Study of classification of organisms.
<i>Pisciculture</i>	Study of fish.	<i>Virology</i>	Study of virus.

Some Important Discoveries

Discovery	Made by	Country
<i>Antibiotic</i>	Alexander Flemming (1928)	Scotland
<i>Antiseptic</i>	Joseph Lister (1867)	Scotland
<i>Blood circulation</i>	William Harvey (1628)	Britain
<i>Blood transfusion</i>	Jean-Baptiste Denys (1625)	France
<i>Cholera and TB germs</i>	Robert Kock (1883)	Germany
<i>Electrocardiogram (ECG)</i>	William Einthoven (1903)	Dutch
<i>CT Scan</i>	Godfrey Hounsfield (1973)	England
<i>Sphygmomanometer</i>	Scipione Riva-Rocci (1898)	Italy
<i>Stethoscope</i>	Rene Laennec (1819)	France
<i>Thermometer</i>	Sir Thomas Aelburt (1867)	England
<i>Ultrasound</i>	Ian Donald (1950)	Ireland
<i>X-ray</i>	WC Roentgen (1895)	Germany
<i>Electroencephalogram (EEG)</i>	Hans Berger (1929)	Germany

Some Important Antibiotics

Antibiotics	Source	Action
Penicillin	<i>Penicillium chrysogenum</i> , <i>P. notatum</i> + <i>Phenyl Acetic Acid</i>	Tonsillitis, Sore Throat, Gonorrhea, Rheumatic Fever, some Pneumonia types
Griseofulvin	<i>Penicillium griseofulvum</i>	Antifungal, especially for Ringworm
Nystatin	<i>Streptomyces noursei</i>	Antifungal for Candidiasis and overgrowth of Intestinal Fungi during excessive antibiotic treatment.
Hamycin	<i>Streptomyces pimprei</i>	Antifungal for Thrush
Fumagillin	<i>Aspergillus fumigatus</i>	Broad spectrum antibacterial especially against Salmonella and Shigella.
Bacitracin	<i>Bacillus licheniformis</i>	Syphilis, Lymphonema or Reticulosis.
Streptomycin	<i>Streptomyces griseus</i>	Meningitis, Pneumonia, Tuberculosis and Local Infection. Toxic in some through eighth cranial nerve.
Chloramphenicol Chloromycetin	<i>Streptomyces venezuelae</i> , <i>S. lavendulae</i> and Now synthetic	Typhoid, Typhus, Whooping cough, Atypical Pneumonia, Bacterial Urinary Infections.
Tetracyclines/ Aureomycin	<i>Streptomyces aureofaciens</i>	Viral pneumonia, Osteomyelitis, Whooping Cough and Eye infections.
Oxytetracycline/ Terramycin	<i>Chlorotetracycline</i> → <i>Hydrogenation Streptomyces rimosus</i>	Intestinal and Urinary Infections (Spirochaetes, Rickettsia and Viruses)
Erythromycin	<i>Streptomyces erythreus</i> (= <i>S. erythraeus</i>)	Typhoid, Common Pneumonia and Diphtheria, Whooping Cough, etc.
Gentamycin	<i>Micromonospora purpurea</i>	Effective against Gram (+) bacteria
Polymixin	<i>Bacillus polymyxa</i>	Antifungal

COMPUTER

A computer is an electronic machine which stores, reads and processes data to produce meaningful information as output.

Components of Computer

- **Input Unit** Devices used to give instructions, *e.g.* Keyboard, Mouse, Joystick, Optical character reader, CDs, Bar code reader, Touch screen, Light pen, Scanner, Magnetic Ink Character Recognition (MICR), etc.
- **Central Processing Unit** (CPU) is the device for the manipulation of information inside the computer. CPU is known as the brain of the computer, but commonly called a processor and has the following components
- **Arithmetic Logic Unit** (ALU) performs all logical and arithmetical operations.
- **Control Unit** (CU) instructs, maintains and controls the flow of information.
- **Output Unit** is the device to display the result of processing, *e.g.* Visual Display Unit, Printer, Monitor, Speaker, Pen Drive, etc.

Memory

Memory holds all the raw and processed data, set of instructions and information inside the CPU.

Primary Memory

Primary Memory stores the data which is currently in use by the computer.

- **RAM** (Random Access Memory) It is a volatile memory. It is a temporary storage.
 - **DRAM** Dynamic Random Access Memory
 - **SRAM** Static Random Access Memory
- **ROM** (Read Only Memory) It is a non-volatile memory where all logical data is stored that cannot be changed.
 - **PROM** Programmable Read Only Memory.
 - **EPROM** Erasable Programmable Read Only Memory.
 - **EEPROM** Electrically Erasable Programmable Read Only Memory.

Secondary Memory

It stores data, program, instruction and information permanently.

Hardware

Any peripheral device which can be seen and touched is hardware. Computer hardware includes input devices, output devices, storage devices and processing devices.

Software

It is a set of instructions that directs the computer to process information. It can be classified as **System Software** and **Application Software**.

Networking

Computer networking relates to the communication between a group of two or more computers linked together. Most common example of networking is Internet, connecting millions of people all over the world together. According to scale or size, computer network can be categorised in three ways

- **Local Area Network** (LAN) Graphical area spread over 1km to 10km or within a same building.
- **Metropolitan Area Network** (MAN) Graphical area spread over a city or town.
- **Wide Area Network** (WAN) Graphical area spread over countries.

Security Threats

- **Worm** It is a self contained program and does not need to be a part of another program to propagate itself.
- **Spam** Spam is an unsolicited message sent over the Internet in the form of e-mails, to a large number of users for the purpose of spreading malware, advertising phishing, etc.
- **Spyware** It is a type of malicious software installed on computers and collects information about users without their knowledge and may send such information to another entity.
- **Malware** A software which is specifically designed to disrupt or damage a computer system. It is a superset of

computer viruses, worms, spyware, trojan horses and other malicious or unwanted software.

- **Virus** A virus is defined as a program or a piece of code that gets loaded onto the computer without users knowledge and replicates itself, e.g. Creeper, Stuxnet, Melissa, Conficker, Code red, SQL Slammer, Nimda (derived from the word 'Admin'), etc.

Antivirus

Antivirus is a software consisting of computer programs that attempt to identify, detect and prevent the malware from the computer.

Some Commonly Used Terms

- **Cache Memory** It is a temporary storage, where frequently accessed data can be stored for rapid access.
- **Registers** These are defined as the special memory units used by the CPU to speed up the rate of accessing information.
- **Operating System** It is a system software, consisting of an integrated set of programs that control computer resources and provides common services for efficient execution of various application software.
- **Compiler** It is a computer program that transforms human readable source code into the Machine readable code at one go.
- **Interpreter** It transforms source code into the machine readable code by converting it line by line.
- **Assembler** It converts assembly language program into machine language program.
- **Modem** (Modulator-Demodulator) An electronic device used to convert computer (digital) electronic signals to communication channel (analog) electronic signals and *vice-versa*.
- **Cloud Computing** is the delivery of on-demand computing resources, everything from applications to data centres, over the Internet, e.g. Google.
- **Dual Core Processor** is the processing technology in which two processors are scheduled together and when one is busy the other takes over.
- **Internet** It is the worldwide, publically accessible system of interconnected

computer networks that transmit data by using the Internet protocol.

- **Cryptography** It is a method of storing and transmitting data in a particular coded form so that only those can read and process it, for whom it is intended. It includes encoding and decoding of data.

Super Computers

A super computer can be defined as the most powerful computer in terms of performance and storage capacity. They are highly expensive and are employed for specialised applications such as for weather forecasting, several scientific researches, etc.

Super Computers Developed in India

Name	Year	Mft Company
Param Siddhi	2020	CDAC
Param Shivay	2019	IIT-BHU
Pratyush	2017	IITM (Pune)
Param Kanchenjunga	2016	CDAC & NIT Sikkim
Param Ishan	2016	CDAC & IIT Guwahati
Aaditya	2013	Indian Institute of Tropical Meteorology
PARAM YUVA II	2013	C-DAC, PUNE
SAGA-220	2011	ISRO
ANUPAM-Adhya	2010-11	BARC

Super Computers of the World

Name	Year	Country	Operating System
Fugaku	2021	Japan	Custom Linux
Frontera	2019	America	Linux (Cent OS)
IBM Summit	2018	America	IBM
Sunway Taihulight	2016	China	Linux
Tianhe-2	2013	China	Kylin Linux
Titan	2012	America	Linux
Sequoia	2011	America	Linux
K-Computer	2011	Japan	Linux
Mira	2010	America	Linux

Sophia

In October, 2017 Saudi Arabia has provided citizenship to a robot Sophia. This robot can change the facial expressions of the face and can chat with people.



GENERAL KNOWLEDGE

First in the World

First Radio Telescope Satellite launched into Space	HALCA (Japan)
First country to use Glass	Egypt and Mesopotamia
First country to make Map	The Greeks
First Spaceship landed on Mars	Viking-I (July 1976)
World's First Multipurpose River Valley Project	Tennessee River Valley Project (USA)
First Space Shuttle Launched	Columbia (April 1981)
First Rocket to go near the Sun	Helios 'B'
First Country to make written Constitution	The USA
First Country to start Underground Metro Rail	Britain
First Unmanned Mission on the Moon	LUNA-9
First Spacecraft to carry man on the Moon	Apollo - 11
First Country to do Artificial Satellite Experiment	Russia
Country to give Voting Right to Women	New Zealand
First Country to appoint Lokpal	Sweden
First Country to impose Carbon Tax	New Zealand

First in the World (Male)

First Asian to Head the International Cricket Council	Jagmohan Dalmiya
First man to climb Mount Everest	Sherpa Tenzing Norgay and Sir Edmund Hillary (29th May, 1953)
First Man to go into Space	Major Yuri Gagarin (USSR) (1961)
First Man to walk into Space	Alexei Leonov (Russia)
First Person to give information about Planets and their motion around the Sun	Nicolous Copernicus
First Man to compile Encyclopaedia	Aspheosis (Athens)
First Person to go on both the Poles (<i>North and South</i>)	Ranulph Fiennes
First Man to reach North Pole	Robert Peary
First Man to reach South Pole	Roald Amundsen
First Man to climb on Mt Everest without Oxygen	Phu Dorji Sherpa
First Secretary of United Nation	Trygve Lie (Norway)

First in the World (Female)

First Woman President of a Country	Maria Estela Peron (Argentina)
First Woman in the world to cross the Strait of Gibraltar	Arti Pradhan (India)
First Woman Cosmonaut in Space	Valentina Tereshkova (USSR)
First woman Prime Minister	Sirimavo Bandaranaike (Sri Lanka)
First Woman to have a Spacewalk	Svetlana Yevgenyevna Savitskaya
First Woman Vice-President of United States of America	Kamla Harris
First Woman to climb Mount Everest	Junko Tabei (Japan)
First Woman Space Tourist	Mrs. Anousheh Ansari (Irani-American)
First Female Amputee to Climb Mount Everest	Arunima Sinha
First Woman CFO and MD of World Bank	Anshula Kant
First Woman Chief Economist for IMF	Gita Gopinath
First Astronaut to complete historic all female Spacewalk	Christina Koch and Jessica Meir

Superlatives (World)*(The Largest, Biggest, Smallest, Longest, Highest)*

Largest Airport (by size)	King Fahd International Airport (<i>Dammam, Saudi Arabia</i>)	Longest Bridge (<i>Railway</i>)	Danyang-Kunshan Grand Bridge (<i>China</i>)
Highest Airport	Bangda Airport, Tibet (<i>now in China</i>)	Largest Dam (<i>Concrete</i>)	Grand Coulee Dam (<i>USA</i>)
Tallest Building	Burj Khalifa, Dubai United Arab Emirates (828 m)	Highest Dam	Jinping-I Dam, across River Yarlong, China
Largest Bay	Hudson Bay, Canada	Highest Straight Dam	Bhakra Dam
Longest Big-ship Canal	Suez Canal (linking Red Sea and Mediterranean Sea)	Highest Capital City	La Paz (Bolivia)
Busiest Canal (<i>Ship</i>)	Kiel Canal	Highest Asian Desert	Gobi, Mongolia
Longest Epic	The Mahabharata	Largest Democracy	India
Largest Diamond	The Cullinan (<i>South Africa</i>)	Biggest Bell	Great Bell at Moscow
Largest Island	Greenland	Reptile which changes its colour	Chameleon
Largest Mosque	Masjid al-Haram, Mecca	Most intelligent Animal	Chimpanzee
Largest Delta	Sundarbans, India	Highest Volcano	Ojos del Salado, Andes, Argentina- Chile (6893 m)
Largest Desert	Sahara, Africa	Largest Volcano	Mauna Loa (<i>Hawaii Islands</i>)
Largest Lake	Caspian Sea	Longest Wall	Great Wall of China
Deepest Lake	Baikal (Siberia)	Highest Mountain Peak	Mount Everest (<i>Nepal</i>)
Highest Lake	Titicaca (<i>Bolivia</i>)	Highest Mountain Range	Himalayas
Largest Lake (<i>Fresh water</i>)	Lake Superior, USA	Longest Mountain Range	Andes Central (<i>South America</i>)
Largest Coral Formation	The Great Barrier Reef (<i>Australia</i>)	Biggest Museum	British Museum (<i>London</i>)
Largest Continent	Asia	Highest Waterfall	Salto Angel Falls (<i>Venezuela</i>)
Smallest Continent	Australia	Longest Gulf	Gulf of Mexico
Largest Country (<i>in population</i>)	China	Deepest and Biggest Ocean	The Pacific
Largest Country (<i>in area</i>)	Russia	Largest Peninsula	Arabia
Longest Dome	World Peace Monument Dome (<i>Pune</i>)	Largest Palace	Imperial Palace (<i>Gugong</i>), Beijing (<i>China</i>)
Tallest Minar (<i>Free standing</i>)	Great Hassan II Mosque, Casablanca, Morocco	Largest Park	National Park, Greenland
Largest City (<i>in population</i>)	Tokyo	Largest Archipelago	Malay Archipelago
Highest City	Wen Chuan (<i>Tibet, China</i>)		
Largest City (<i>in population</i>)	Tokyo (<i>Japan</i>)		

Coldest Place	Verkhoyansk (<i>Siberia</i>) Temperature (– 89.2°C).	Tallest Statue	Statue of Unity, Gujarat (<i>India</i>)
Driest Place	McMurdo Dry Valleys, Antarctica	Tallest Tower	Tokyo Skytree (<i>Japan</i>)
Hottest Place	Al-Aziziyah (<i>Libya, Africa</i>) 136°F	Longest Swimming Course	English Channel (<i>between London and Edinburgh</i>)
Largest Platform (<i>Railway</i>)	Gorakhpur (<i>Uttar Pradesh</i>)	Longest Train Nonstop	Flying Scotsman
Largest Bridge (<i>Railway</i>)	Danyang-Kunshan Grand Bridge (<i>China</i>)	Longest Tunnel (<i>Railway</i>)	Gotthard Base Tunnel
Largest Plateau	Tibetan Plateau	Longest and Largest Canal/Tunnel	Le Rove Tunnel (<i>South of France</i>)
Largest River Basin	Amazon Basin	Lightest Gas	Hydrogen
World's Rainiest Spot	Mawsynram (<i>Meghalaya</i>)	Lightest Metal	Lithium
Largest Gorge	Grand Canyon on the Colorado river, USA	Highest Melting Point	Tungstan, (34100°C)
Largest Port	Shanghai (<i>China</i>)	Hardest Substance	Wurtzite Boron Nitride
Busiest Port	Shanghai (<i>China</i>)	Fastest Bird	The Peregrine Falcon
Longest Railway	Trans-Siberian Railway	Longest Poisonous Snake	King Cobra
Longest River	Nile (6690 km)	Largest Temple	Angkor Vat (<i>Cambodia</i>)
Longest River Dam	Tarbela Dam, Pakistan	Largest Diamond Mine	Kimberley (<i>South Africa</i>)
Largest Sea-Bird	Albatross	Tallest Structure	Burj Khalifa (<i>Dubai</i>)
Largest Sea	Philippine Sea		

Countries with Capitals and Currencies

Country	Capital	Currency	Country	Capital	Currency
Afghanistan	Kabul	Afghani	Colombia	Bogota	Colombian Peso
Albania	Tirana	Lek	Denmark	Copenhagen	Krone
Algeria	Algiers	Algerian Dinar	Egypt	Cairo	Egyptian Pound
Angola	Luanda	Kwanza	France	Paris	Franc, Euro
Argentina	Buenos Aires	Peso	Germany	Berlin	Euro
Australia	Canberra	Australian Dollar	Greece	Athens	Euro
Austria	Vienna	Euro	Hungary	Budapest	Forint
Bangladesh	Dhaka	Taka	India	New Delhi	Rupee
Belarus	Minsk	Ruble	Indonesia	Jakarta	Rupiah
Belgium	Brussels	Euro	Iran	Tehran	Rial
Bhutan	Thimphu	Ngultrum	Iraq	Baghdad	Dinar
Brazil	Brasilia	Cruzeiro Real	Ireland	Dublin	Euro
Cambodia	Phnom-Penh	Riel	Israel	Jerusalem	Shekel
Canada	Ottawa	Canadian Dollar	Italy	Rome	Euro
Chile	Santiago	Peso	Japan	Tokyo	Yen
China	Beijing	Yuan, Renminbi	Kazakhstan	Nur-Sultan	Tenge

<i>Country</i>	<i>Capital</i>	<i>Currency</i>
Kenya	Nairobi	Shilling
North Korea	Pyongyang	Won
Kuwait	Kuwait City	Kuwait Dinar
South Korea	Seoul	Won
Libya	Tripoli	Libyan Dinar
Malaysia	Kuala Lumpur	Ringgit
Maldives	Male	Rufiyaa
Mauritius	Port Louis	Rupee
Mongolia	Ulan Bator	Tugrik
Montenegro	Podgorica	Euro
Myanmar	Naypyidaw	Kyat
Namibia	Windhoek	Namibian Dollar
Nepal	Kathmandu	Nepalese Rupee
Netherlands	Amsterdam	Euro
New Zealand	Wellington	New Zealand Dollar
Nigeria	Abuja	Naira
Norway	Oslo	Krone
Pakistan	Islamabad	Rupee
Philippines	Manila	Peso
Poland	Budapest	Zloty
Portugal	Lisbon	Euro

<i>Country</i>	<i>Capital</i>	<i>Currency</i>
Qatar	Doha	Riyal
Russia	Moscow	Ruble
Saudi Arabia	Riyadh	Riyal
Somalia	Mogadishu	Somali Shilling
Singapore	Singapore	Dollar
South Africa	Pretoria	Rand
Spain	Madrid	Euro
Sri Lanka	Colombo	Sri Lankan Rupee
Sudan	Khartoum	Sudanese Pound
South Sudan	Juba	South Sudanese Pound
Sweden	Stockholm	Krona
Switzerland	Bern	Swiss Franc
Taiwan	Taipei	New Taiwan Dollar
Thailand	Bangkok	Baht
Turkey	Ankara	Lira
Uganda	Kampala	Uganda Shilling
Ukraine	Kiev	Hryvnia
UK	London	Pound Sterling
US	Washington DC	US Dollar
Venezuela	Caracas	Bolivar
Zimbabwe	Harare	US Dollar

Geographical Epithets

Blue Mountains	Nilgiri Hills
Beautiful City	Chandigarh
City of Golden Gate	San Francisco
City of Magnificent Buildings	Washington
City of Palaces	Kolkata
City of Seven Hills	Rome
Cockpit of Europe	Belgium
Continent of Birds	South Africa
City of Smoke	Chicago
Dark Continent	Africa
Forbidden City	Lhasa (Tibet)
Gift of the Nile	Egypt
Granite City	Aberdeen
Holy Land	Palestine
Island Continent	Australia
Island of Cloves	Zanzibar
Isle of Pearls	Bahrain

Key to the Mediterranean	Gibraltar
Land of Golden Fleece	Australia
Land of Maple	Canada
Land of Morning Calm	Korea
Land of the Midnight Sun	Norway
Land of the Rising Sun	Japan
Land of the Thunderbolt	Bhutan
Land of Thousand Lakes	Finland
Land of White Elephant	Thailand
Mistress of Eastern Sea	Sri Lanka
Pearl of the Antilles	Cuba
Pearl of the Pacific	Guayaquil Port of Ecuador
Roof of the World	The Pamirs, Central Asia
Spice Garden of India	Kerala
Sugar Bowl of the World	Cuba

Geographical Discoveries

<i>Discovery</i>	<i>Discoverer</i>	<i>Discovery</i>	<i>Discoverer</i>
America	Christopher Columbus	New Foundland	John Cabot
Sea Route to India via Cape of Good Hope	Vasco Da Gama	Hudson Bay	Henry Hudson
Solar System	Copernicus	Circumnavigation of World	Magellan
Planets	Kepler	Mount Everest	Edmund Hillary
South Pole	Roald Amundsen	Brazil	Pedro Alvares Cabral
North Pole	Robert Peary	Tasmania Island	Abel Tasman
China	Marco Polo	Cape of Good Hope	Bartolomeu Dias

Official Books of Major Countries

Blue Book	An official report of the British Government
Green Book	An official publications of Italy and Iran
Grey Book	An official reports of the Governments of Japan and Belgium
Orange Book	An official publications of the Government of Netherlands
White Book	An official publications of China, Germany and Portugal
White Paper	An official paper of the Governments of Britain and India on a particular issue
Yellow Book	An official paper of the Government of France

Important Monuments of Some Famous Countries

<i>Monument</i>	<i>Country</i>	<i>Monument</i>	<i>Country</i>
Imperial Palace (<i>Tokyo</i>)	Japan	Leaning Tower of Pisa	Italy
Eiffel Tower (<i>Paris</i>)	France	Pyramid (<i>Giza</i>)	Egypt
Great Wall of China	China	Opera House (<i>Sydney</i>)	Australia
Kremlin Palace (<i>Moscow</i>)	Russia	Statue of Liberty (<i>New York</i>)	USA
Kinder Disk	Denmark	Taj Mahal (<i>Agra</i>)	India

The Seven Wonders of the World

<i>Ancient World</i>	<i>Modern World</i>	<i>The 'New' Wonder</i>
The Colossus of Rhodes	Channel Tunnel	Pyramid at Chichen Itza, Mexico
The Great Pyramid of Giza	CN Tower	Christ Redeemer, Brazil
The Hanging Gardens of Babylon	Empire State Building	The Great Wall, China
The Mausoleum at Halicarnassus	Golden Gate Bridge	Machu Picchu, Peru
The Statue of Zeus at Olympia	Itaipu Dam	Petra, Jordan
The Lighthouse of Alexandria	North Sea Protection works	Roman Colosseum, Italy
The Temple of Artemis at Ephesus	Panama Canal	The Taj Mahal, India

Intelligence/Detective Agencies of the World

<i>Detective Agency</i>	<i>Country</i>
Ministry of State Security (MSS)	China
Australian Security and Intelligence Organisation (ASIO)	Australia
KGB/GRU	Russia
National Intelligence Agency	South Africa
MI (Military Intelligence)-5 and 6, Special Branch, Joint Intelligence Organisation	United Kingdom
Inter Services Intelligence (ISI)	Pakistan
Research and Analysis Wing (RAW), Intelligence Bureau (IB)	India
Central Intelligence Agency (CIA), Federal Bureau of Investigation (FBI)	USA
MOSSAD	Israel
Mukhabarat	Egypt
Naicho	Japan
SAVAK (Sazamane Etelaatva Amniate Kechvar)	Iran
General Security Directorate	Iraq
DGSE (Direction General de la Securite Exterieur)	France

Important Symbols or Signs

Pen	Symbol of culture and civilisation
Lotus	Culture and civilisation
Red Cross	Medical aid and hospital
Red Flag	Revolution; also 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
White Flag	Symbol of truce
Pigeon or Dove	Symbol of peace
A blindfolded woman holding a balanced scale	Symbol of justice
Black strip on face arm	Sign of mourning or protest
One skull on two bones crossing each other diagonally	Sign of danger
Wheel (Chakra)	Symbol of progress
Flag flown at half mast	Symbol of national mourning
Olive Branch	Symbol of peace

Languages Spoken

<i>Language</i>	<i>Member</i>	<i>Language</i>	<i>Member</i>
Mandarin Chinese	955 million	Arabic	295 million
Spanish	405 million	Hindi	260 million
English	360-380 million	Portuguese	215 million

Major Newspapers of the World

<i>Newspaper</i>	<i>Country</i>	<i>Newspaper</i>	<i>Country</i>
The Sydney Morning Herald	Australia	The Hindustan Times	India
The Age	Australia	Mainichi Daily News	Japan
Globe and Mail	Canada	The New Zealand Herald	New Zealand
The Gazette	Canada	The Press	New Zealand
International Herald Tribune	France	The Times	United Kingdom
Die Welt	Germany	The Scotsman	United Kingdom
The Times of India	India	The Guardian	United Kingdom
The Hindu	India	The Herald	United Kingdom
The Tribune	India	The Courier	United Kingdom
The Statesman	India	Washington Post	United States of America

Parliaments of the World

<i>Country Name</i>	<i>Parliament Name</i>	<i>Country Name</i>	<i>Parliament Name</i>
Afghanistan	Shora	Maldives	People's Majlis
Australia	Federal Parliament	Japan	Diet
Bangladesh	Jatiyo Shangsad/ House of the Nation	Nepal	Rashtriya Panchayat
Bhutan	Tshogdu	Pakistan	National Assembly and Senate
Canada	Parliament	Russia	Duma
China	National People's Congress	Spain	Cortes
Egypt	People's Assembly	Sweden	Riksdag
France	National Assembly	South Africa	Parliament
Germany	Bundestag	Mauritius	National Assembly
Britain	Parliament	USA	Congress

Top 5 Largest and Smallest Countries

<i>Largest Country (Area-wise)</i>	<i>Largest Country (Population-wise)</i>	<i>Smallest Country (Area-wise)</i>	<i>Smallest Country (Population-wise)</i>
Russia	China	Vatican City	Vatican City
Canada	India	Monaco	Tuvalu
China	USA	Nauru	Nauru
United States	Indonesia	Tuvalu	Palau
Brazil	Brazil	San Marino	San Marino

Religions of the World

<i>Religion</i>	<i>Member</i>	<i>Percentage</i>	<i>Religion</i>	<i>Member</i>	<i>Percentage</i>
Christianity	2.4 billion	31.2%	Buddhism	0.5 billion	6.9%
Islam	1.8 billion	24.1%	Sikhism	25 million	0.29%
Hinduism	1.2 billion	15.1%	Jewish	14.5 million	0.23%

National Emblems of Major Countries

Country	Emblem	Country	Emblem
<i>Australia</i>	Kangaroo	<i>Italy</i>	White Lily
<i>Bangladesh</i>	Water Lily	<i>Japan</i>	Chrysanthemum
<i>Belgium</i>	Lion	<i>Netherlands</i>	Lion
<i>Canada</i>	White Lily	<i>New Zealand</i>	Southern Cross, Kiwi, Fern
<i>Chile</i>	Candor and Huemul	<i>Norway</i>	Lion
<i>France</i>	Lily	<i>Pakistan</i>	Crescent
<i>Germany</i>	Corn Flower	<i>Spain</i>	Eagle
<i>India</i>	Lion Capital	<i>United Kingdom</i>	Rose
<i>Iran</i>	Rose	<i>United States of America</i>	Golden Rod

First in India

Newspaper	<i>Bengal Gazette (James Hickey)</i>
Vernacular Daily	<i>Samachar Darpan (Bengali)</i>
Hindi Newspaper	<i>Udant Martand (Pt. Jugal Kishore Shukla)</i>
Telegraph Line	<i>Diamond Harbour to Kolkata</i>
International Telephone Service	<i>Mumbai to London (1851)</i>
Silent Movie	<i>Raja Harish Chandra (Dadasaheb Phalke 1913)</i>
Talkie Movie	<i>Alam Ara (Ardeshir Irani-1931)</i>
Aircraft Carriage Warship	<i>INS Vikrant</i>
Satellite	<i>Aryabhata (19th April, 1975)</i>
Satellite dedicated exclusively for Education purposes	<i>EDUSAT</i>
Dedicated multi wavelength space observatory	<i>Astrosat</i>
Successful indigenous launch vehicle	<i>SLV-3</i>
Nuclear Reactor	<i>Apsara (1956)</i>
Lunar Mission	<i>Chandrayaan-I (October, 2008)</i>
Mars Mission	<i>Mars Orbiter Mission (5th November, 2013)</i>
Hydroelectric Project	<i>Sidrapong (1897)</i>
Asian Games	<i>Delhi (1951)</i>
Census	<i>1872</i>
Regular Decadal Census	<i>1881 Onwards</i>
Biosphere Reserve	<i>Nilgiri</i>
National Park	<i>Hailey National Park (Jim Corbett), 1936</i>
First asymmetrical cable stayed bridge	<i>Signature Bridge (New Delhi)</i>
E-court	<i>Ahmedabad</i>
Court exclusively dedicated to women	<i>Malda (WB)</i>
Technology Park	<i>Technopark, Thiruvananthapuram</i>
Cloned Animal	<i>Samrupa</i>
Rail University	<i>Vadodara</i>

First in India (Male)

First Governor-General of India	<i>William Bentinck (1828)</i>
First and last Indian Governor-General of Free India	<i>C Rajagopalachari</i>
First Commander-in-Chief of Free India	<i>General KM Kariappa</i>
First Field Marshal of India	<i>General SHFJ Manekshaw (1971)</i>
First Indian to go in Space	<i>Rakesh Sharma</i>
First Indian to climb the Mount Everest without Oxygen	<i>Sherpa Ang Dorje</i>
First Indian to become the Managing Director of World Bank	<i>Gautam Kaji</i>
First Indian Judge in the International Court of Justice	<i>Dr Nagendra Singh</i>
First Indian to get Nobel Prize in Physics	<i>CV Raman (1930)</i>
First Indian to get Nobel Prize in Literature	<i>Rabindranath Tagore (1913)</i>
First Indian to get Nobel Prize in Economics	<i>Dr Amartya Sen (1998)</i>
First Indian to get Nobel Prize in Medicines (Physiology)	<i>Dr Har Govind Khorana (1968)</i>
First Indian to get Bharat Ratna	<i>Dr S Radhakrishnan, C Rajgopalachari and Dr CV Raman (1954)</i>
First Person to be Honoured with the Jnanpith Award	<i>G Sankara Kurup (Malayalam)</i>
First Person to get Bharat Ratna (Posthumously)	<i>Lal Bahadur Shastri</i>
First Cricketer to get Padma Bhushan	<i>CK Naidu</i>
First Indian to get through ICS	<i>Satyendra Nath Tagore (1869)</i>
First Indian to swim across the English Channel	<i>Mihir Sen (1958)</i>
First Judge of International Court of Justice	<i>Dr. Nagendra Singh</i>
First Chief of Defence Staff	<i>Bipin Rawat</i>

First in India (Female)

First Indian Female Chairperson of Indian National Congress	<i>Sarojini Naidu (1925)</i>
First Woman to climb the Everest	<i>Bachendri Pal (1984)</i>
First Woman Cabinet Minister	<i>Rajkumari Amrit Kaur (1947)</i>
First Woman Chairman of the UN General Assembly	<i>Vijaya Laxmi Pandit</i>
First Woman President of India	<i>Pratibha Devi Singh Patil</i>
First Woman Speaker of Lok Sabha	<i>Meira Kumar (2009)</i>
First Woman Deputy Chairman of Rajya Sabha	<i>Margaret Alva (1983-85)</i>
First Woman Prime Minister of India	<i>Indira Gandhi</i>
First Woman to reach Antarctica	<i>Meher Moos (1977)</i>
First Woman IAS Officer	<i>Anna Rajam George (1950)</i>
First Female Chief Justice	<i>Leela Seth (1991)</i>
First Women Defence Minister	<i>Nirmala Sitharaman</i>
First Woman to get the Bharat Ratna	<i>Indira Gandhi</i>
First Female Nobel Prize Winner	<i>Mother Teresa (1979)</i>
First Woman to complete Century in World Cup Cricket	<i>Thirush Kamini</i>
First to win Silver in Olympics (Badminton)	<i>PV Sindhu</i>
First Indian Woman to become member of International Olympic Committee	<i>Nita Ambani</i>
First to win Bronze in Olympics (Wrestler)	<i>Sakshi Malik</i>
First Indian Woman Fighter Pilot to fly a fighter jet	<i>Avani Chaturvedi (2018)</i>
First Indian Naval Woman Pilot	<i>Shubhangi Swaroop (2018)</i>
First Female ICC Match Referee	<i>GS Lakshmi</i>

Superlatives (India)*(Biggest, Highest, Largest, Longest, Smallest etc)*

The longest River	The Ganga (2525 km)	The highest Airport	Leh Airport (<i>Ladakh</i>)
The longest Canal	Indira Gandhi Canal or Rajasthan Canal (<i>Rajasthan</i>) (649 km)	The largest Desert	Thar (<i>Rajasthan</i>)
The longest Dam	Hirakud Dam (<i>Odisha</i>) (26 km)	The largest Delta	Sunderbans (<i>Paschim Banga</i>)
The longest Sea Beach	Marina Beach (<i>Chennai</i>) (13 km)	The state with maximum Forest Area	Madhya Pradesh (25.14% of its geographical area)
The highest Lake	Cholamu Lake (<i>Sikkim</i>)	The largest Zoo	Zoological Garden (<i>Kolkata</i>)
The largest Saline Water Lake	Chilka Lake (<i>Odisha</i>)	The biggest Stadium	Yuva Bharti (<i>Salt Lake</i>) Stadium, <i>Kolkata</i>
The biggest River Islands	Majuli, Brahmaputra river (<i>Assam</i>)	The highest Award	Bharat Ratna
The largest Fresh Water Lake	Wular Lake (<i>Jammu and Kashmir</i>)	The highest Gallantry Award	Param Vir Chakra
The highest Dam	Tehri Dam (<i>Uttarakhand</i>) (260 mt)	The largest Gurudwara	Golden Temple, Amritsar
The highest Waterfall	Kunchikal Falls (<i>Karnataka</i>) (455 m, 1493 ft)	The largest Cave Temple	Kailash Temple (<i>Ellora, Maharashtra</i>)
The deepest River Valley	Bhagirathi and Alaknanda	The highest Peak	Godwin Austin I, K 2 (8611 m)
The longest River Bridge	Bhupen Hazarika Setu, Assam (9,150 m)	The largest Mosque	Jama Masjid (<i>Delhi</i>)
The biggest Cantilever Bridge	Rabindra Setu or Howrah Bridge (<i>Kolkata</i>)	The longest Tunnel	Atal tunnel (Himachal Pradesh)
The state with longest Coastline	Gujarat (1600 km)	The largest Auditorium	Sri Shanmukhanand Hall (<i>Mumbai</i>)
The longest river without Delta	Narmada	The largest Animal Fair	Sonepur (<i>Bihar</i>)
The longest Sea Bridge	Bandra-Worli Sea Link (5.6 km)	The largest Cave	Amarnath (<i>Jammu and Kashmir</i>)
The largest Artificial Lake	Dhebar Lake (<i>Rajasthan</i>)	The highest Gate Way	Buland Darwaza, Fatehpur Sikri (<i>Uttar Pradesh</i>)
The longest River of Southern India	Godavari (1465 km)	The tallest Statue	'Statue of Unity' Gujarat, India (182 m)
The longest Railway Platform	Gorakhpur, Uttar Pradesh (1366.33 m)	The largest Public Sector Bank	State Bank of India
The longest National Highway	NH-44 (<i>Srinagar to Kanyakumari</i>)	The most Populous City	Mumbai (Maharashtra)
The longest Corridor	Corridor of Ramnathswami Temple at Rameshwaram (<i>Tamil Nadu</i>)	The biggest Church	Saint Cathedral at Old Goa (<i>Goa</i>)
The highest Road	Road at Khardungla (<i>in Leh-Manali Sector</i>)	The highest Battlefield	Siachen Glacier (5753 m)

Books and Authors

Author Name	Book Name
Alexandre Dumas	The Three Musketeers
Amartya Sen	Identity and Violence : The Illusion of Destiny
Amartya Sen	The Argumentative Indian
Amartya Sen	Development as Freedom
Amitav Ghose	River of Smoke, Sea of Poppies, The Circle of Reason, The Great Derrangement: Climate Change and the Unthinkable
Amrita Pritam	Death of a City
Anita Desai	Clear Light of the Day
Aristotle	Politics
Arun Shourie	A Secular Agenda
Arundhati Roy	The Algebra of Infinite Justice
Arundhati Roy	The God of Small Things
Arundhati Roy	Greater Common Good
Ashwaghosha	Budda Charitham
Aung San Suu Kyi	Freedom from Fear
Bankim Chandra Chatterji	Anand Math, Durgeshnandini
Barack Obama	Dreams from My Father, 4 Promised Land
Barrett Lee, Marina Chapman	The Girl with No Name
Benazir Bhutto	Pakistan the Gathering Storm
Javier Moro	The Red Saree
Chandrashekar	Meri Jail Diary
Charles Dickens	David Copperfield
Chetan Bhagat	Revolution 2020, What Young India Wants, Half Girl Friend, One Night at the Call Centre, Making India Awesome, One Indian Girl
Chitra Subramaniam	India is for Sale
Dalai Lama	Freedom in Exile, Ethics for the New Millennium
Dante Alighieri	The Divine Comedy
Dr C Rangarajan	Indian Economy : Essays on Money and Finance
Edward Luce	Inspite of the Gods
Eleanor Catton	The Luminaries
EM Forster	A Passage to India
Gen V P Malik	Kargil : From Surprise to Victory
Gunter Grass	The Tin Drum
H R Bhardwaj	Law, Lawyers and Judges
Herbert George Wells	Time Machine

Author Name	Book Name
Indira Gandhi	My Truth
Jai Shankar Prasad	Ajatshatru
Jawaharlal Nehru	Discovery of India, Glimpses of World History
Jayaprakash Narayan	Prison Diary
K Natwar Singh	Walking with Lions, Curtain Raisers
Kapil Dev	Straight from the Heart
Karl Marx	Das Kapital
Karl Marx and Fredrik Engels	Communist Manifesto
Khushwant Singh	Train to Pakistan
Kiran Bedi	I Dare, As I See
Kiran Desai	The Inheritance of Loss
Kuldeep Mathur	Too Old to be Bold
LK Advani	A Prisoner's Scrap
Mahatma Gandhi	My Experiments with Truth
Malala Yousafzai	We Are Displaced
Mark Tully	The Heart of India
Mulk Raj Anand	Untouchable
Narendra Modi	Exam Warriors
Pranab Mukherjee	The Coalition Years, The Presidential Years
Premchand	Godan
Ramchandra Guha	Gandhi, Makers of Modern India
RK Narayan	The Guide
Ruskin Bond	A Garland of Memories, Death under the deodars
Sarojini Naidu	Golden Threshold, The Broken Wings
Shashi Tharoor	A Long Era of Darkness, Paradoxical Prime Minister
Sir Richard Burton	The Arabian Nights
Sri Aurobindo Ghosh	Essays on Gita
Stephen Hawking	A Brief History of Time
Taslima Nasreen	All About Women
Thomas Pynchon	Against the Day
V S Naipaul	India : A Wounded Civilisation, Letters Between a Father and Son
Ved Vyas	Bhagwad Gita
Vikram Chandra	Love and Longing in Bombay
Vikram Seth	An Equal Music
Vimal Kumar	Sachin Cricketer of the Century

Books and Authors

<i>Author Name</i>	<i>Book Name</i>
Saurav Ganguly and Gautam Bhattacharya	A Century is Not Enough
Yuvraj Singh	The Test of My Life
Vijay Lokapally	Driven : The Virat Kohli Story
Nand Kishore Acharya	Chilte Hue Apne Ko (2019)
Natwar Singh	One Life is not Enough
P. Chidambaram	A View from Outside
Raghuram Rajan	I Do What I Do
Naveen Chawla	Every Vote Counts
Rajdeep Sardesai	How Modi Won India (2019)
Vasdev Mohi	Cheque book (2019, Saraswati Samman)

International Decades

2010-2020	UN Decade for Desert and Fight against Desertification
2014-2024	UN Decade of Sustainable Energy for All
2015-2024	International Decade for People of African Descent
2016-2025	UN Decade of Action on Nutrition

2018-2028	International Decade for Action "Water for Sustainable Development"
2019-2028	UN Decade of Family Planning
2021-2030	UN Decade of Healthy Ageing
2022-2032	International Decade of Indigenous Language

International Years

2009	International Year of Astronomy
2010	International Year of Biodiversity
2011	International Year of Forests
2012	International Year of Cooperatives
2013	International Year of Water Cooperation
2014	International Year of Family Farming
2015	International Year of Light and Light based Technologies
2016	International Year of Pulses
2017	International Year of Sustainable Tourism for Development
2019	International Year of Indigenous Languages
2020	International Year of Plant Health
2021	International Year for Elimination of Child Labour

Important Dates and Days of the Year**January**

- 1 Global Family Day
- 9 NRI Day
- 12 National Youth Day (of Swami Vivekanand)
- 15 Indian Army Day
- 25 National Tourism Day, Voter's Day
- 26 Indian Republic Day, International Customs Day
- 28 Data Protection Day
- 30 Martyr's Day (Mahatma Gandhi's Martyrdom), World Leprosy Eradication Day

February

- 4 World Cancer Day
- 13 World Radio Day
- 20 World Day of Social Justice
- 24 Central Excise Day
- 28 National Science Day

March

- 8 International Women's Day
- 15 World Consumer Rights Day,
- 21 World Forestry Day, International Day for the Elimination of Racial Discrimination
- 22 World Water Day
- 23 World Meteorological Day
- 24 World TB Day

April

- 4 International Day for Mine Awareness
- 5 National Maritime Day,
- 7 World Health Day
- 18 World Heritage Day
- 21 Civil Services Day
- 22 World Earth Day

May

- 1 International Labour Day (May Day)
- 3 World Press Freedom Day
- 8 World Red Cross Day
- 17 World Telecommunications Day
- 21 Anti-Terrorism Day

June

- 5 World Environment Day
- 7 World Food Safety Day
- 8 World Oceans Day
- 12 World Day against Child Labour
- 21 International Yoga Day

July

- 1 National Doctor's Day
- 7 International day of Cooperatives
- 11 World Population Day
- 12 International Malala Day

August

- 6 Hiroshima Day
- 10 World Bio-Fuel Day
- 12 International Youth Day
- 20 Sadbhavna Divas
- 29 National Sports Day (Dhyanchand's birthday)

September

- 5 Teachers' Day (Dr Radhakrishnan's Birthday)
- 14 Hindi Day, World First Aid Day
- 16 World Ozone Day

- 21 International Day of Peace
- 26 International Day for Elimination of Nuclear Weapons
- 27 World Tourism Day

October

- 2 International Non-Violence Day, Lal Bahadur Shastri and Mahatma Gandhi's Birthday
- 3 World Habitat Day
- 5 World Teacher's Day
- 8 Indian Air Force Day
- 11 National Education Day (India)
- 16 World Food Day
- 24 United Nations Day

November

- 9 National Legal Services Day
- 14 World Diabetes Day, Children's Day
- 20 Universal Children's Day (UN)
- 26 World Environment Protection Day, Samvidhan Diwas

December

- 1 World AIDS Day
- 3 International Day of Person with Disabilities
- 4 Indian Navy Day
- 7 Armed Forces Flag Day
- 10 Human Rights Day
- 16 Vijay Diwas
- 25 National Good Governance Day

ABBREVIATIONS

A

ABM	Anti Ballistic Missiles
ADB	Asian Development Bank
AERE	Atomic Energy Research Establishment
AFSPA	Armed Forces Special Power Act
AGOC	Asian Games Organising Committee
AIDS	Acquired Immuno Deficiency Syndrome
AIIMS	All India Institute of Medical Sciences
ALH	Advanced Light Helicopter
APPLE	Ariane Passenger Payload Experiment

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
APEC	Asia-Pacific Economic Cooperation
ASAT	Anti-Satellite Weapon
ASIAN	Association of Southeast Asian Nations
ASCII	American Standard Code for Information Interchange
ASLV	Augmented Satellite Launch Vehicle
ASI	Archaeological Survey of India
ATM	Automated Teller Machine
ATS	Anti-Terrorism Squad
AU	African Union
AVES	Acute Viral Encephalitic Syndrome

B

BC SBI	Banking Codes and Standard Board of India
BARC	Bhabha Atomic Research Centre
BBC	British Broadcasting Corporation
BCG	Bacillus Calmette Guerin (Anti-Tuberculosis Vaccine)
BCTT	Banking Cash Transaction Tax
BCCI	Board for Control of Cricket in India
BENELUX	Belgium, Netherlands, Luxembourg
BIMSTEC	Bay of Bengal Initiative for Multisectoral Technical and Economic Cooperation
BIS	Bureau of Indian Standards
BMD	Ballistic Missile Defence System
BPO	Business Process Outsourcing
BRO	Border Roads Organisation

C

CAA	Citizenship Amendment Act
CABE	Central Advisory Board of Education
CAG	Comptroller and Auditor General
CAPEX	Computer-Aided Paperless Examination System
CAZRI	Central Arid Zone Research Institute
CBI	Central Bureau of Investigation
CECA	Comprehensive Economic Cooperation Agreement
CFC	Chlorofluoro Carbon
CID	Criminal Investigation Department
CISF	Central Industrial Security Force
CITES	Convention on International Trade in Endangered Species
CNG	Compressed Natural Gas
COFEPOSA	Conservation of Foreign Exchange and Prevention of Smuggling Act
CPCB	Central Pollution Control Board
CPRI	Central Power Research Institute
CRR	Cash Reserve Ratio
CSIR	Council of Scientific and Industrial Research

D

DAVP	Directorate of Advertising and Visual Publicity
DDT	Dichloro-Diphenyl Trichloro-ethane (disinfectant)
DNA	De-oxyribonucleic Acid
DPSA	Deep Penetration Strike Aircraft
DPT	Diphtheria, Pertussis and Tetanus
DRDO	Defence Research and Development Organisation
DTH	Direct-to-Home (broadcasting)
DVD	Digital Versatile Disk

E

ECG	Electro Cardiogram
EEG	Electro-Encephalography
EET	Eastern European Time
ESCAP	Economic and Social Commission for Asia and the Pacific
EVM	Electronic Voting Machine

F

FDI	Foreign Direct Investment
FII	Foreign Institutional Investor
FBI	Federal Bureau of Investigation
FERA	Foreign Exchange Regulations Act
FICCI	Federation of Indian Chambers of Commerce and Industry
FDR	Fixed Deposit Receipt
FLAG	Fibre Optic Link Around the Globe

G

GAIN	Global Alliance for Improved Nutrition
GANDHI	Green Action for National Dandi Heritage Initiative
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GEF	Global Environment Fund
GMPS	Global Mobile Personal Communications System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSLV	Geosynchronous Satellite Launch Vehicle

H

HAC	Hindustan Aluminium Corporation
HAL	Hindustan Aeronautics Limited
HIV	Human Immunodeficiency Virus
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
HYV	High Yielding Variety

I

IAAI	International Airport Authority of India
IAEA	International Atomic Energy Agency
IBRD	International Bank for Reconstruction and Development
ICAO	International Civil Aviation Organisation
ICAR	Indian Council of Agricultural Research
ICMR	Indian Council of Medical Research
ICRC	International Committee of the Red Cross
IDBI	Industrial Development Bank of India
IMA	Indian Military Academy
IMO	International Maritime Organisation
INMAS	Institute of Nuclear Medicines and Allied Sciences
INSAS	Indian Small Arms System
INSAT	Indian National Satellite
INTERPOL	International Police Organisation
IPCC	Intergovernmental Panel on Climate Change
IRBM	Intermediate Range Ballistic Missile
IRS	Indian Remote Sensing Satellite
ISCS	Integrated Smart Card System
ISRO	Indian Space Research Organisation
ITU	International Telecommunication Union

JKL

JNNURM	Jawaharlal Nehru National Urban Renewal Mission
LCA	Light Combat Aircraft
LOC	Line of Control
LOAC	Line of Actual Control
LTA	Light Transport Aircraft

M

MAT	Minimum Alternative Tax
METSAT	Meteorological Satellite
MNP	Mobile Number Portability
MSS	Multimedia Message Service
MODEM	Modulator-DEModulator
MRI	Magnetic Resonance Imaging
MRTS	Mass Rapid Transit System
MSP	Minimum Support Price
MTCR	Missile Technology Control Regime

N

NAA	National Airport Authority
NABARD	National Bank for Agriculture and Rural Development
NADA	National Anti-Doping Agency
NASA	National Aeronautics and Space Administration
NEERI	National Environment Engineering Research Institute
NATA	Natural Aptitude Test for Architecture
NCEP	National Committee on Environmental Planning
NCERT	National Council of Educational Research and Training
NeGP	National e-governance Plan
NEP	National Education Policy
NEPA	National Environment Protection Authority
NHDP	National Highways Development Project
NHRC	National Human Right Commission
NITI	National Institution for Transforming India
Aayog	
NRC	National Register of Citizens

O

OCI	Overseas Citizenship of India
OAS	Organisation of American States
OAU	Organisation of African Unity
ODS	Ozone Depletion Substances
OIC	Organisation of Islamic Countries
OPEC	Organisation of the Petroleum Exporting Countries
OSCE	Organisation for Security and Cooperation in Europe

P

PURA	Providing Urban Amenities in Rural Areas
PATA	Pacific Asia Travel Association
POTA	Prevention of Terrorism Act
PPE	Personal Protective Equipment
PSLV	Polar Satellite Launch Vehicle

QR

QIB	Qualified Institutional Buyer
QIP	Qualified Institutional Placement
RAF	Rapid Action Force
RBI	Reserve Bank of India
RCC	Reinforced Concrete Cement
RDSS	Radio Determination Satellite Service
RTGS	Real Time Gross Settlement System
RTE	Right to Education
RTI	Right to Information

S

SAARC	South Asian Association for Regional Cooperation
SAFTA	South Asian Free Trade Area
SAIL	Steel Authority of India Limited
SAPTA	SAARC Preferential Trading Agreement
SATNAV	SATellite NAVigation
SALT	Strategic Arms Limitation Talks
SAVE	SAARC Audio Visual Exchange
SCO	Shanghai Cooperation Organisation
SEBI	Securities and Exchange Board of India
SIDBI	Small Industries Development Bank of India
SPIN	Software Process Improvement Networks
STARS	Satellite Tracking and Ranging Station
START	Strategic Arms Reduction Treaty
SWIFT	Society for Worldwide Interbank Financial Telecommunications

T

TADA	Terrorist and Disruptive Activities (Prevention) Act
TAPS	Tarapur Atomic Power Station
TIN	Tax Identification Number
TRAI	Telecom Regulatory Authority of India
TRIPS	Trade Related Intellectual Property Rights
TVOA	Tourist Visa on Arrival

U

UAV	Unmanned Aerial Vehicle
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFPA	United Nations Fund for Population Activities
UPS	Uninterruptible Power Supply

V

VAT	Value Added Tax
VOIP	Voice Over Internet Protocol
VPN	Virtual Private Network
VSAT	Very Small Aperture Terminals

W

WADA	World Anti-Doping Agency
WAP	Wireless Application Protocol
WAVE	Wireless Access for Virtual Enterprise
WFP	World Food Programme
WFTU	World Federation of Trade Unions
WHO	World Health Organisation
WLL	Wireless in Local Loop
WWW	World Wide Web

XY&Z

XML	Extensible Markup Language
YWCA	Young Women's Christian Association
ZSI	Zoological Survey of India
ZUPO	Zimbabwe United People Organisation

AWARDS AND HONOURS

INTERNATIONAL

Nobel Prize

- The most prestigious award in the world. It was set-up in 1900 under the will of **Alfred Bernhard Nobel**.
- The Nobel Prizes are presented annually on 10th December (The death anniversary of the founder).
- It is given in the fields of Peace, Literature, Physics, Chemistry, Physiology or Medicine (from 1901) and Economics (from 1969).

Winners of Nobel Prize from India

Winner	Field	Year
Abhijit Banerjee	Economics	2019
Kailash Satyarthi	Peace	2014
Venkatraman Ramakrishnan	Chemistry	2009
Amartya Sen	Economics	1998
Subrahmanyam Chandrasekhar	Physics	1983
Mother Teresa	Peace	1979
Hargobind Khorana	Medicine	1968
CV Raman	Physics	1930
Rabindranath Tagore	Literature	1913

Grammy Awards

- It is awarded for the outstanding achievements in the music industry by National Academy for Recording Arts and Sciences, America. It was started in 1959. Pt. Ravi Shankar got this 3 times.

Pulitzer Prize

- Instituted in 1917 and named after US publisher Joseph Pulitzer.
- It is conferred annually in the United States for the accomplishments in journalism, literature and music.

Magsaysay Awards

- Instituted in 1957. Named after Ramon Magsaysay, the former President of Philippines.

- The award is given annually on 31st August, the birth anniversary of Magsaysay, for outstanding contributions in Public service, Community Leadership, Journalism, Literature and Creative Arts and International Understanding.

Man Booker Prize

Instituted in 1968, is the highest literary award of the world, set-up by the Booker Company and the British Publishers Association along the lines of the Pulitzer Prize of USA.

Right Livelihood Award

- The Right Livelihood Award was established in 1980.
- It is also referred as '**Alternative Nobel Prize**'.
- It is given to persons to honour those "working on practical and exemplary solutions to the most urgent challenges facing the world today."

Oscar Awards

Instituted in 1929, these awards are conferred annually by the Academy of Motion Pictures, Arts and Sciences, USA, in recognition of outstanding contribution in the various fields of film making.

- The Indian films nominated for Oscars are Mother India (1957), Salaam Bombay (1988), Lagaan (2001)
- Bhanu Athaiya was the first Indian to win an Oscar Award in 1982 for costume design in Gandhi Movie.

UN Human Rights Award

Instituted in 1966, this award is given every 5 years for individual contributions to the establishment of human rights.

NATIONAL

Bharat Ratna

- Bharat Ratna is India's highest Civilian Award. It was first awarded in 1954.
- The actual award is designed in the shape of a **peepal** leaf with *Bharat Ratna* inscribed in Devanagiri script in the Sun Figure.
- The reverse side of the decoration Satyameva Jayate has been written in Hindi with an inscription of state emblem.
- The emblem, the Sun and the rim are of platinum. The inscriptions are in burnished bronze.

Winners of Bharat Ratna

- Pranab Mukherjee (2019)
- Bhupen Hazarika (2019)
- Nanaji Deshmukh (2019)
- Madan Mohan Malaviya (2015)
- Atal Bihari Vajpayee (2015)
- Sachin Tendulkar (2014)
- CNR Rao (2014)
- Pandit Bhimsen Joshi (2008)
- Lata Dinanath Mangeshkar (2001)
- Ustad Bismillah Khan (2001)
- Prof Amartya Sen (1999)
- Lokpriya Gopinath Bordoloi (1999)
- Loknayak Jayprakash Narayan (1999)
- Pandit Ravi Shankar (1999)
- Chidambaram Subramaniam (1998)
- Madurai Shanmukhavadiy Subbulakshmi (1998)
- Dr Abul Pakir Jainulabdeen Abdul Kalam (1997)
- Aruna Asaf Ali (1997)
- Gulzari Lal Nanda (1997)
- Jehangir Ratanji Dadabhai Tata (1992)
- Maulana Abul Kalam Azad (1992)
- Satyajit Ray (1992)
- Morarji Ranchhodji Desai (1991)
- Rajiv Gandhi (1991)
- Sardar Vallabhbhai Patel (1991)
- Dr Bhimrao Ramji Ambedkar (1990)
- Dr Nelson Rolihlahla Mandela (1990)
- Marudur Gopalan Ramachandran (1988)
- Khan Abdul Ghaffar Khan (1987)
- Acharya Vinoba Bhave (1983)

- Mother Teresa (Agnes Gonxha Bojaxhiu) (1980)
- Kumaraswamy Kamraj (1976)
- Varahagiri Venkata Giri (1975)
- Indira Gandhi (1971)
- Lal Bahadur Shastri (1966)
- Dr Pandurang Vaman Kane (1963)
- Dr Zakir Hussain (1963)
- Dr Rajendra Prasad (1962)
- Dr Bidhan Chandra Roy (1961)
- Purushottam Das Tandon (1961)
- Dr Dhonde Keshav Karve (1958)
- Pt Govind Ballabh Pant (1957)
- Dr Bhagwan Das (1955)
- Jawaharlal Nehru (1955)
- Dr Mokshagundam Vivesvaraya (1955)
- Chakravarti Rajagopalachari (1954)
- Dr Chandrasekhara Venkata Raman (1954)
- Dr Sarvapalli Radhakrishnan (1954)

Republic Day Awards

Padma Awards

Padma Awards, which were instituted in 1954, is announced every year on the occasion of Republic Day. The award is given in three categories—Padma Vibhushan, Padma Bhushan and Padma Shri. The awards fall in line after the Bharat Ratna.

There are three Padma Awards

- **Padma Vibhushan** is the second highest National Award given for exceptional and distinguished service in any field including service rendered by government employees.
- **Padma Bhushan** is the third highest National Award given for distinguished service in any field.
- **Padma Shri** is the fourth highest award given for distinguished service in any field.

Gallantry Awards

- **Param Vir Chakra** is the highest decoration of valour award. It is the most conspicuous act of bravery or some act of valour or self-sacrifice in the presence of the enemy, whether on land, at sea or in the air. The medal is made of bronze.
- **Mahavir Chakra** is the second highest gallantry award for acts of conspicuous gallantry in the presence of the enemy whether on land, at sea or in the air. The medal is made of standard silver.

- **Vir Chakra** is awarded for acts of gallantry in the presence of enemy, whether on land, at sea or in the air. The medal is made of standard silver.
- **Ashok Chakra** This is awarded for valour, courageous action or sacrifice, away from the battlefield. It is highest military award during peacetime.
- **Kirti Chakra** The decoration is awarded for conspicuous gallantry. It is made of standard silver and is circular in shape. The obverse and the reverse are exactly the same as in Ashoka Chakra.
- **Shaurya Chakra** The decoration is awarded for an act of gallantry during peacetime.
- This award is given to a film personality for his/her outstanding contribution to the growth and development of Indian cinema. The award comprises of a swarna kamal, a cash prize of Rs. 10,00,000 and a shawl.
- Dhundiraj Govind (Dadasheb) Phalke's silent feature film, **Raja Harishchandra** (1913) was first indigenous feature film of India.
- Ardeshir Irani in 1931, released first full length talkies film **Alam Ara**. **Mrs Devika Rani Roerich** was the first person to receive Dadasaheb Phalke Award in 1969.

Sports Awards

- **Rajiv Gandhi Khel Ratna** is instituted in 1991-92 with the objective of honouring most outstanding sports-person to enhance their general status. It is the highest award bestowed to a sports person in India.
- **Arjuna Award** instituted in 1961 by the Government of India to recognise outstanding achievement in National Sports. The award carries a cash prize, a bronze statue of Arjuna and a scroll of honour.
- **Dronacharya Award** instituted in 1985 by the Government of India to recognise excellence in sports coaching. The award carries a cash prize, a bronze statue of Dronacharya and a scroll of honour.
- **Dhyanchand Award** instituted in 2002, carries a cash prize, a plaque and a scroll of honour. This honour is given to those sportspersons who have contributed to sportspersons, and sports by their performance and continue to contribute their promotion for sports even after their retirement from active sporting career.

Indian Cinema Awards

Dadasaheb Phalke Award

- Dadasaheb Phalke is known as the Father of Indian Cinema. The highest National Film Award is named after him in 1969.

Other National Awards

Bharatiya Jnanpith Award

- Instituted in 22nd May, 1961, carries a cash prize of ₹ 11 lakh, a citation and a bronze replica of Vagdevi (Saraswati).
- This award is given for the best literary writing by an Indian citizen in a language listed in Eighth Schedule of the Indian Constitution.

Gandhi Peace Prize

- Established in 2nd October, 1994, on the occasion of the 125th birthday anniversary of Mahatma Gandhi, carries a cash prize of ₹ 1 crore.
- Indian Government instituted this annual prize to encourage and promote the significance of Gandhian values over the world.

Indira Gandhi Prize for Peace, Disarmament and Development

- Instituted in 1985, this prestigious award is regarded as 'Nobel' and over the years, it has been awarded to those persons who have done outstanding work for international peace, disarmament and development.

Borlaug Award

- Instituted in 1973, carries a cash prize of ₹ 5 lakh. Instituted to honour outstanding agricultural scientists.

Sahitya Akademi Award

- Awarded for outstanding literary work and carries a cash prize of ₹ 1 lakh.
- Sahitya Akademi gives 22 awards for literary works in the languages which has recognised works.

INDIAN DEFENCE

Indian Army Commands

<i>Command</i>	<i>HQ Location</i>	<i>Command</i>	<i>HQ Location</i>
Central Command	Lucknow	South-Western Command	Jaipur
Eastern Command	Kolkata	Western Command	Chandigarh
Northern Command	Udhampur	Training Command	Shimla
Southern Command	Pune		

Indian Air Force Commands

<i>Command</i>	<i>HQ Location</i>	<i>Command</i>	<i>HQ Location</i>
Central Air Command	Prayagraj	Western Air Command	New Delhi
Eastern Air Command	Shillong	Maintenance Command	Nagpur
Southern Air Command	Thiruvananthapuram	Training Command	Bengaluru
South-Western Air Command	Gandhinagar		

Indian Navy Commands

<i>Command</i>	<i>HQ Location</i>
Western Naval Command	Mumbai
Eastern Naval Command	Vishakhapatnam
Southern Naval Command	Kochi

Note Andaman and Nicobar Command at Port Blair is the only Tri-service Command of Armed Forces.

Indian Defence Training Institutions

<i>Training Institution</i>	<i>Place</i>	<i>Estd in</i>
Rashtriya Indian Military College (RIMC)	Dehradun	1922
Army Cadet College (ACC)	Dehradun	1929
Indian Military Academy (IMA)	Dehradun	1932
National Defence Academy (NDA)	Khadakwasla, Pune	1941
High Altitude Warfare School (HAWS)	Gulmarg	1948
National Defence College (NDC)	New Delhi	1960
Officers Training Academy (OTA)	Chennai	1963
Counter Insurgency and Jungle Warfare School	Vairengte (Mizoram)	1970
College of Defence Management	Secunderabad	1970
College of Combat/Army War College	Mhow (Madhya Pradesh)	1971
Army School of Physical Training (ASPT)	Pune	1978
Army Air Defence College (AADC)	Gopalpur (Odisha)	1989
Officers Training Academy	Gaya	2011
Indian National Defence University (INDU)	Gurgaon (Haryana)	2013

Ranks of Commissioned Officers

<i>Army</i>	<i>Air Force</i>	<i>Navy</i>
General	Air Chief Marshal	Admiral
Lt. General	Air Marshal	Vice Admiral
Major General	Air Vice Marshal	Rear Admiral
Brigadier	Air Commodore	Commodore
Colonel	Group Captain	Captain
Lt. Colonel	Wing Commander	Commander
Major	Squadron Leader	Lt Commander
Captain	Flight Lieutenant	Lieutenant
Lieutenant	Flying Officer	Sub-Lieutenant

Missiles and other Weapons

<i>Name</i>	<i>Class</i>	<i>Range</i>
Agni II	MRBM	2500 km
Agni III	IRBM	3500 km-5500 km
Agni IV or Agni II Prime	IRBM	4000 km
Agni V	ICBM	5000 km-6000 km
Agni VI	ICBM	8000-10000 km
Barak	MRSAM	100 km
Dhanush	SRBM	350 km
Nirbhay	Subsonic Cruise Missile	1000 km
Brahmos	Supersonic Cruise Missile	290 km
Brahmos 2	Hypersonic Cruise Missile	290 km
Prithvi I	SRBM	150 km
Prithvi III	SRBM	350 km
Rudram	Air to Surface Anti-radiation Missile	125 km
Sagarika	SLBM	700 km
Shourya	TBM	700 km
Astra	Air to Air Missile	80 km-100 km
Nag	Anti-Tank	7 km

Note Recently, a post, *Chief of Defence Staff* is created to help improve coordination among the three services of Armed Forces. It is the highest ranking (4-Star Officer) in the Armed Forces and is head of the military staff of Armed Forces and Chief Executive of Department of Military Affairs.

Paramilitary, Reserve Forces and other Agencies

Indo-Tibetan Border Police (ITBP)	<ul style="list-style-type: none"> It was established in 1962, after the Chinese attack. It is basically employed in the Northern borders for monitoring the borders and also to stop smuggling and illegal immigration.
National Security Guards (NSG)	<ul style="list-style-type: none"> It was established in 1984 to counter the surge of militancy in the country. It is a highly trained force which deals with the militants effectively.
Central Industrial Security Force (CISF)	<ul style="list-style-type: none"> It was set-up in 1969 after the recommendations of Justice B Mukherji. Its objective is to monitor the industrial complexes of Central Government.
Assam Rifles	<ul style="list-style-type: none"> It was established in 1835 and is the oldest paramilitary force in the country. Its main objective is to keep vigilance of international borders in North East and counter insurgency operations in Arunachal Pradesh, Manipur, Mizoram and Nagaland.
Border Security Force (BSF)	<ul style="list-style-type: none"> It was established in 1965. It keeps a vigil over the international borders against the intrusion in the country.

National Cadet Corps (NCC)	<ul style="list-style-type: none"> It was established in 1948. 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.
Central Reserve Police Force (CRPF)	<ul style="list-style-type: none"> It was set-up in 1939. Its main objective is to assist the State / Union Territory Police in maintenance of law and order. The 88th Battalion of CRPF, known as 'Mahila Battalion' (commissioned on 30th March, 1986) is the world's first paramilitary force comprising entirely of women.
Territorial Army (TA)	<ul style="list-style-type: none"> It was established in 1948. It is a voluntary, part-time force (between 18 and 42 years), not of professional soldiers, but civilians who wish to assist in defence of the country.
Home Guard	<ul style="list-style-type: none"> 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.
Indian Coast Guard	<ul style="list-style-type: none"> It was set-up in 1978. Its objective is to protect the maritime and other national interests in the maritime zones of India.
Intelligence Bureau (IB)	<ul style="list-style-type: none"> It was set-up in 1920. Its objective is to collect secret information relating to country's security. It was originally set-up as Central Special Branch (CSB) in 1887 and renamed IB in 1920.
Central Bureau of Investigation (CBI)	<ul style="list-style-type: none"> It was established in 1963. Its objective is to investigate cases of misconduct by public servants, cases of cheating, embezzlement and fraud. CBI is also entrusted with the investigation of international crime cases in collaboration with INTERPOL.
National Crime Records Bureau (NCRB)	<ul style="list-style-type: none"> It was established in 1986. Its objective is to collect crime statistics at the national level, information of inter-state and international criminals to help investigation agencies.
Rapid Action Force (RAF)	<ul style="list-style-type: none"> It was established in 1991. Under the operational command of CRPF, 10 battalions of the CRPFs have been re-oriented for tackling communal riots in the country.

Nuclear and Space Research Centres in India

<i>Research Centre</i>	<i>Place</i>
Indian Rare Earths Limited	Mumbai
Uranium Corporation of India Limited	Jadugoda (Jharkhand)
Atomic Energy Commission (AEC)	Mumbai
Electronics Corporation of India Limited	Hyderabad
Bhabha Atomic Research Centre (BARC)	Trombay (Mumbai)
Radio Astronomy Centre	Ootacamund (Tamil Nadu)
Tata Institute of Fundamental Research	Mumbai
Saha Institute of Nuclear Physics	Kolkata
Centre of Earth Sciences Studies	Thiruvananthapuram (Kerala)
Physical Research Laboratory	Ahmedabad
Space Commission	Bengaluru
Vikram Sarabhai Space Centre	Thiruvananthapuram
Indian Space Research Organisation (ISRO)	Bengaluru
Space Application Centre	Ahmedabad
Thumba Equatorial Rocket Launching Station	Thumba (Kerala)
Second Satellite Launch Port (Planned)	Thoothukudi (Tamil Nadu)

SPORTS

Olympics

- Olympics games were started in 776 BC on Mount Olympia in the honour of Greek God, 'Zeus'. The modern Olympic Games were started in **Athens**, the capital of Greece on **6th April, 1896** with great efforts made by French nobleman, **Baron Pierre de Coubertin**.
- The Olympic Games are organised after every 4 years. The Olympic Flag is made up of white silk and contains five intertwined rings as the Olympic Emblem.
- The five interlaced rings are arranged in 3-2 pattern on a white background, with the blue ring to the extreme left, followed by yellow, black, green and red, in the same order. Blue for Europe, Black for Africa, Red for Americas (North and South America), Yellow for Asia and Green for Oceania (Australia and New Zealand).
- The official Olympic Motto is **Citius, Altius, Fortius**, a Latin phrase meaning **Swifter, Higher, Stronger**. 2024, Summer Olympic will be held in Paris, France.

Commonwealth Games

- The first Commonwealth Games were held in 1930 in Hamilton, Canada.
- Since 1930, the games have been conducted every 4 years except for 1942 and 1946 due to World War II.
- The Commonwealth Games Federation (CGF) is the organisation which is responsible for the direction and control of the Commonwealth Games.
- There are currently 53 members in the Commonwealth of Nations.
- The 2018 Commonwealth Games (21st) were held an Gold Coast, Queensland, Australia. Most gold medals were won by Australia. 2022 Commonwealth Games will be held at Birmingham, England.

The Asian Games

- The Asian Games, also called the Asiad, are a multi-sport event held every 4 years among athletes from all over Asia.
- The games are regulated by the Olympic Council of Asia (OCA), under the supervision of the International Olympic

Committee (IOC). The first Asian Games were held in 1951 in New Delhi (India). 18th Asian Games of 2018 were held at Jakarta (Indonesia) in which India finished at eighth position. The next game is scheduled to be held in Hangzhou, China in 2022.

Cricket World Cup

- The first Cricket World Cup was organised in England in 1975. A separate women's Cricket World Cup has been held every 4 years since 1973.

List of Cricket World Cup

1975	England	West Indies beat Australia
1979	England	West Indies beat England
1983	England	India beat West Indies
1987	India	Australia beat England
1992	Australia	Pakistan beat England
1996	Pakistan	Sri Lanka beat Australia
1999	England	Australia beat Pakistan
2003	South Africa	Australia beat India
2007	West Indies	Australia beat Sri Lanka
2011	India	India beat Sri Lanka
2015	Australia and New Zealand	Australia beat New Zealand
2019	England	England beat New Zealand
2023	India	Scheduled

T-20 Cricket World Cup

2007	South Africa	India beat Pakistan
2009	England	Pakistan beat Sri Lanka
2010	West Indies	England beat Australia
2012	Sri Lanka	West Indies beat Sri Lanka
2014	Bangladesh	Sri Lanka beat India
2016	India	West Indies beat England
2021	India	Scheduled

Hockey World Cup

The first Hockey World Cup was organised in Barcelona (Spain) in 1971. Women's Hockey World Cup has been held since 1974. The 13th Men's Hockey World Cup held in the Netherlands (Hague) in 2014. The 14th Men's Hockey World Cup was held in Bhubaneswar India in 2018. Belgium won this championship beating Netherlands. The 15th Men's Hockey World Cup is Scheduled to be held in 2023 at **Bhubaneswar** and **Rourkela**.

Football World Cup

- The Football World Cup is organised by FIFA (Federation of International

Football Association). The World Cup is called 'Jules Rimet Cup' named after the name of FIFA President Jules Rimet. The first Football World Cup was organised in Uruguay in 1930.

- In 1942 and 1946, the Football World Cup was not played due to World War II.
- The 20th FIFA World Cup held in Brazil in which Germany became the champion by defeating Argentina 1-0 in the final.
- Brazil is the only nation to have participated in every World Cup so far. The 2018 Football World Cup was held at Russia. France won this Championship beating Croatia. 2022 Football World Cup is scheduled to be held at **Qatar**.

United Nations Organisation (UNO)

- The United Nations (UN) is a world organisation formed in 24th October, 1945. It came into existence after World War II, when the leaders of the world, including American President Roosevelt and British Prime Minister Churchill, decided to create a world organisation that would help to ensure peace.
- The original membership of 51 nations has grown to 193 members. The 193rd member being the newly created South Sudan. The United Nations Headquarters is in New York City. The UN also has offices in Nairobi (Kenya), Geneva (Switzerland) and Vienna (Austria).
- **The General Assembly** is the main place for discussions and policy making in the United Nations.
- **The Security Council** has primary responsibility for the maintenance of international peace and security. The Security Council is made up of 15 members.
- There are five permanent members of the Security Council-China, France, Russia, United Kingdom and USA and 10 non-permanent members elected for 2 years terms starting on 1st January.

Non-Permanent Members of UNSC

Country	Term Ends
Estonia	2021
India	2022
Ireland	2022
Kenya	2022
Mexico	2022
Niger	2021
Norway	2022
Saint Vincent and the Grenadines	2021
Tunisia	2021
Vietnam	2021

- Economic and Social Council is the principal body for coordination, policy review, policy dialogue and recommendations on economic, social and environmental issues. The secretariat comprises the Secretary-General and other staff who carry out day-to-day work of the U.N.
- **The International Court of Justice (ICJ)**, located in the Hague, Netherlands, is the primary judicial organ of the United Nations, established in 1945 by the United Nations Charter, the Court began work in 1946, as the successor to the Permanent Court of International Justice.
- Trygve Lie of Norway (1946-52) was the first Secretary-General of the UN.
- **Antonio Guterres** is the new Secretary-General of UN. He succeeded Ban ki-Moon.

Some Important UN Agencies

<i>Name</i>	<i>Estd in</i>	<i>Headquarter</i>	<i>Purpose</i>
International Telecommunication Union (ITU)	1865	Geneva	Sets international regulations for radio telegraph, telephone and space radio communications.
International Labour Organisation (ILO)	1919	Geneva	To improve conditions and living standards of workers.
International Monetary Fund (IMF)	1945	Washington DC	Promotes international monetary cooperation.
United Nations International Children's Emergency Fund (UNICEF)	1945	New York	To promote children's welfare all over the world.
Food and Agricultural Organisation (FAO)	1945	Rome	To improve living conditions of rural population.
United Nations Educational, Scientific and Cultural Organisation (UNESCO)	1946	Paris	To promote collaboration among nations through education, science and culture.
World Health Organisation (WHO)	1948	Geneva	Attainment of highest possible level of health by all people.
International Atomic Energy Agency (IAEA)	1957	Vienna	To promote peaceful uses of atomic energy.
International Development Association (IDA)	1960	Washington DC	An affiliate of the World Bank, aims to help under-developed countries raise living standards.
United Nations Development Programme (UNDP)	1965	New York	Helps developing countries increase the wealth producing capabilities of their natural and human resources.
United Nations Environmental Programme (UNEP)	1972	Nairobi (Kenya)	Promotes international cooperation in human environment.
World Trade Organisation (WTO)	1995	Geneva	Setting rules for world trade to reduce tariffs.
United Nations Office on Drugs and Crime (UNODC)	1997	Vienna (Kenya)	To prevent illicit trafficking and abuse of drug, crime prevention.
UN Women	2010	New York City (USA)	To enable member states to achieve gender equality and women empowerment.
World Food Programme	1961	Rome	To eradicate hunger and malnutrition.
Organisation for Economic Cooperation and Development (OECD)	1961	Paris (France)	To stimulate economic progress and world trade.

Other International Organisations and Groups

Name	Estd	Headquarter	Objective
The Commonwealth	1926	London	It was originally known as 'The British Commonwealth of Nations'. It is an association of sovereign and independent states which formally made up the British empire. To promote trade and investment in the Pacific basin.
Asia Pacific Economic Cooperation (APEC)	1989	Singapore	
Asian Development Bank (ADB)	1966	Manila	To promote regional economic cooperation.
Association of South-East Asian Nations (ASEAN)	1967	Jakarta	Regional, economic, social and cultural cooperation among the non-communist countries of South-East Asia.
Commonwealth of Independent States (CIS)	1991	Minsk (Belarus)	To coordinate inter-common wealth relations and to provide a mechanism for the orderly dissolution of the USSR.
Group of 7 (G-7)	1975	—	To promote cooperation among major non-communist economic powers.
Group of 15 (G-15)	1989	Geneva (Switzerland)	To promote economic cooperation among developing nations.
International Olympic Committee (IOC)	1894	Lausanne (Switzerland)	To promote the olympic ideals and administer olympic games.
International Organisation for Standardisation (ISO)	1947	Geneva (Switzerland)	To promote the development of international standards.
Non-Aligned Movement (NAM)	1961	—	Political cooperation and separate itself from both USA and USSR (in the cold-war era).
European Union	1993	Brussels (Belgium)	To create a united Europe in which member countries would have such strong economic and political bonds that war would cease to be a recurring fact.
North Atlantic Treaty Organisation (NATO)	1949	Brussels (Belgium)	Mutual defence and cooperation.
Organisation of Petroleum Exporting Countries (OPEC)	1960	Vienna (Austria)	Attempts to set world prices by controlling oil production and also pursues member interest in trade and development.
South Asian Association for Regional Cooperation (SAARC)	1985	Kathmandu (Nepal)	To promote economic, social and cultural cooperation.
Amnesty International (AI)	1961	London (UK)	To keep a watch over human rights violation worldwide. Got Nobel Prize in 1977 for Peace.
World Wildlife Fund (WWF) for Nature	1961	Gland, (Switzerland)	To save the wildlife from extinction.
Sanghaï Cooperation Organisation (Previously Sanghaï Five)	1996	Beijing (China)	Strengthen relation and cooperation among members in diverse fields like Security Economic, culture etc.
Gulf Cooperation Council	1981	Riyadh (Saudi Arabia)	Cooperation among states bordering Persian Gulf on located near the Arabian Peninsula.
Bay of Bengal Initiative for Multi-sectoral Technical and Economic Cooperation (BIMSTEC)	1997	Dhaka (Bangladesh)	Multi-sectoral cooperation among members of Bay of Bengal region.

1. Tell me something about yourself. And Introduce yourself in 30 seconds.

Hi all, my name is Tushar Panja. I am from Kolkata, West Bengal. From where I have done my secondary and higher secondary schooling. I have done my graduation from "Government College of Engineering and Leather Technology" in the domain of Computer Science and Engineering. My hobbies include playing football, cycling and playing chess.

2. Tell me something that is not on your CV.

3. Which one word would describe you the best?

Being calm helps me think clearly and make good decisions, even when things get tough. It's as if I can see through pathways from confusion and chaos, allowing me to think precisely about the best course of action. When things get tough, instead of getting overwhelmed, my calm attitude helps me focus on finding pragmatic solutions.

4. Use three adjectives to describe yourself.

adaptable, hard working, dedicated, empathetic

Adaptable: I describe myself as being adaptable, able to seamlessly guide through changes and challenges. This flexibility not only allows me to stay productive in dynamic spaces but also helps me approach problems with a fresh outlook, fostering innovative solutions.

Hardworking: With a strong work ethic, I am dedicated to putting in the time and effort required to achieve success. Whether faced with compact deadlines or complex tasks, I approach each challenge with a determined mindset, ensuring that I deliver high-quality results consistently.

Dedicated: My dedication is a driving force behind my work. I commit wholeheartedly to my responsibilities, ensuring that I meet and surpass expectations. This steady commitment translates into a strong sense of responsibility and accountability in every task I undertake.

Empathetic: Being empathetic is a foundation of my approach to working with others. I strive to understand the perspectives and feelings of those around me, creating a supportive and collaborative environment. This empathy not only strengthens interpersonal relationships but also improves my ability to work effectively within a team.

5. How would your friends describe you?

My friends will describe me as a dynamic and fun loving person who has a positive attitude over everything. But occasionally they will describe me as an overthinker.

6. What are your short-term/long-term goals?

7.What do success and failure mean to you?

For me, success and failure go beyond just reaching my goal. It's about how much effort I put in – giving my best, my 200% if I am able to. Whether I eventually achieve what I set out to do or not isn't the main thing. What matters most is knowing I've worked hard and put my all into it. That, to me, is success. On the flip side, if I don't give it my full effort, even if I achieve the goal, it feels like a personal letdown – a failure. So, it's not just about winning or losing; it's about giving everything I've got in the pursuit of my goals.

8.Tell me about an accomplishment that you are proud of.

In 2023, I faced many challenges—family health issues, mental struggles, and academic hurdles. Despite these barriers, I managed to overcome them all. It's been a tough journey, dealing with various challenges throughout the year but Now, I have the opportunity to join one of the top B schools in the country, and this opportunity to pursue higher education at a prestigious institution feels like a significant accomplishment. This achievement is not just about academic success; it symbolizes my resilience and determination to overcome hardship.

9.Tell me about a time when you made a mistake and what you learned from it.

10.What has been your biggest failure? How did you deal with it?

11.What is your biggest regret in your life?

My biggest regret was underperforming in my class 12th. I took things too casually after excelling in class 11th, especially after getting a smartphone for the first time. The newfound freedom distracted me from studies, impacting my scores. This experience taught me the importance of making decisions with long-term goals in mind. Now, I do anything I think of, what my decision could affect me long term and how this will help me to achieve my long term goal.

12. How would you rate yourself on a scale of 1-10?

I would rate myself a 6 out of 10. While I've achieved academic success in my career, I acknowledge the importance of experience as a key factor for overall success. Currently, I lack extensive experience, but I believe that with time, I'll gain valuable wisdom, enhancing my skills and contributing to my journey towards perfection.

13.How do you deal with criticism and sarcasm?

Most criticism and sarcasm comes from my friends and I see them as chances to learn and get better. I see feedback as a way to improve, so I try to understand what's being said. Instead of

feeling hurt, I use it to grow. This way, I keep getting better at what I do, and it helps create a friendly atmosphere.

14. What are the three most important events of your life?

15. What are your strengths and weaknesses?

Adaptable: I describe myself as being adaptable, able to seamlessly guide through changes and challenges. This flexibility not only allows me to stay productive in dynamic spaces but also helps me approach problems with a fresh outlook, fostering innovative solutions.

Hardworking: With a strong work ethic, I am dedicated to putting in the time and effort required to achieve success. Whether faced with compact deadlines or complex tasks, I approach each challenge with a determined mindset, ensuring that I deliver high-quality results consistently.

Dedicated: My dedication is a driving force behind my work. I commit wholeheartedly to my responsibilities, ensuring that I meet and surpass expectations. This steady commitment translates into a strong sense of responsibility and accountability in every task I undertake.

My weakness is, I sometimes spend too much time thinking about things. It can be a good quality because I make sure to try to view all the aspects, but it can also slow down decision-making. I'm conscious about this, and I am working on finding a balance between thinking things through and making decisions efficiently. I believe my careful thinking helps me identify potential issues and come up with innovative solutions. I'm actively learning to streamline my decision-making process to make it more effective while still benefiting from my thoughtful approach.

16. What is your biggest fear, and how did you overcome it?

My biggest fear revolves around living up to the vision my childhood self had for me. The fear of falling short of those aims used to be overwhelming. However, I've learned that growth is a journey, not an instant achievement. Embracing this, I focus on continuous improvement and learning. Setting realistic goals and celebrating small victories. Overcoming this fear involves acknowledging that the path to becoming the person I aspire to be is incremental, marked by resilience and self-discovery. I've learned to view challenges as opportunities for growth and to appreciate the progress made along the way, ultimately getting me closer to the person my childhood dreams of.

17. Why should we select you, given that thousands of similar applicants are like you?

I bring fresh perspectives, enthusiasm to learn to your program. My dedication, adaptability, and devotion for the field set me apart. Though I lack practical experience, I offer intact potential, a strong work ethic, and a commitment to contributing actively throughout the

MBA curriculum and beyond. I am ready to leverage the knowledge gained by the program to excel and bring a unique, enthusiastic energy to the diverse pool of applicants.

18. Give us three reasons not to select you

Although I see myself as a good candidate, I also recognize I lack at some places like lack of experience. But I wanted to work on them and if you find a better candidate than me then I will try again to be a better candidate next time.

19. Mention a few aspects you bring to the table if selected.

If selected, I bring a fresh perspective, eagerness to learn, and a dedicated work ethic. I am adaptable, passionate about the field, and committed to actively contributing to the MBA community. Despite being a fresher, I offer untapped potential and a readiness to leverage the knowledge gained by the program. My unique qualities and enthusiasm make me an asset, and I am composed to bring a positive and dynamic energy to the selected group of candidates.

20. Do you think Hard work or smart work is more important?

In my perspective both complement each other. When things are really tough, putting in a lot of time and effort is important. But if you love what you're doing, it won't feel like hard work; it'll be something you want to do. If a task doesn't make you excited, it's better to find something else that you're eager to spend time towards learning. This way, you make sure to focus on things that truly interest you, combining hard work with smart choices based on what you love and what you're passionate about will make things easy and interesting for you.

21. What are your hobbies?

My hobbies include football, cycling and drawing.

22. What is your passion and why?

I'm passionate about contributing to society. As I grow, I feel a responsibility to give back and improve things for everyone. This sense of duty stems from a personal experience when a professor, whom my father knew only slightly, provided me with free coaching during my joint examination preparation. This act of generosity instilled a strong sense of responsibility in me, inspiring a commitment to contribute positively to society, just as others have done for me.

While working for an NGO is valuable, I believe that getting an MBA will give me the skills and knowledge to make a bigger difference in society. An MBA provides a broader perspective and equips leadership and management skills, the tools to address social issues more effectively. With better from an MBA, I can contribute to positive changes on a larger scale. For example, if I secure a management position with a higher income, I aim to sponsor education for underprivileged children. By doing so, I want to provide opportunities for those

who lack privileges, ensuring they have access to quality education and a chance for a better future.

23. Who is your role model (both family and non-family)? Why?

My parents are my role models to me. Though they don't have any formal education. They ensured I had every resource to pursue education. Their unwavering support during life's challenges is my inspiration.

Not only that, they helped others as much as possible. Like donating food in retirement home, also with the help of others they all funded the education of an orphan girl and in her marriage too.

They are the greatest part of my life.

Despite their own limitations, they've instilled in me the value of education and the strength to overcome obstacles.

Lionel Messi is my role model because, despite early setbacks when doctors doubted his ability to play football, he defied the odds through determination and passion. His career faced challenges, especially with national success, but he carried on, never losing hope. In 2022, he and his team prevailed, securing a World Cup victory. The boy once told to give up is now considered as one of the greatest, showcasing that relentless hard work and resilience can turn adversity into remarkable success. Messi's journey inspires me to overcome obstacles and strive for greatness in the face of challenges.

24. What motivates you?

I'm motivated by becoming the best version of myself and learning even small skills. Every little achievement feels like a big win. I love the idea of always getting better. It's exciting to pick up new skills, even if they're small, as it contributes to my personal growth. The journey of discovering more about myself is important, and I find joy in continuously learning and improving. The process of striving for excellence in every aspect keeps me enthusiastic about my journey of self-improvement.

25. What makes you uncomfortable?

I get uncomfortable when people lie, and it bothers me when others talk about someone behind their back. I value honesty, and lying goes against my beliefs. I think it's essential to treat everyone with respect. When trust is compromised or people aren't treated fairly, it makes me uneasy. Whether in personal or professional situations, maintaining open communication and integrity is important to me.

26. What values did you learn through your extracurricular activities?

Playing football taught me teamwork, coordination, and time management. I learned to foster discipline. On the field, everyone plays a role, sharpening my leadership skills. Football also taught me to adapt to different strategies, improving thinking abilities. Wins and losses showed the importance of determination and resilience. Overall, these experiences shaped my character, emphasizing teamwork, discipline, resilience, leadership, and adaptability.

27. Did you hold a significant position of responsibility at your college? What did it teach you?

In my first college year, I took charge of organizing the student and sports fests, participating actively in both. These experiences enhance my skills significantly. Organizing those fests improved my planning and coordination abilities, ensuring the events' success. It sharpened my teamwork and communication skills. These responsibilities taught me the importance of effective communication, meticulous planning, and collaborative teamwork. So I gotta know all my new batches as well as the seniors. They were instrumental in developing my team working skills and understanding the crucial role of responsibility in achieving successful outcomes in any organized endeavor.

28. How important do you feel social responsibility is nowadays?

Social responsibility is super important nowadays. It's about realizing that we all live together in a society, and what we do affects others. So, we have a responsibility to reduce any bad impacts we might have on people around us. It's like understanding that our actions can either help or harm others, and we should actively choose to do things that make a positive difference. This is not just a good thing to do, but it also makes our communities better and helps everyone live in a way that's fair and good for everyone.

29. After MBA, job or Entrepreneurship?

After completing my MBA, my plan is to gain experience through a job for 4-5 years and then start a small restaurant in my area. I've observed many people from other states settling here for education or work. Running a restaurant would not only be a personal passion but also a strategic move to cater to the diverse community. It's an opportunity to provide a familiar taste for newcomers and create a second income stream. This venture aligns with my long-term goal of building a sustainable business.

30. If you are planning for a startup, then why MBA? What values do you think you will gain over the two years?

I'm pursuing an MBA to secure funds for my startup. Working in the corporate world during the program will provide valuable experience, preparing me for the challenges of entrepreneurship. Throughout the years, I aim to acquire knowledge in finances, understand business dynamics, and develop the resilience required to initiate and sustain a successful venture. This dual approach ensures not only financial support but also equips me with the skills and insights vital for navigating the complexities of launching and maintaining a thriving business.

31. Why IIM Lucknow?

32. What other calls do you have? Would you still choose our institute over X if you converted to X institute? Why do you want to join this institute? What, according to you, makes this institute unique?

34. Should more IIMs be opened in the country or not? Will it cause brand dilution?

35. What are your reasons for joining an MBA program this year?

36. Don't you think it will be better to do an MBA after 2-3 years of work-ex? Why? Why should we choose you (Fresher) over someone with work-ex?

First CAT welcomes both experienced and as well as inexperienced candidates, shows that our education system values the potential in all. While I acknowledge my current lack of business experience, I believe that an MBA program serves as a comprehensive training ground. Fresh out of college, I may not meet all criteria now, but with two years of intensive training, maturing, and understanding the processes, I am confident in my ability to excel and contribute significantly, leveraging the education and skills gained during the program.

38. Cite examples of why you think you might be a good fit for that discipline.

Adaptable: I describe myself as being adaptable, able to seamlessly guide through changes and challenges. This flexibility not only allows me to stay productive in dynamic spaces but also helps me approach problems with a fresh outlook, fostering innovative solutions.

Hardworking: With a strong work ethic, I am dedicated to putting in the time and effort required to achieve success. Whether faced with compact deadlines or complex tasks, I approach each challenge with a determined mindset, ensuring that I deliver high-quality results consistently.

Dedicated: My dedication is a driving force behind my work. I commit wholeheartedly to my responsibilities, ensuring that I meet and surpass expectations. This steady commitment translates into a strong sense of responsibility and accountability in every task I undertake.

39. You have X years of gap in your resume? What did you do during that time? What did you learn during that time? Why should we consider someone with X years of gap over others?

40. Why do you have low marks in School/College? What did you do?

I took things too casually after excelling in class 11th, especially after getting a smartphone for the first time. The newfound freedom distracted me from studies, impacting my scores. This experience taught me the importance of making decisions with long-term goals in mind. Now, I do anything I think of, what my decision could affect me long term and how this will help me to achieve my long term goal.

41. We do not believe that extracurricular involvement is reason enough to justify your low grades. What do you have to say? Then, can you keep up with the IIM environment where you have many things to do?

42. What is your contingency plan if you are not selected for this interview?

I believe I gave my best in the interview, yet I acknowledge my areas for improvement, such as the lack of work experience. If not selected, I plan to address these gaps, aiming to become a stronger candidate in the future. I'm committed to continuous improvement and will try again to enhance my qualification.

43. If given a chance, what would you do differently in this interview?

44. Tell me five unique things about your hometown.

<https://www.whatshot.in/kolkata/10-facts-about-our-kolkata-which-will-make-every-bengali-proud-c-14386>

<https://www.quora.com/What-are-the-less-known-facts-about-Pune>

https://www.reddit.com/r/pune/comments/qqp6a/please_suggest_places_to_explore_in_pune_or_near/

45. Do you have any questions for us?

46. Tell us about an incident where you stood against your superiors.

47. Describe a situation where you had a conflict with your colleagues

48. Tell me about when you had trouble at work while working on a project.

49. Tell me about a time when you displayed leadership skills

50. Describe a situation where you messed up.

51. Do you consider yourself a team player?

52. How will you handle a scenario (based on your weakness) in future?

53. What are the qualities of a Leader? What is the difference between a Leader and a Manager?

54. What experience would you want to go back and change in your life?

55. What is the major setback that you have faced so far in your life? What did you learn from it?

56. Give an example where you have displayed commendable leadership skills.

57. Are you a team player? Give an instance.

58. How do you handle pressure? Give an instance.

59. As freshers, why should we consider you over someone with work-ex?

60. You have X years of gap in your resume? What did you do during that time? What did you learn during that time?

61. Why should we consider someone with X years of gap over others?

62. Why do you have low marks in School/College? What did you do?

63. We do not believe that extracurricular involvement is reason enough to justify your low

grades. What do you have to say? Then, can you keep up with the IIM environment where you

have many things to do?

64. What is your contingency plan if you are not selected for this interview?

65. Tell me five unique things about your hometown.

66. What do you know about the political conditions of your hometown?

67. What are the famous things (food, clothes, monuments, etc) of your village/ city/ state and Lucknow?

68. Last book you read, details about it- author, last line by the protagonist, other books by the same author?

69. Do you have any questions for us?

70. Why MBA and why not M.Tech or Masters?

Computer Science Related Questions

1. Define Mean, Median and Mode?

- **Mean**: The mean is the average of a set of numbers. It is calculated by adding up all the numbers in the set and dividing by the total count of numbers.

- **Median**: The median is the middle value in a sorted list of numbers. If there is an odd number of values, it's the value at the center. If there's an even number, it's the average of the two middle values.

- **Mode**: The mode is the number that appears most frequently in a set of numbers. If multiple numbers occur with the same highest frequency, then the set is multimodal.

2. Why is a “Bug” called bug not virus? Difference between bug and virus?

A "bug" is called a bug because of a literal insect. The term originated when an actual insect caused a malfunction in a mechanical computer in the mid-20th century. A "bug" in software refers to a flaw or error in the code.

A "virus," on the other hand, is a type of malicious software that infects computer systems by replicating itself and spreading to other programs or files. It is designed to cause harm, steal data, or disrupt normal operations. Unlike bugs, viruses are intentionally created and have harmful intent.

3. What is trojan virus and what is ransom virus? Examples of Famous attack by this two?

A "Trojan virus" is a type of malware disguised as legitimate software, tricking users into installing it. Once installed, it can perform various malicious activities such as stealing sensitive information, compromising security, or providing unauthorized access to the attacker.

A "ransomware virus" is a type of malware that encrypts files on a victim's computer or network, rendering them inaccessible. The attacker then demands a ransom payment in exchange for providing the decryption key to unlock the files.

An example of a famous Trojan attack is the "Zeus Trojan," which targeted online banking systems to steal login credentials and financial information.

An example of a famous ransomware attack is the "WannaCry" ransomware, which spread rapidly in 2017, infecting hundreds of thousands of computers worldwide and demanding ransom payments in Bitcoin for decryption keys.

Zeus Trojan Attack:

The Zeus Trojan, also known as Zbot, was a notorious piece of malware designed to steal banking credentials.

It typically infected users' computers through phishing emails or drive-by downloads from compromised websites.

Once installed, Zeus would monitor the victim's browsing activity and capture sensitive information such as usernames, passwords, and financial data.

Attackers could then use this information for various fraudulent activities, including unauthorized bank transfers or identity theft.

WannaCry Ransomware Attack:

The WannaCry ransomware attack occurred in May 2017 and targeted computers running Microsoft Windows operating systems.

It exploited a vulnerability in the Windows SMB protocol, allowing it to spread rapidly across networks without user interaction.

Once a computer was infected, WannaCry encrypted the files on the system and displayed a ransom note demanding payment in Bitcoin for the decryption key.

The attack impacted organizations worldwide, including hospitals, businesses, and government agencies, causing significant disruption and financial losses.

These examples highlight the different methods and objectives of malware attacks, with the Zeus Trojan focusing on data theft for financial gain and WannaCry ransomware aiming to extort money through file encryption.

4. What are type1 and type2 errors?

Type 1 and Type 2 errors are concepts in statistical hypothesis testing:

Type 1 Error (False Positive):

Type 1 error occurs when the null hypothesis is true, but we incorrectly reject it.

In other words, it's the incorrect rejection of a true null hypothesis.

Example: Concluding a person is guilty (alternative hypothesis) when they are innocent (null hypothesis).

Type 2 Error (False Negative):

Type 2 error occurs when the null hypothesis is false, but we fail to reject it.

It's the failure to reject a false null hypothesis.

Example: Failing to diagnose a disease (alternative hypothesis) when the person is actually sick (null hypothesis).

These errors are inherent in hypothesis testing and involve a trade-off: minimizing one type of error can increase the likelihood of the other type.

5. Design an algorithm to detect any particular object in the room?

Designing an algorithm to detect a particular object in a room involves several steps:

Input: Obtain an image or video feed of the room using a camera or sensor.

Preprocessing: Process the image to enhance features relevant to the object detection task. This may involve techniques such as resizing, normalization, noise reduction, and edge detection.

Feature Extraction: Extract features from the preprocessed image that are relevant to the object you want to detect. Common techniques include Histogram of Oriented Gradients (HOG), Haar cascades, or deep learning-based feature extraction using convolutional neural networks (CNNs).

Object Detection: Use a suitable algorithm or model to detect the object in the image based on the extracted features. This could be achieved through techniques like template matching, sliding window approach, or more advanced methods such as YOLO (You Only Look Once) or SSD (Single Shot MultiBox Detector).

Post-processing: Refine the detected object regions to improve accuracy and eliminate false positives. This may involve techniques like non-maximum suppression or bounding box refinement.

Output: Finally, output the location and/or identity of the detected object within the room.

Here's a pseudocode representation of the algorithm:

```
function detectObject(image):  
    preprocessed_image = preprocess(image)  
    features = extractFeatures(preprocessed_image)  
    detections = detect(features)  
    refined_detections = postProcess(detections)  
    return refined_detections
```

This algorithm can be implemented using various libraries and frameworks such as OpenCV for image processing and object detection, or deep learning frameworks like TensorFlow or PyTorch for feature extraction and detection using CNNs.

6. COBOL is 50 years old language how is it still in existence?

COBOL (Common Business-Oriented Language) has persisted for several reasons:

Legacy Systems: Many large organizations, especially in banking, finance, and government sectors, have extensive COBOL-based systems that are critical for their operations. Rewriting or replacing these systems would be costly and risky.

Stability and Reliability: COBOL is known for its stability, reliability, and backward compatibility. It continues to be used for mission-critical applications where reliability is paramount.

Skill Availability: Despite its age, there is still a considerable pool of COBOL programmers available, many of whom have decades of experience. This makes it easier for organizations to maintain and enhance existing COBOL systems.

Regulatory Compliance: In industries such as finance and government, regulations often require the use of specific programming languages or technologies. COBOL's long-standing presence means it meets regulatory requirements in many cases.

Modernization Efforts: While some organizations still rely heavily on legacy COBOL systems, there are ongoing efforts to modernize these systems. This includes integrating COBOL with newer technologies and platforms, as well as refactoring or rewriting parts of the codebase.

Overall, COBOL's continued existence can be attributed to its reliability, compatibility, and the significant investment made by organizations in maintaining and modernizing their existing COBOL systems.

7. Write a program for double and single linked list?

Single linked list:-

```
#include <iostream>

struct Node {
    int data;
    Node* next;

    Node(int val) : data(val), next(nullptr) {}
};

class LinkedList {
private:
    Node* head;

public:
    LinkedList() : head(nullptr) {}

    void insert(int val) {
        Node* newNode = new Node(val);
        newNode->next = head;
        head = newNode;
    }

    void display() {
        Node* temp = head;
        while (temp != nullptr) {
            std::cout << temp->data << " ";
            temp = temp->next;
        }
    }
};
```

```

    }
    std::cout << std::endl;
}
};

```

```

int main() {
    LinkedList myList;
    myList.insert(5);
    myList.insert(10);
    myList.insert(15);
    myList.display();
    return 0;
}

```

Double linked list:- #include <iostream>

```

struct Node {
    int data;
    Node* prev;
    Node* next;

    Node(int val) : data(val), prev(nullptr), next(nullptr) {}
};

```

```

class DoublyLinkedList {
private:
    Node* head;

public:
    DoublyLinkedList() : head(nullptr) {}

    void insert(int val) {
        Node* newNode = new Node(val);
        newNode->next = head;
        if (head != nullptr)
            head->prev = newNode;
        head = newNode;
    }
}

```

```

void display() {
    Node* temp = head;
    while (temp != nullptr) {
        std::cout << temp->data << " ";
        temp = temp->next;
    }
}

```

```

    }
    std::cout << std::endl;
}
};

int main() {
    DoublyLinkedList myList;
    myList.insert(5);
    myList.insert(10);
    myList.insert(15);
    myList.display();
    return 0;
}

```

The main difference between single and double linked lists lies in how they organize their elements and the connections between them:

1. ****Single Linked List****:

- Each node in a single linked list contains data and a pointer/reference to the next node in the sequence.
- Traversal in a single linked list is only possible in one direction, starting from the head node and moving towards the end of the list.
- Insertions and deletions are generally faster compared to double linked lists since only the next pointer needs to be updated.

2. ****Double Linked List****:

- Each node in a double linked list contains data, a pointer/reference to the next node, and a pointer/reference to the previous node in the sequence.
- Traversal in a double linked list can be done in both forward and backward directions, allowing easier access to elements in both directions.
- Double linked lists consume more memory per node due to the additional pointer/reference for the previous node.
- Although insertions and deletions may require updating both next and previous pointers, they provide more flexibility in terms of operations like inserting or deleting nodes at any position in the list.

In summary, single linked lists are simpler and more memory-efficient but have limited traversal capabilities, while double linked lists offer bidirectional traversal at the cost of increased memory overhead and potentially slower insertions/deletions due to maintaining additional pointers.

8. **What is turing machine?**

A Turing machine is a theoretical computational model comprising an infinite tape divided into cells, a read/write head, and a set of states and transition rules. It

operates by reading a symbol from the tape, transitioning to a new state based on the current state and symbol, potentially writing a new symbol, and moving the head left or right. Turing machines are foundational in computer science for formalizing algorithmic computation and establishing principles of computability and complexity theory.

9. What is the difference between truncate and delete in sql

In SQL:

- **DELETE**: The DELETE statement removes rows from a table based on a specified condition. It removes the entire row, including all its data, and it can be rolled back using a transaction if needed.

- **TRUNCATE**: The TRUNCATE statement removes all rows from a table, effectively resetting it to its initial state. Unlike DELETE, TRUNCATE is not logged individually for each row, making it faster but unable to be rolled back. It also resets any associated auto-incrementing identity columns.

In summary, DELETE removes specific rows based on a condition and can be rolled back, while TRUNCATE removes all rows from a table and cannot be rolled back.

10. What is sorting and searching

Sorting and searching are fundamental operations in computer science:

- **Sorting**: Sorting involves arranging a collection of items in a specific order, typically ascending or descending. This arrangement makes it easier to perform other operations like searching or accessing elements efficiently. Common sorting algorithms include bubble sort, insertion sort, selection sort, merge sort, quick sort, and heap sort.

- **Searching**: Searching is the process of finding a particular item within a collection of items. There are various search algorithms designed for different scenarios, including linear search (sequential search), binary search, interpolation search, and more advanced techniques like hash tables and binary search trees (BSTs). Each algorithm has its advantages and is suitable for different types of data and search requirements.

In summary, sorting arranges data in a specific order, while searching locates a particular item within that ordered data. Both operations are crucial for efficiently managing and accessing data in computer programs and systems.

11. How do we measure force ? name some instrument and the transducers use?

Force is typically measured using devices known as force sensors or force transducers. These devices can convert mechanical force into an electrical signal that can be measured and analyzed. Some common instruments and transducers used to measure force include:

1. **Load Cells**: Load cells are widely used force sensors that measure force applied along a single axis. They often use strain gauges as transducers, where the strain induced by the force changes the electrical resistance of the gauge, providing a measurable output.
2. **Piezoelectric Sensors**: Piezoelectric sensors utilize the piezoelectric effect to measure force. When mechanical stress is applied to certain materials (such as quartz or certain ceramics), they generate a voltage proportional to the force applied. This voltage can be measured using appropriate electronics.
3. **Force Plates**: Force plates are specialized devices used to measure the forces exerted by a body, typically in biomechanical studies or sports analysis. They often consist of multiple load cells arranged in a grid, allowing the measurement of forces in multiple directions.
4. **Strain Gauges**: Strain gauges are commonly used in conjunction with load cells or directly bonded to the structure under measurement. When subjected to mechanical stress, the strain gauge's electrical resistance changes, which can be measured and correlated with the applied force.
5. **Hydraulic and Pneumatic Systems**: Hydraulic and pneumatic systems can also be used to indirectly measure force by utilizing pressure sensors to measure the pressure exerted by a fluid within a system. By correlating pressure with force based on system parameters, the applied force can be determined.

These instruments and transducers provide various options for accurately measuring force in different applications, ranging from industrial processes to scientific research and biomechanical analysis.

12. What is mesh topology

Mesh topology is a network architecture where each node (or device) is connected to every other node in the network, forming a fully interconnected mesh of links. In a mesh topology:

- Every node has a dedicated point-to-point link with every other node.
- This redundancy ensures robustness and fault tolerance, as data can still be routed even if one or more links fail.
- Mesh networks can be either full mesh, where every node is connected to every other node, or partial mesh, where only certain nodes have multiple connections.

Mesh topologies are commonly used in scenarios where reliability and fault tolerance are critical, such as in mission-critical systems, telecommunications networks, and large-scale data centers. However, they can be expensive to implement due to the large number of required connections.

13. What is data mining

Data mining involves extracting patterns and insights from large datasets using statistical and computational techniques. It enables organizations to uncover hidden relationships and trends within their data, aiding decision-making and predictive analysis. Key steps include data preprocessing, exploratory analysis, and applying various algorithms like clustering and classification. Widely used in business, finance, healthcare, and marketing, data mining helps in tasks such as customer segmentation, fraud detection, and predictive modeling, contributing to improved efficiency and decision-making.

14. Write down 7 osi layers

The OSI (Open Systems Interconnection) model consists of seven layers:

1. **Physical Layer**: Deals with the physical connection between devices and the transmission of raw data bits over a physical medium.
2. **Data Link Layer**: Responsible for node-to-node communication, ensuring reliable data transmission over the physical layer and detecting and correcting errors.
3. **Network Layer**: Manages the addressing and routing of data packets between devices on different networks, enabling communication across multiple networks.
4. **Transport Layer**: Provides end-to-end communication between applications, ensuring data delivery, error detection, and flow control.
5. **Session Layer**: Establishes, maintains, and terminates connections between applications, allowing them to communicate and synchronize data exchange.
6. **Presentation Layer**: Handles data formatting, encryption, and decryption, ensuring that data exchanged between applications is in a format they can understand.
7. **Application Layer**: Provides network services directly to end-users, allowing applications to interact with the network and access resources such as file transfer, email, and web browsing.

15. What is divisibility rule of 11? Write an algorithm for it?

The divisibility rule for 11 states that a number is divisible by 11 if the difference between the sum of its digits at odd positions and the sum of its digits at even positions is either 0 or divisible by 11.

Here's an algorithm to determine if a number is divisible by 11:

Initialize two variables: sum_odd and sum_even to 0.
Traverse the digits of the number from right to left.
For each digit, add it to sum_odd if the position is odd (counting from the right) and add it to sum_even if the position is even.
After traversing all digits, calculate the absolute difference between sum_odd and sum_even.
If the difference is 0 or divisible by 11, then the number is divisible by 11.

```
function isDivisibleBy11(number):  
    sum_odd = 0  
    sum_even = 0  
    position = 1  
  
    while number > 0:  
        digit = number % 10  
        if position % 2 == 0:  
            sum_even = sum_even + digit  
        else:  
            sum_odd = sum_odd + digit  
        number = number // 10  
        position = position + 1  
  
    difference = abs(sum_odd - sum_even)  
  
    if difference == 0 or difference % 11 == 0:  
        return true  
    else:  
        return false
```

16. What is a prime number? How do we find a prime number? Give algorithm for that?

A prime number is a natural number greater than 1 that has no positive divisors other than 1 and itself. In simpler terms, it's a number that is only divisible by 1 and itself.

Here's a basic algorithm to find whether a number is prime:

1. Start with the number you want to check (`num`).
2. Iterate from 2 to the square root of `num`.
3. For each number `i` in the iteration, check if `num` is divisible by `i`.
4. If `num` is divisible by any number in this range, it's not prime. Otherwise, it's prime.

Here's the algorithm in Python:

```
```python
import math

def is_prime(num):
 if num <= 1:
 return False
 elif num <= 3:
 return True
 elif num % 2 == 0 or num % 3 == 0:
 return False

 i = 5
 while i * i <= num:
 if num % i == 0 or num % (i + 2) == 0:
 return False
 i += 6
 return True

Example usage:
number = 17
print(is_prime(number)) # Output: True
```
```

This algorithm is more optimized by checking divisibility only up to the square root of the number and skipping multiples of 2 and 3 after checking divisibility by them initially.

17. How do we find a arbitrary prime number?write down algorithm for that?

To find an arbitrary prime number, you can iterate through numbers starting from 2 and check each number for primality until you find one that is prime. Here's a simple algorithm to achieve that:

1. Start with a variable `number` initialized to 2.

2. While `number` is not prime (using the algorithm to check primality), increment `number` by 1.
3. Once a prime number is found, return that number.

Here's the algorithm in pseudocode:

```
...  
function find_arbitrary_prime():  
    number = 2  
    while True:  
        if is_prime(number): // Implement is_prime function as described before  
            return number  
        number = number + 1  
...
```

This algorithm will keep searching for prime numbers, incrementing the number to be checked until a prime number is found. Once a prime number is found, it will be returned.

18. What is data structure? What are the types of the data structure?

A data structure is a way of organizing and storing data in a computer so that it can be accessed and manipulated efficiently. It defines the relationship between data elements and the operations that can be performed on them.

There are two main types of data structures:

1. ****Linear Data Structures****: In linear data structures, data elements are arranged in a sequential manner where each element has a predecessor and a successor, except for the first and last elements. Examples include:
 - Arrays
 - Linked Lists
 - Stacks
 - Queues
2. ****Non-Linear Data Structures****: In non-linear data structures, data elements are not arranged sequentially. Instead, they may have multiple predecessors and successors, forming hierarchical or interconnected relationships. Examples include:
 - Trees
 - Graphs
 - Hash Tables

Each type of data structure has its own advantages, disadvantages, and specific use cases, depending on factors such as the nature of the data, the operations to be performed, and the efficiency requirements.

19. Write an algorithm for queue and stack using arrays?

Certainly! Below are the algorithms for implementing a queue and a stack using arrays in C++:

Queue using Array

```
```cpp
#include <iostream>
#define MAX_SIZE 100

class Queue {
private:
 int arr[MAX_SIZE];
 int front;
 int rear;
public:
 Queue() {
 front = -1;
 rear = -1;
 }

 bool isEmpty() {
 return (front == -1 && rear == -1);
 }

 bool isFull() {
 return (rear + 1) % MAX_SIZE == front ? true : false;
 }

 void enqueue(int value) {
 if (isFull()) {
 std::cout << "Queue is full. Cannot enqueue.\n";
 return;
 } else if (isEmpty()) {
 front = rear = 0;
 } else {
 rear = (rear + 1) % MAX_SIZE;
 }
 arr[rear] = value;
 }
}
```

```

int dequeue() {
 if (isEmpty()) {
 std::cout << "Queue is empty. Cannot dequeue.\n";
 return -1;
 } else if (front == rear) {
 int dequeuedValue = arr[front];
 front = rear = -1;
 return dequeuedValue;
 } else {
 int dequeuedValue = arr[front];
 front = (front + 1) % MAX_SIZE;
 return dequeuedValue;
 }
}
};
...

```

### Stack using Array

```

```cpp
#include <iostream>
#define MAX_SIZE 100

class Stack {
private:
    int arr[MAX_SIZE];
    int top;
public:
    Stack() {
        top = -1;
    }

    bool isEmpty() {
        return (top == -1);
    }

    bool isFull() {
        return (top == MAX_SIZE - 1);
    }

    void push(int value) {
        if (isFull()) {
            std::cout << "Stack is full. Cannot push.\n";

```

```

        return;
    }
    arr[++top] = value;
}

int pop() {
    if (isEmpty()) {
        std::cout << "Stack is empty. Cannot pop.\n";
        return -1;
    }
    return arr[top--];
}

int peek() {
    if (isEmpty()) {
        std::cout << "Stack is empty. Cannot peek.\n";
        return -1;
    }
    return arr[top];
}
};
...

```

These implementations provide basic functionalities for both a queue and a stack using arrays in C++. You can extend these implementations to add more operations or features as needed.

20. Read basics of computer network

21. Why does java do not have pointers

Java does have pointers, but they are not directly accessible or manipulable by developers as they are in languages like C or C++. Instead, Java uses references, which are similar to pointers but with some key differences:

1. ****Automatic Memory Management****: Java manages memory automatically using a garbage collector, which frees up memory when objects are no longer referenced. This eliminates the need for manual memory management using pointers.
2. ****Strong Type Checking****: Java enforces strong type checking, meaning that references are strongly typed and cannot be arbitrarily cast to other types like pointers in C or C++. This helps prevent memory-related errors such as segmentation faults.

3. ****Security and Stability****: By abstracting away direct memory manipulation, Java enhances security and stability. Java's pointer-like references are safer and less prone to memory corruption vulnerabilities, making Java programs more robust and secure.

Overall, while Java does use pointers under the hood to manage memory and reference objects, it abstracts away direct access to pointers from developers, providing a safer and more controlled environment for programming.

22. What is modem and router

A modem and a router are two distinct networking devices commonly used in home and office networks:

1. **Modem (Modulator-Demodulator):**

- A modem is a device that modulates and demodulates digital signals to enable communication between a computer or network and an Internet Service Provider (ISP) over a telephone or cable line.
- It converts digital data from a computer into analog signals for transmission over analog communication lines and vice versa.
- Modems are typically used to establish a connection to the internet by converting signals between the digital format used by computers and the analog format used by telephone or cable lines.

2. **Router:**

- A router is a device that connects multiple devices within a local area network (LAN) and forwards data packets between them. It operates at the network layer (Layer 3) of the OSI model.
- Routers use IP addresses to determine the best path for data packets to travel between devices on the network or between different networks.
- In addition to routing data between devices on the same network, routers also perform Network Address Translation (NAT), which allows multiple devices on a local network to share a single public IP address provided by the modem.
- Routers often include additional features such as wireless access points (for Wi-Fi connectivity), firewalls, and port forwarding.

In summary, a modem facilitates communication between a computer or network and an ISP over analog communication lines, while a router connects multiple devices within a local network and routes data packets between them, allowing devices to communicate with each other and access the internet.

23. What is client side architecture?

Client-side architecture refers to the structure and organization of software components that run on the client side of a client-server application. In this

architecture, the client is typically a web browser or a mobile application, and the client-side code executes on the user's device.

Key components of client-side architecture include:

1. **User Interface (UI)**: This component defines how the user interacts with the application, including the layout, design, and functionality of the user interface elements.
2. **Presentation Layer**: The presentation layer is responsible for rendering the UI components and managing their appearance and behavior based on user input and application state.
3. **Application Logic**: This layer contains the business logic and application rules that govern the behavior of the client-side application. It handles tasks such as data validation, manipulation, and processing.
4. **Data Access Layer**: The data access layer is responsible for retrieving and managing data from external sources such as web servers, APIs, or databases. It interacts with server-side components to exchange data and synchronize application state.
5. **Client-Side Frameworks and Libraries**: Client-side architectures often rely on frameworks and libraries to streamline development and provide pre-built components and functionality. Examples include React.js, Angular, Vue.js for web applications, and UIKit, SwiftUI, or Android SDK for mobile applications.

Overall, client-side architecture focuses on delivering a responsive, interactive, and visually appealing user experience by efficiently managing UI rendering, application logic, and data interaction on the client device.

24. What is linear programming

Linear programming is like a math puzzle where you want to make the best decision. Imagine you have limited resources, like money or time, and you want to use them wisely to achieve the most profit or minimize costs. Linear programming helps you figure out the best way to do that by considering all the options and constraints. It's like finding the best path to follow when you have multiple choices and limited resources. People use it in business to plan production, in economics to optimize resources, and in many other areas where decisions need to be made efficiently.

25. What is EFF

In computer science, EFF stands for the Electronic Frontier Foundation. It's a nonprofit organization that focuses on protecting civil liberties and digital rights in the online world. The EFF works on various issues such as privacy, free speech,

government surveillance, and digital innovation. They advocate for policies and technologies that empower individuals and defend against threats to privacy and freedom of expression on the internet. The EFF also provides legal assistance, publishes reports, and develops software tools to support their mission of defending digital rights.

26. Name data structures whose memory is not stored in contiguous locations? Explain in detail?

1. **Linked List**: In a linked list, each element (or node) contains a reference to the next node in the sequence, allowing memory to be scattered. This structure enables dynamic memory allocation, efficient insertions, and deletions, but accessing elements by index can be inefficient.
2. **Tree**: A tree organizes data hierarchically with a root node and child nodes. Memory is distributed across nodes, allowing for dynamic allocation and flexible structure. Trees support efficient search, insertion, and deletion operations, but performance can degrade if the tree becomes unbalanced.
3. **Graph**: A graph consists of nodes (vertices) and edges that connect them. Memory is dispersed among nodes and edges, enabling flexible connectivity. Graphs are versatile and can represent complex relationships, but traversal and search operations may require more sophisticated algorithms compared to linear data structures.

27. Explain difference between java and dot net technologies? Which one is better

In computer science, Java and .NET represent two distinct platforms for software development, each with its own characteristics:

1. **Language and Ecosystem**: Java predominantly employs the Java programming language and integrates with the Java Virtual Machine (JVM) ecosystem, while .NET supports multiple languages such as C#, VB.NET, and F# and operates within the Common Language Runtime (CLR) ecosystem.
2. **Platform Independence**: Java is renowned for its platform independence, facilitating execution across diverse environments with a compatible JVM, whereas .NET initially catered primarily to Windows-based environments but has expanded its horizons with .NET Core, enabling cross-platform development.
3. **Development Tools**: Java developers often leverage Integrated Development Environments (IDEs) like IntelliJ IDEA or Eclipse, while .NET developers typically rely on the comprehensive Visual Studio suite, renowned for its robust tooling and feature-rich environment.
4. **Community and Support**: Both platforms boast vibrant developer communities, extensive documentation, and rich resources; thus, the choice between them hinges on factors such as project requirements, team expertise, and organizational infrastructure, rather than a definitive superiority of one over the other.

Choosing between Java and .NET depends on factors like project requirements, team expertise, and existing infrastructure. Java offers platform independence and a wide range of tools, while .NET provides seamless integration with Windows environments and extensive support for languages like C#. Both have vibrant communities and resources, so the decision ultimately comes down to what works best for your specific needs and preferences. There isn't a clear "better" choice; it's about finding the right fit for your project.

Java is often preferred for projects requiring platform independence, such as web applications or software targeting multiple operating systems. It's also chosen for its extensive ecosystem, robust tools, and large developer community. On the other hand, .NET is commonly used in Windows-centric environments or for projects heavily integrated with Microsoft technologies. It's favored for its seamless integration with Windows platforms, strong support for languages like C#, and comprehensive development tools like Visual Studio. Ultimately, the choice between Java and .NET depends on factors like project requirements, existing infrastructure, team expertise, and organizational preferences.

28. Write a C++ code to find the greatest in 5 numbers?

```
#include <iostream>
using namespace std;

int main() {
    int num1, num2, num3, num4, num5;

    cout << "Enter five numbers: ";
    cin >> num1 >> num2 >> num3 >> num4 >> num5;

    int greatest = num1; // Assume the first number is the greatest

    // Compare with the other numbers
    if (num2 > greatest) {
        greatest = num2;
    }
    if (num3 > greatest) {
        greatest = num3;
    }
    if (num4 > greatest) {
        greatest = num4;
    }
    if (num5 > greatest) {
        greatest = num5;
    }
}
```

```
cout << "The greatest number is: " << greatest << endl;

return 0;
}
```

29. Basic oops questions

30. What is the different types of network security attacks

There are several types of network security attacks, including:

1. ****Denial of Service (DoS) and Distributed Denial of Service (DDoS) Attacks****: These attacks flood a network or server with excessive traffic, making it unavailable to legitimate users.
2. ****Malware Attacks****: Malicious software, such as viruses, worms, trojans, and ransomware, are designed to infiltrate systems, steal data, or cause damage.
3. ****Phishing Attacks****: Phishing involves tricking users into revealing sensitive information, such as passwords or financial details, by impersonating trustworthy entities via email, social media, or other communication channels.
4. ****Man-in-the-Middle (MitM) Attacks****: In MitM attacks, an attacker intercepts and potentially alters communication between two parties without their knowledge, allowing them to eavesdrop or manipulate data.
5. ****SQL Injection Attacks****: Attackers exploit vulnerabilities in web applications' database queries to gain unauthorized access or manipulate data.
6. ****Cross-Site Scripting (XSS) Attacks****: XSS attacks inject malicious scripts into web pages viewed by other users, enabling attackers to steal information or hijack sessions.
7. ****Zero-Day Exploits****: Zero-day exploits target vulnerabilities in software or systems that are unknown to the vendor or have not yet been patched, giving attackers the advantage of exploiting them before fixes are available.
8. ****Password Attacks****: These attacks involve attempting to crack passwords using techniques like brute-force attacks, dictionary attacks, or password sniffing.
9. ****Social Engineering Attacks****: Social engineering exploits human psychology to manipulate individuals into divulging confidential information or performing actions that compromise security.

10. ****Insider Threats****: Insider threats involve malicious actions or negligence by individuals within an organization, such as employees or contractors, who abuse their privileges to steal data or sabotage systems.

Protecting against these network security attacks requires a comprehensive approach, including implementing security measures such as firewalls, antivirus software, intrusion detection systems, encryption, strong authentication mechanisms, security awareness training, and regular security audits and updates.

31. Different types of software testing, alpha testing and beta testing

Software testing encompasses various methodologies to ensure the quality and reliability of software products. Two important types of testing are alpha testing and beta testing:

1. **Alpha Testing**:

- Alpha testing is conducted by the development team within a controlled environment before the software is released to external users.
- It focuses on validating the functionality, performance, and overall stability of the software.
- Alpha testing aims to identify and fix any bugs or issues before the software progresses to the beta testing phase.
- Testers may use techniques such as white-box testing, black-box testing, and usability testing during alpha testing.

2. **Beta Testing**:

- Beta testing involves releasing the software to a limited group of external users, known as beta testers or early adopters, for real-world testing in diverse environments.
- The primary goal of beta testing is to gather feedback from end-users regarding usability, functionality, and any defects or issues encountered.
- Beta testers provide valuable insights and help identify potential issues that may not have been discovered during alpha testing.
- Beta testing enables the development team to make necessary improvements and refinements based on user feedback before the official release of the software.

Overall, alpha testing is conducted internally by the development team to ensure the software meets quality standards, while beta testing involves external users to validate the software's readiness for release and gather user feedback for further enhancements.

32. How do windows os and microsoft word communicate?

Windows OS and Microsoft Word communicate through various mechanisms, primarily facilitated by the operating system's services and APIs (Application Programming Interfaces). Here's a simplified overview of how they communicate:

1. **File System Interaction**: Microsoft Word interacts with the Windows file system to open, save, and manage documents. It utilizes file system APIs provided by the operating system to read from and write to files stored on disk.
2. **Inter-Process Communication (IPC)**: Windows provides mechanisms for inter-process communication, such as Dynamic Data Exchange (DDE), Object Linking and Embedding (OLE), and Component Object Model (COM). These technologies allow Microsoft Word to communicate with other applications, including the Windows OS itself, to perform tasks like printing documents, accessing system resources, or embedding objects.
3. **User Interface Integration**: Microsoft Word interacts with the Windows graphical user interface (GUI) to display windows, menus, dialogs, and other user interface elements. It utilizes Windows APIs to create and manage graphical components, respond to user input, and handle window events.
4. **System Services**: Windows OS provides system services and utilities that Microsoft Word may utilize, such as the Print Spooler service for printing documents, the Clipboard service for copying and pasting data, and the Task Scheduler service for scheduling tasks.

Overall, Microsoft Word and Windows OS communicate through a combination of file system interactions, inter-process communication mechanisms, user interface integration, and utilization of system services, enabling seamless operation and integration between the application and the operating system.

33. How do windows and other software communicate?

Sort answer ---

In computer terms, Windows and other software communicate using methods like inter-process communication (IPC), where they exchange data and messages. It's similar to different apps on your phone sharing information or talking to each other. They also use things like DLLs (Dynamic Link Libraries) and APIs (Application Programming Interfaces) to work together, sort of like sharing tools or following common rules. These methods help them collaborate efficiently, much like how students in a study group share notes and resources to solve problems together. Ultimately, it's about making sure everything runs smoothly and cooperatively in the digital world.

Long answer---

Windows and other software communicate through various mechanisms, primarily facilitated by the operating system's services and APIs (Application Programming Interfaces). Here's an overview of how they communicate:

1. **Inter-Process Communication (IPC)**:

- Windows provides several mechanisms for inter-process communication, such as Named Pipes, Windows Sockets (Winsock), Remote Procedure Calls (RPC), and Memory Mapped Files. These allow different software applications to exchange data and messages, collaborate on tasks, or share resources.

2. **Dynamic Link Libraries (DLLs)**:

- Windows software often utilizes DLLs, which are collections of code and data that can be used by multiple programs simultaneously. DLLs provide a way for software components to communicate and share functionality, enabling modular and efficient software development.

3. **Component Object Model (COM)**:

- COM is a platform-independent, language-independent binary interface standard for software components developed by Microsoft. It enables communication between software components, regardless of the programming language or technology used to create them.

4. **Application Programming Interfaces (APIs)**:

- Windows provides APIs that allow software applications to interact with the operating system and access system resources. These APIs provide functions and services for tasks such as file I/O, networking, user interface management, and system administration.

5. **Message Passing**:

- Windows software communicates with the operating system and other applications through messages sent and received via the Windows Message Queue. Applications can send messages to request actions or notifications, and the operating system dispatches these messages to the appropriate recipient for processing.

Overall, Windows and other software communicate through a combination of inter-process communication mechanisms, DLLs, COM, APIs, and message passing, enabling seamless interaction and interoperability between different software components running on the Windows platform.

34. What is cloud computing? What are the hurdles in the implementation of cloud computing?

Cloud computing refers to the delivery of computing services, including servers, storage, databases, networking, software, and analytics, over the internet (the cloud) to offer faster innovation, flexible resources, and economies of scale. It allows users to access and use computing resources on-demand, without the need for physical infrastructure or upfront investment, paying only for what they use.

However, several hurdles can arise during the implementation of cloud computing:

1. ****Security and Privacy Concerns****: Storing sensitive data and applications in the cloud raises concerns about data security, privacy, and compliance with regulations. Organizations need to ensure robust security measures, encryption, access controls, and compliance frameworks to protect their data.
2. ****Reliability and Availability****: Dependence on cloud service providers for critical services means any downtime or service disruptions can impact operations. Ensuring high availability, redundancy, failover mechanisms, and disaster recovery plans is essential to minimize downtime and ensure continuous operations.
3. ****Performance and Latency****: Cloud services may experience performance issues, latency, or network congestion, especially when accessing resources over the internet. Organizations need to optimize network configurations, choose geographically distributed data centers, and employ content delivery networks (CDNs) to improve performance.
4. ****Data Transfer and Migration****: Transferring large volumes of data to the cloud and migrating existing applications can be challenging and time-consuming. Organizations need efficient data transfer tools, migration strategies, and careful planning to minimize disruption and ensure data integrity during the migration process.
5. ****Vendor Lock-In****: Adopting specific cloud platforms or services may lead to vendor lock-in, making it difficult to switch providers or migrate data and applications to alternative platforms. Organizations should consider vendor-agnostic solutions, open standards, and interoperability to avoid vendor lock-in and maintain flexibility.
6. ****Cost Management****: While cloud computing offers cost benefits with pay-as-you-go pricing models, managing cloud costs effectively can be complex. Organizations need to monitor resource usage, optimize cloud spending, and implement cost management strategies to avoid unexpected expenses and overspending.

Addressing these hurdles requires careful planning, collaboration between stakeholders, and ongoing management and optimization of cloud resources to maximize the benefits of cloud computing while mitigating risks and challenges.

35. What is bit? give full form of bit?

A bit, short for "binary digit," is the smallest unit of data in computing and digital communications. It represents a single binary value, which can be either 0 or 1. Bits are the building blocks of digital information storage and processing, and they are used to represent and manipulate data in binary form, where each bit represents a distinct state or condition.

The full form of bit is "binary digit."

36. What is tautology, commutative and transitive law?

In logic and mathematics, tautology, commutative law, and transitive law are fundamental concepts:

1. **Tautology**:

- A tautology is a statement that is always true, regardless of the truth values of its constituent parts. In other words, it is a logical expression that is true in every possible interpretation.
- For example, the statement "A or not A" is a tautology because it is true whether A is true or false.

2. **Commutative Law**:

- The commutative law states that the order of operands does not affect the result of an operation. In mathematics, it commonly refers to addition and multiplication operations.
- For example, the commutative law of addition states that $a + b = b + a$, and the commutative law of multiplication states that $a * b = b * a$.

3. **Transitive Law**:

- The transitive law states that if one quantity is equal to a second quantity, and the second quantity is equal to a third quantity, then the first quantity is equal to the third quantity.
- In mathematics, this principle is commonly used in equality and inequality relations.
- For example, if $a = b$ and $b = c$, then by the transitive law, we can conclude that $a = c$.

These principles are foundational in various areas of mathematics, logic, and computer science, forming the basis for reasoning, problem-solving, and the development of mathematical proofs.

37. Write a program for binary to decimal and decimal to binary?

Sure, here are C++ programs for converting binary to decimal and decimal to binary:

```
```cpp
#include <iostream>
#include <cmath>
using namespace std;

// Function to convert binary to decimal
int binaryToDecimal(int binary) {
 int decimal = 0, base = 1, remainder;
 while (binary > 0) {
 remainder = binary % 10;
 decimal += remainder * base;
 binary /= 10;
 base *= 2;
 }
 return decimal;
}

// Function to convert decimal to binary
long decimalToBinary(int decimal) {
 long binary = 0;
 int remainder, i = 1;
 while (decimal > 0) {
 remainder = decimal % 2;
 decimal /= 2;
 binary += remainder * i;
 i *= 10;
 }
 return binary;
}

int main() {
 int binaryNumber, decimalNumber;

 // Convert binary to decimal
 cout << "Enter a binary number: ";
 cin >> binaryNumber;
 cout << "Decimal equivalent: " << binaryToDecimal(binaryNumber) << endl;

 // Convert decimal to binary
```

```

 cout << "Enter a decimal number: ";
 cin >> decimalNumber;
 cout << "Binary equivalent: " << decimalToBinary(decimalNumber) << endl;

 return 0;
}
...

```

These programs take input from the user, convert between binary and decimal using the provided functions, and then output the result.

### 38. Program to print prime number?

Here's a simple C++ program to print prime numbers up to a given limit:

```

```cpp
#include <iostream>
using namespace std;

// Function to check if a number is prime
bool isPrime(int num) {
    if (num <= 1) {
        return false;
    }
    for (int i = 2; i * i <= num; i++) {
        if (num % i == 0) {
            return false;
        }
    }
    return true;
}

// Function to print prime numbers up to a given limit
void printPrimeNumbers(int limit) {
    cout << "Prime numbers up to " << limit << " are:\n";
    for (int i = 2; i <= limit; i++) {
        if (isPrime(i)) {
            cout << i << " ";
        }
    }
    cout << endl;
}

int main() {
    int limit;

```

```

        cout << "Enter the limit to find prime numbers: ";
        cin >> limit;
        printPrimeNumbers(limit);
        return 0;
    }
    ...

```

This program prompts the user to enter a limit, then it checks and prints all prime numbers up to that limit using the `isPrime` function to determine primality.

39. What is object oriented programming and the main advantages and disadvantages of it?

Object-oriented programming (OOP) is a programming paradigm based on the concept of "objects," which can contain data in the form of fields (attributes or properties) and code in the form of procedures (methods or functions). These objects are instances of classes, which serve as blueprints for creating objects.

****Advantages of Object-Oriented Programming:****

1. ****Modularity****: OOP promotes modularity by breaking down software into smaller, self-contained objects. This makes it easier to understand, maintain, and modify code.
2. ****Reusability****: Objects and classes can be reused in different parts of a program or in different programs altogether, reducing redundancy and saving development time.
3. ****Encapsulation****: OOP encapsulates data within objects and hides internal implementation details, allowing for better data security and preventing unintended access or modification.
4. ****Abstraction****: OOP allows developers to create abstract data types with interfaces that specify how objects interact with each other. This abstraction simplifies complex systems by focusing on high-level concepts rather than low-level details.
5. ****Inheritance****: OOP supports inheritance, where classes can inherit attributes and methods from other classes. This promotes code reuse and allows for the creation of hierarchies of classes, facilitating better organization and extensibility.

****Disadvantages of Object-Oriented Programming:****

1. ****Complexity****: OOP can introduce complexity, especially for novice programmers, due to concepts like inheritance, polymorphism, and

encapsulation. Understanding and implementing these concepts effectively requires time and experience.

2. **Performance Overhead**: OOP may incur performance overhead compared to procedural programming due to the overhead of objects, dynamic memory allocation, and method dispatching.

3. **Overhead of Design**: Designing object-oriented systems requires careful planning and analysis, including defining class hierarchies, relationships, and interfaces. Poor design decisions can lead to overly complex or inefficient systems.

4. **Difficulty in Testing**: Object-oriented systems can be more challenging to test compared to procedural code, especially when dealing with inheritance, polymorphism, and complex object interactions.

5. **Overuse of Inheritance**: While inheritance promotes code reuse, overuse of inheritance hierarchies can lead to tight coupling between classes, making the system inflexible and difficult to maintain.

Overall, while object-oriented programming offers numerous advantages in terms of modularity, reusability, and abstraction, it also comes with potential drawbacks related to complexity, performance, design overhead, testing challenges, and the risk of overusing certain features. As with any programming paradigm, the key lies in understanding its principles and applying them judiciously to achieve the desired balance between flexibility, maintainability, and performance.

40. Write a program to find if the given 'word' is palindrome or not? Write the time complexity of the given program?

Here's a C++ program to check if a given word is a palindrome without using any built-in algorithms:

```
```cpp
#include <iostream>
#include <string>
using namespace std;

bool isPalindrome(const string& word) {
 int i = 0, j = word.length() - 1;
 while (i < j) {
 if (word[i] != word[j]) {
 return false;
 }
 i++;
 }
}
```

```

 j--;
 }
 return true;
}

int main() {
 string word;
 cout << "Enter a word: ";
 cin >> word;

 if (isPalindrome(word)) {
 cout << word << " is a palindrome." << endl;
 } else {
 cout << word << " is not a palindrome." << endl;
 }

 return 0;
}
...

```

This program defines a function `isPalindrome` that takes a string as input and iterates through the characters from both ends of the string, comparing them until reaching the middle. If any characters do not match, it returns false, indicating that the word is not a palindrome. Otherwise, it returns true. The `main` function prompts the user to enter a word, calls the `isPalindrome` function, and prints the result.

**\*\*Time Complexity\*\*:** The time complexity of this program is  $O(n)$ , where  $n$  is the length of the input word. This is because we need to iterate through the characters of the word only once, comparing them from both ends until reaching the middle, which takes linear time.

#### 41. What are the features of the Python

Object-Oriented Programming (OOP): Python supports object-oriented programming paradigms, allowing for the creation and manipulation of objects, inheritance, encapsulation, and polymorphism

Python comes with a comprehensive standard library that includes modules and packages for various tasks, such as file I/O, networking, database access, GUI development, and more, reducing the need for external dependencies.

Python uses dynamic typing, meaning variables are automatically assigned data types based on the values they hold, simplifying code development and allowing for faster prototyping.

Python has straightforward syntax and requires fewer lines of code compared to other programming languages, making it accessible to beginners and experienced developers alike.

#### **42. In java why is the constructor of the not specifically called?**

In Java, the constructor of a class is not specifically called because it is automatically invoked when an object of that class is created using the `new` keyword. When an object is instantiated, the constructor initializes the object's state by setting initial values to its attributes or performing any necessary setup operations. Since the constructor is an integral part of the object creation process, Java ensures that it is automatically called whenever an object is created, simplifying the code and ensuring proper object initialization. Developers can define multiple constructors with different parameters to provide flexibility in object creation, but ultimately, the constructor appropriate for the object instantiation context will be invoked automatically.

#### **43. What is default constructor**

A default constructor in Java is a constructor that is automatically generated by the compiler if no explicit constructors are defined within a class. This default constructor takes no parameters and initializes the object's attributes to their default values (e.g., numeric types to 0, boolean types to false, and object references to null).

For example, consider the following Java class:

```
```java
public class MyClass {
    // Default constructor (automatically generated)
    public MyClass() {
        // Initialization code (if any)
    }

    // Other methods and attributes can be defined here
}
```
```

In this case, if no constructors are explicitly defined within the `MyClass` class, Java will automatically provide a default constructor similar to the one shown above. This default constructor can be used to create objects of the class without specifying any constructor arguments. However, if any explicit constructors are defined within the class, the default constructor will not be generated automatically.

#### **44. What is friend function in C++**



In C++, a friend function is a function that is not a member of a class but has access to the private and protected members of that class. Friend functions are declared inside a class with the `friend` keyword, and they can access the private and protected members of the class as if they were members of the class itself.

Here's an example of a friend function:

```
```cpp
class MyClass {
private:
    int data;

public:
    MyClass(int value) : data(value) {}

    // Declare the friend function
    friend void displayData(const MyClass& obj);
};

// Define the friend function
void displayData(const MyClass& obj) {
    // Friend function can access private members of MyClass
    std::cout << "Data: " << obj.data << std::endl;
}

int main() {
    MyClass obj(42);
    displayData(obj); // Call the friend function
    return 0;
}
```
```

In this example, the `displayData` function is declared as a friend function inside the `MyClass` class. As a result, it can access the private member `data` of the `MyClass` objects. When the `displayData` function is called in the `main` function, it can directly access the private member `data` of the `MyClass` object `obj`.

Friend functions are often used when you need to provide access to the private or protected members of a class to functions or classes that are not part of the class hierarchy but still need access to its internals. However, it's important to use friend functions judiciously to maintain encapsulation and avoid compromising the integrity of the class's design.

#### 45. What is operator overload in C++

Operator overloading in C++ allows you to redefine the behavior of operators (such as `+`, `-`, `\*`, `/`, `==`, `!=`, etc.) for user-defined types. It enables you to use operators with custom data types, providing syntactic convenience and improving code readability.

For example, you can define how the `+` operator works for your own class:

```
```cpp
class Complex {
private:
    double real;
    double imag;

public:
    Complex(double r, double i) : real(r), imag(i) {}

    // Operator overloading for addition
    Complex operator+(const Complex& other) const {
        return Complex(real + other.real, imag + other.imag);
    }
};

int main() {
    Complex c1(2.0, 3.0);
    Complex c2(1.0, 2.0);
    Complex c3 = c1 + c2; // Calls the overloaded + operator
    return 0;
}
```
```

In this example, the `+` operator is overloaded for the `Complex` class, allowing you to add two `Complex` objects using the `+` operator. When `c1 + c2` is evaluated, the overloaded `+` operator is called, and the result is a new `Complex` object.

Operator overloading can be applied to most operators in C++, but it should be used judiciously to maintain clarity and consistency in code. Overloading operators can make code more concise and expressive, but it can also lead to confusion if not used appropriately.

#### 46. What is the difference between list and tuples in python

In Python, lists and tuples are both sequence data types, but they have some key differences:

1. **Mutability**:

- Lists are mutable, meaning you can change, add, or remove elements after the list has been created.

- Tuples, on the other hand, are immutable, meaning once they are created, their elements cannot be changed, added, or removed.

2. **Syntax**:

- Lists are created using square brackets `[]`, and elements are separated by commas.

- Tuples are created using parentheses `()`, and elements are also separated by commas.

3. **Performance**:

- Since tuples are immutable, they generally have better performance than lists in terms of memory usage and iteration speed.

4. **Use Cases**:

- Lists are typically used for collections of items that may need to be modified, sorted, or manipulated in various ways.

- Tuples are often used for collections of items that are fixed and known ahead of time, such as coordinates, database records, or function return values.

Here's a quick example to illustrate the differences:

```
```python
# List example
my_list = [1, 2, 3]
my_list[0] = 4 # Valid: Modify the first element
my_list.append(5) # Valid: Add a new element
print(my_list) # Output: [4, 2, 3, 5]

# Tuple example
my_tuple = (1, 2, 3)
# my_tuple[0] = 4 # Invalid: Tuples are immutable, this will raise an error
# my_tuple.append(5) # Invalid: Tuples do not have an append method
print(my_tuple) # Output: (1, 2, 3)
```
```

In summary, use lists when you need a collection of items that can change over time, and use tuples when you have a fixed collection of items that should not be modified.

## Sales and Marketing

1. What is marketing?

Marketing is all about understanding customers' needs and desires and finding innovative ways to fulfill them. It involves creating value for both customers and companies through various strategies like advertising, branding, and market research. Essentially, it's about building relationships and communicating the benefits of products or services to the target audience.

2. What is Sales?

Sales is the process of directly engaging with customers to persuade them to purchase products or services. It involves building relationships, understanding customer needs, and effectively communicating how a product or service can address those needs. Sales professionals often use techniques such as negotiation, persuasion, and relationship-building to close deals and achieve revenue targets. Ultimately, it's about converting leads into satisfied customers while meeting business objectives.

3. What is the difference between marketing and sales?

Marketing focuses on understanding customer needs, creating awareness about products or services, and building brand reputation through strategies like advertising, market research, and branding. Sales, on the other hand, involves the direct engagement with customers to persuade them to purchase products or services. While marketing sets the stage by generating leads and creating interest, sales professionals convert those leads into actual sales through personalized interactions and negotiations. In essence, marketing is about creating demand, while sales is about fulfilling that demand by closing deals.

4. What is the difference between a consumer and a customer?

A consumer is someone who uses or consumes a product or service, deriving direct benefit from it. They are the end-users who purchase goods or services for their personal use or consumption. On the other hand, a customer is someone who purchases goods or services, whether for personal use or for resale. Customers may not always be the end-users; they can include businesses or individuals who buy products or services for various purposes. In summary, all consumers are customers, but not all customers are necessarily consumers.

5. What is a brand?

A brand is more than just a logo or a product; it's the perception and reputation that consumers associate with a company. It encompasses the values, personality, and unique identity of a business, influencing how customers perceive and interact with its offerings. Ultimately, a brand serves to differentiate a company's products or services from competitors and build trust and loyalty among consumers.

6. Define STP?

STP stands for Segmentation, Targeting, and Positioning. It's a strategic marketing process used to identify and understand different customer segments, select the most attractive segments to target, and then develop a compelling positioning strategy to appeal to those segments. Essentially, it involves breaking down the market into smaller, more manageable groups, choosing the segments with the highest potential, and crafting a unique value proposition to position the brand effectively within those segments.

7. Name your favorite brand and its positioning
8. What are the 4 Ps of Marketing? Give an example of the 4 Ps.  
The 4 Ps of marketing are Product, Price, Place, and Promotion.

For example, let's consider a smartphone:

1. Product: The smartphone itself, including its features, design, and functionality.
2. Price: The cost at which the smartphone is sold to consumers, which may vary based on factors like brand, quality, and competition.
3. Place: The distribution channels through which the smartphone is made available to customers, such as online stores, retail outlets, or direct sales.
4. Promotion: The marketing strategies used to create awareness and persuade customers to buy the smartphone, which may include advertising, social media campaigns, or influencer endorsements.

9. What are the 7 Ps of Marketing?  
Certainly! Here are the 7 Ps of Marketing with examples:

1. Product: The actual offering being sold, such as a smartphone, a car, or a software application.
2. Price: The amount customers are charged for the product or service, such as \$999 for a flagship smartphone or \$30,000 for a mid-sized sedan.
3. Place: The locations or channels where the product is made available to customers, such as online stores, retail outlets, or direct sales.
4. Promotion: The methods used to communicate the benefits of the product and persuade customers to buy, such as advertising, sales promotions, and public relations campaigns.
5. People: The individuals involved in delivering the product or service, including customer service representatives, salespeople, and technical support staff.
6. Process: The procedures and systems used to deliver the product or service, ensuring consistency and efficiency, such as order processing, production, and delivery logistics.
7. Physical evidence: The tangible elements that customers can see, touch, or experience, providing proof of the product or service's quality and value, such as packaging, branding materials, or the physical environment of a store or office.

10. What are Porter's 5 Forces? What are Porter's 5 Forces used for?

Porter's Five Forces is a framework developed by Michael Porter to analyze the competitive forces within an industry. The five forces include:

1. Threat of new entrants: The likelihood of new competitors entering the market, which can affect profitability.
2. Bargaining power of buyers: The ability of customers to negotiate prices and terms, influencing the profitability of firms.
3. Bargaining power of suppliers: The leverage suppliers have over firms in terms of prices, quality, or availability of inputs.
4. Threat of substitute products or services: The availability of alternative products or services that could attract customers away from existing offerings.
5. Competitive rivalry among existing firms: The intensity of competition among firms within the industry, which can affect pricing, innovation, and profitability.

Porter's Five Forces are used to assess the attractiveness and profitability of an industry by understanding the competitive dynamics and potential threats facing firms operating within it. It helps businesses develop strategies to mitigate risks, capitalize on opportunities, and gain a competitive advantage.

#### 11. What is Holistic Marketing?

Holistic marketing is an approach that considers the entire business and all its stakeholders in the marketing process. It integrates various marketing strategies, such as relationship marketing, internal marketing, and societal marketing, to create a unified and comprehensive marketing strategy. The focus is on building long-term relationships with customers by understanding their needs, values, and preferences, while also considering the impact of marketing activities on society and the environment. Holistic marketing recognizes that every aspect of a business, from product development to customer service, contributes to its overall marketing effectiveness and success.

#### 12. What is SEO? How does SEO work?

SEO stands for Search Engine Optimization. It's a process of improving a website's visibility and ranking on search engine results pages (SERPs) to increase organic (non-paid) traffic. SEO works by optimizing various aspects of a website, including its content, structure, and HTML code, to make it more attractive to search engines like Google, Bing, and Yahoo. This involves keyword research, on-page optimization (such as optimizing titles, meta descriptions, and headings), off-page optimization (such as building backlinks from other websites), and technical optimization (such as improving site speed and mobile-friendliness). By following SEO best practices, websites can improve their chances of ranking higher in search results, thereby attracting more visitors and potential customers.

#### 13. What is digital marketing?

Digital marketing refers to the use of digital channels, such as websites, search engines, social media, email, and mobile apps, to promote products or services and engage with customers. It encompasses a wide range of tactics and strategies, including search

engine optimization (SEO), search engine marketing (SEM), content marketing, social media marketing, email marketing, and online advertising. Digital marketing allows businesses to reach a wider audience, target specific demographics, track and analyze campaign performance in real-time, and ultimately drive traffic, leads, and sales more efficiently compared to traditional marketing methods.

14. How do you measure the performance of digital marketing?

The performance of digital marketing can be measured using various metrics and key performance indicators (KPIs) depending on the specific goals and objectives of the campaign. Some common metrics include:

1. Website traffic: Monitoring the number of visitors to your website and their behavior, such as pages visited, time spent on site, and bounce rate.

2. Conversion rate: Tracking the percentage of website visitors who complete a desired action, such as making a purchase, filling out a form, or subscribing to a newsletter.

3. Return on investment (ROI): Calculating the revenue generated compared to the cost of the marketing campaign, which helps determine the profitability and efficiency of your digital marketing efforts.

4. Cost per acquisition (CPA): Measuring the cost of acquiring a new customer or lead through digital marketing channels, which helps optimize spending and allocate resources effectively.

5. Click-through rate (CTR): Evaluating the percentage of people who click on your ads or links compared to the total number of impressions, which indicates the effectiveness of your ad copy and targeting.

6. Social media engagement: Analyzing metrics such as likes, shares, comments, and followers on social media platforms to gauge audience engagement and brand awareness.

7. Email metrics: Tracking metrics like open rate, click-through rate, and conversion rate for email marketing campaigns to assess the effectiveness of your messaging and targeting.

By regularly monitoring and analyzing these metrics, businesses can evaluate the performance of their digital marketing efforts, identify areas for improvement, and make data-driven decisions to optimize future campaigns.

15. What is the Product life cycle?

The product life cycle is a conceptual framework that describes the stages a product goes through from its introduction to its eventual decline in the market. The typical stages of the product life cycle include:

1. Introduction: This is the stage when a new product is launched into the market. Sales are typically low as consumers become aware of the product and its features.

2. Growth: In this stage, sales begin to increase rapidly as more consumers adopt the product and competitors enter the market. Profits also tend to rise as economies of scale are achieved and marketing efforts pay off.

3. Maturity: Sales growth starts to slow down in the maturity stage as the market becomes saturated and competition intensifies. Companies often focus on product differentiation and pricing strategies to maintain market share.

4. Decline: Eventually, sales begin to decline as consumer preferences change, technological advancements render the product obsolete, or new competitors disrupt the market. Companies may choose to discontinue the product or invest in product innovation to extend its life cycle.

Understanding the product life cycle helps companies make informed decisions about marketing strategies, product development, pricing, and resource allocation throughout the various stages of a product's existence.

16. What was the impact of COVID-19 on marketing?

Sure, here's the question divided into positive and negative impacts:

Positive Impact:

- Shift to digital: The increased reliance on digital channels opened up new opportunities for businesses to reach and engage with customers online, potentially expanding their customer base and market reach.
- Acceleration of e-commerce: The surge in e-commerce adoption provided businesses with the opportunity to tap into the growing online shopping trend and capitalize on the convenience and accessibility it offers to consumers.
- Increased emphasis on data and analytics: The heightened focus on data and analytics enabled businesses to gain deeper insights into consumer behavior and preferences, empowering them to make more informed and strategic marketing decisions.

Negative Impact:

- Disruption of traditional marketing channels: The closure of physical stores and cancellation of in-person events led to disruptions in traditional marketing channels, forcing businesses to quickly adapt their strategies to the changing landscape.
- Economic uncertainty: The economic uncertainty brought about by the pandemic resulted in budget constraints for many businesses, limiting their ability to invest in marketing initiatives and causing them to reevaluate their marketing priorities.
- Challenges in messaging and communication: Navigating the sensitive nature of the pandemic posed challenges for businesses in crafting appropriate messaging and



communication strategies that resonated with consumers without appearing opportunistic or insensitive.

17. What are some emerging trends in Marketing?

Some emerging trends in marketing include:

1. Personalization: There's a growing demand for personalized experiences as consumers seek more tailored and relevant interactions with brands. Marketers are leveraging data and technology to deliver personalized content, products, and recommendations based on individual preferences and behavior.
2. Influencer marketing: Influencer marketing continues to gain popularity as brands collaborate with social media influencers and content creators to reach and engage with niche audiences authentically. Micro-influencers, in particular, are becoming increasingly influential due to their highly engaged and loyal followings.
3. Voice search and AI: The rise of voice-enabled devices like smart speakers and virtual assistants is reshaping the way consumers search for information and interact with brands. Marketers are optimizing their content and strategies for voice search and leveraging artificial intelligence (AI) to personalize experiences, automate tasks, and analyze data more effectively.
4. Sustainability and ethical marketing: Consumers are becoming more conscious of environmental and social issues, driving demand for sustainable and ethically sourced products and brands. Marketers are incorporating sustainability into their messaging and strategies, highlighting eco-friendly practices, corporate social responsibility initiatives, and ethical business practices to appeal to socially conscious consumers.
5. Interactive and immersive experiences: Marketers are increasingly embracing interactive and immersive technologies like augmented reality (AR), virtual reality (VR), and interactive content to create engaging and memorable brand experiences. These technologies enable brands to connect with consumers in more immersive ways, driving engagement and brand loyalty.

Overall, these emerging trends reflect the evolving needs and preferences of consumers in a rapidly changing digital landscape, shaping the future of marketing strategies and practices.

18. What is the importance of marketing?

The importance of marketing lies in its ability to create value for both businesses and customers. Here are some key reasons why marketing is essential:

1. Generates awareness: Marketing helps businesses raise awareness about their products or services, making it known to potential customers and increasing visibility in the market.
2. Drives sales and revenue: Effective marketing strategies attract customers, generate leads, and ultimately drive sales, contributing to the revenue and growth of businesses.
3. Builds brand reputation: Marketing plays a crucial role in shaping brand perception and reputation by communicating the values, benefits, and uniqueness of a brand to customers. A strong brand reputation can differentiate businesses from competitors and build trust and loyalty among customers.
4. Fosters customer relationships: Marketing allows businesses to engage with customers, understand their needs and preferences, and build meaningful relationships over time. By delivering personalized experiences and value-added content, businesses can strengthen customer loyalty and retention.
5. Enables innovation: Marketing insights and feedback from customers can inform product development, innovation, and improvement, driving continuous evolution and adaptation to changing market demands.

Overall, marketing is essential for businesses to thrive in competitive markets, connect with customers, and create sustainable growth and success.

19. Give examples of how some brands reacted to COVID-19?

Certainly! Here are a few examples of how some brands reacted to COVID-19:

1. **Nike**: Nike launched the "Play Inside, Play for the World" campaign, encouraging people to stay active and healthy indoors during the lockdown. They also provided free access to premium workout content on their Nike Training Club app to support people's fitness goals at home.
2. **Unilever**: Unilever announced various initiatives to support communities and frontline workers during the pandemic. They donated food, sanitizer, and personal care products to healthcare facilities and vulnerable communities, as well as pledged financial support to relief efforts worldwide.
3. **Zoom**: With the sudden surge in remote work and online learning, Zoom quickly adapted its services to meet the increased demand for virtual communication tools. They offered free accounts for schools, expanded features for educators, and enhanced security measures to ensure user privacy and safety.
4. **Starbucks**: Starbucks implemented safety measures such as contactless pickup, drive-thru services, and enhanced cleaning protocols in response to the pandemic. They

also provided additional support to employees, including paid leave and mental health resources, to ensure their well-being during uncertain times.

5. **LVMH**: LVMH, the parent company of luxury brands like Louis Vuitton and Christian Dior, shifted production from perfume to hand sanitizer to address the shortage of essential supplies during the pandemic. They distributed millions of bottles of hand sanitizer free of charge to healthcare workers and hospitals in France and other affected regions.

These examples illustrate how brands responded to the challenges of COVID-19 by adapting their strategies, supporting communities, and prioritizing the health and well-being of their customers and employees.

Certainly! Here are three more examples of how other brands reacted to COVID-19:

1. **Uber Eats**: Recognizing the impact of restaurant closures and social distancing measures, Uber Eats waived delivery fees for independent restaurants to encourage customers to support local businesses. They also introduced contactless delivery options to prioritize safety for both customers and delivery partners.

2. **Apple**: Apple closed its retail stores worldwide in response to the pandemic but continued to provide support to customers through online channels. They launched initiatives such as online workshops and virtual appointments with Apple Geniuses to assist customers with product inquiries and technical support while maintaining social distancing measures.

3. **Coca-Cola**: Coca-Cola shifted its marketing focus during the pandemic to emphasize themes of unity, resilience, and community support. They launched campaigns like "Open Like Never Before" to inspire optimism and encourage people to stay connected despite physical distancing measures. Additionally, Coca-Cola redirected advertising budgets to support COVID-19 relief efforts and healthcare workers in affected communities.

These examples highlight the diverse ways in which brands adapted their strategies and operations to address the challenges and uncertainties brought about by the COVID-19 pandemic.

20. Do you think COVID-19 has changed marketing forever?

Yes, COVID-19 has fundamentally altered marketing strategies, likely shaping its landscape for the foreseeable future. The pandemic accelerated the digital transformation of businesses, prompting a greater reliance on online channels for communication and commerce. Brands have also prioritized empathy and authenticity in their messaging, recognizing the importance of connecting with consumers on a human level. Moreover, the crisis underscored the need for flexibility and agility in marketing

strategies, as companies quickly adapted to shifting consumer behaviors and market conditions. Looking ahead, a hybrid approach that integrates digital and in-person interactions may become the new norm as businesses strive to deliver seamless and engaging customer experiences in a post-pandemic world.

21. What is the difference between a product and a service?

The main difference between a product and a service lies in their nature and tangible presence.

A product is a tangible item that is manufactured, stored, and physically delivered to the customer. Examples include smartphones, clothing, and household appliances.

On the other hand, a service is intangible and involves the provision of a skill, expertise, or performance to meet a specific need or desire. Services are typically consumed at the time of their production and cannot be stored or possessed. Examples include consulting, healthcare, and transportation services.

While both products and services aim to satisfy customer needs, they differ in their form, delivery method, and characteristics.

22. What is the difference between B2B and B2C?

The key difference between B2B (business-to-business) and B2C (business-to-consumer) lies in the type of transactions and target audiences involved.

B2B refers to transactions where businesses sell products or services to other businesses. The customers in B2B transactions are typically organizations, institutions, or other companies. Examples include suppliers selling raw materials to manufacturers or software companies providing services to businesses.

B2C, on the other hand, involves transactions where businesses sell products or services directly to individual consumers. The customers in B2C transactions are individuals who purchase goods or services for personal use. Examples include retailers selling clothing, electronics, or groceries directly to consumers through online or brick-and-mortar stores.

While both B2B and B2C marketing involve understanding customer needs and delivering value, they differ in their target audiences, sales processes, and marketing strategies. B2B marketing often focuses on building long-term relationships, providing solutions to business challenges, and demonstrating expertise, while B2C marketing may emphasize emotional appeal, brand loyalty, and convenience.

23. What is the marketing strategy of your company?

Below is the pricing strategy in Cognizant marketing strategy:

Cognizant has got a dynamic pricing based on the service of solution required by clients. For similar and common services, that do not require much expertise, Cognizant charges a price depending on the market.

This is important, as with growing IT requirements, the competition in this sector is also growing and clients obviously want to save their money, if task is not very demanding. Hence competitive pricing marketing mix strategy is an essential element for Cognizant. For specific tasks, when company has to show more dedication in terms of research and employee engagement, the pricing strategy adopted is such that it benefits both the client and the company. As the cost saved by the software, is huge thus, for better services, Cognizant can charge also a good amount of fees. Hence it charges a customized fee. For offering better prices to customer, cost saving is done through offshoring the employees, where salaries are significantly low. Thus, depending on the talent pool of the company, it can offer a lot lesser price than its competitors.

Following is the distribution strategy in the Cognizant marketing mix:

Cognizant is a global brand and has a worldwide presence. Sales and marketing offices look after to acquire new clients, by constantly being in touch with the market trends and following and assessing the requirement of targeted companies. The clients are managed through pool of employees who are sitting in different regions of the world, giving a cost advantage to the firm. India is one great place for hiring new employees by the firm. More than half the employees are from India. Cognizant maintains a widespread global footprint, across the world. Main clients are based out of US, UK, India and China.

The headquarter of the company is in New Jersey, US, with additional 21 delivery centers in US itself.

The clients are based out of countries round the world, which require services either on day to day basis or periodically.

The promotional and advertising strategy in the Cognizant marketing strategy is as follows:

Being in b2b sector, most branding and promotional activities include, developing a positive trustworthy image amongst the client. For this company has many initiatives, Cognizant community, CSR activities, positive word of mouth and reference to past deals are some. 'Cognizant community' is the leading self-promotional program of the company. It is basically a customer conference, a modern event for IT sector industries, which is surrounded by the belief of developing strong bonds with customers. This is done through sharing common interests. The annually held summit, which is carried on in different places as UK, US or India, Singapore, is attended by significant speakers in the field of business and technology. Even adventure sports are made part of this summit. Positive relations, successful deals and the revenues the company is trusted with, manages the positive branding of company through word of mouth. Cognizant portrays itself as a concerned and responsible organization, involved in philanthropic works. 'Cognizant foundation' has been working for many altruistic works like education, health care, positive effect on environment.

Since this is a service marketing brand, here are the other three Ps to make it the 7Ps marketing mix of Cognizant.

24. What is your favorite advertisement and why?

25. What is the difference between social media marketing and digital marketing?

Social media marketing is a subset of digital marketing. While digital marketing encompasses a broad range of online channels and strategies to promote products or services, social media marketing specifically focuses on leveraging social media platforms such as Facebook, Instagram, Twitter, and LinkedIn to connect with audiences, build brand awareness, and drive engagement. Digital marketing includes other tactics like search engine optimization (SEO), email marketing, content marketing, and online advertising, while social media marketing revolves around creating and sharing content on social platforms to achieve marketing goals.

26. What is traditional marketing?

Traditional marketing refers to conventional marketing methods and channels used before the rise of digital technologies. It includes strategies such as print advertisements in newspapers or magazines, television and radio commercials, direct mail campaigns, billboards, and trade shows or events. Traditional marketing typically involves one-way communication from the brand to the audience and relies on mass media to reach a broad audience. While digital marketing has gained prominence in recent years, traditional marketing still plays a role in certain industries and can complement digital strategies to create a comprehensive marketing approach.

27. What are ATL, BTL and TTL forms of promotional strategies?

ATL (Above the Line), BTL (Below the Line), and TTL (Through the Line) are different forms of promotional strategies used by marketers:

1. Above the Line (ATL): ATL refers to promotional activities that target a wide audience through mass media channels such as television, radio, newspapers, magazines, and outdoor advertising. These activities aim to build brand awareness and reach a large number of people simultaneously. Examples include TV commercials, print ads, and billboards.

2. Below the Line (BTL): BTL promotional activities are more targeted and personalized, focusing on specific segments or individuals rather than a broad audience. These activities include direct marketing, sales promotions, sponsorships, events, and experiential marketing. BTL strategies aim to create direct engagement with customers, generate leads, and drive sales.

3. Through the Line (TTL): TTL strategies integrate both ATL and BTL activities to create a cohesive and unified marketing approach. TTL campaigns leverage multiple channels and touchpoints to reach customers at different stages of the buyer journey. By combining above-the-line mass reach with below-the-line personalized engagement, TTL

strategies aim to maximize the effectiveness of marketing efforts and drive business results.

Each of these promotional strategies has its advantages and is used based on the specific objectives, target audience, and budget of the marketing campaign.

28. What is the point of sales advertising?

Point of Sale (POS) advertising refers to promotional materials or displays strategically placed at the location where products are purchased or transactions are completed, such as retail stores, supermarkets, or checkout counters. The primary goal of POS advertising is to influence purchasing decisions and drive impulse buying by attracting customers' attention to specific products or promotions at the point of sale. These advertising materials can include posters, banners, shelf-talkers, product samples, or digital displays, designed to highlight product features, discounts, or special offers and encourage customers to make a purchase. POS advertising is an effective way to increase brand visibility, stimulate sales, and enhance the overall shopping experience for customers.

29. How do you define impulse purchasing?

Impulse purchasing is when someone buys something unexpectedly, usually without planning to beforehand. It happens when you see something you like or that catches your eye while you're shopping, and you decide to buy it on the spot, often without thinking too much about whether you really need it or not. It's like making a spur-of-the-moment decision to buy something just because it seems appealing at that moment.

30. How has COVID changed the advertising/marketing landscape for the country?\*

India's advertising industry is booming thanks to factors like rapid urbanization, increased tech adoption, and favorable government policies. Ads are everywhere, from billboards to smartphones, shaping consumer perceptions and boosting brand recall with catchy slogans and relatable campaigns.

Digital technologies are revolutionizing advertising, making India the second-fastest-growing market in Asia. Despite pandemic challenges, the industry is rebounding, especially in digital and TV sectors, with OTT platforms gaining traction.

Looking forward, digital platforms will dominate, fueled by rising internet and social media usage, particularly in rural areas. TV remains strong, complemented by digital media's expanding reach.

As India embraces its digital future, digital advertising will lead, driven by factors like affordable internet access and increased experimentation by industries with non-traditional platforms.

In conclusion, India's advertising sector is thriving, adapting to digital transformations and evolving consumer behaviors, poised for continued growth in the digital era.

31. Give examples of companies which have changed their advertising and promotional  
Dove is known for its groundbreaking "Real Beauty" campaign, which challenged conventional beauty standards and promoted body positivity. Through this campaign and others like it, Dove has shifted its advertising focus to inclusivity and empowerment, resonating with consumers seeking authenticity and diversity in beauty.
32. campaigns with respect to the COVID situation in the nation?

Certainly! Here are some examples of campaigns launched by companies in response to the COVID-19 situation in India:

1. **Amul**: Amul, the dairy cooperative, launched a campaign to raise awareness about COVID-19 safety measures. They used their iconic cartoon mascot, the Amul girl, to promote messages about wearing masks, maintaining social distancing, and washing hands regularly.
2. **BharatPe**: BharatPe, a fintech company, launched a campaign to support small businesses affected by the pandemic. They offered financial assistance, waived fees, and provided resources to help merchants navigate the challenges posed by COVID-19 and sustain their businesses.
3. **Cadbury**: Cadbury launched a heartwarming campaign titled "Iss Diwali Aap #KiseKhushKarenge?" (Whom will you make happy this Diwali?). The campaign encouraged people to spread joy and happiness during the festive season by sharing Cadbury chocolates with friends, family, and frontline workers as a gesture of gratitude and appreciation.
4. **Dettol**: Dettol, a hygiene and sanitation brand, launched a campaign to promote hand hygiene and cleanliness as essential measures to prevent the spread of COVID-19. They provided educational resources, hygiene tips, and product discounts to encourage people to maintain good hygiene practices.
5. **Zomato**: Zomato, a food delivery platform, launched a campaign to support frontline workers and healthcare professionals during the pandemic. They offered special discounts and free meals to healthcare workers and collaborated with NGOs to distribute food and essential supplies to vulnerable communities affected by COVID-19.

These campaigns demonstrate how companies in India responded to the COVID-19 crisis by raising awareness, supporting communities, and promoting solidarity during challenging times.

Certainly! Here are more examples of campaigns launched by companies in response to the COVID-19 situation in India:



6. **Swiggy**: Swiggy, a food delivery platform, launched the "Hope, Not Hunger" campaign to provide meals to migrant workers, daily wage earners, and other vulnerable populations affected by the lockdown. They partnered with NGOs and local organizations to distribute food packets and essentials in various cities across India.

7. **Ola**: Ola, a ride-hailing company, launched the "Ola Emergency" campaign to provide free transportation services for healthcare workers and patients during the pandemic. They offered discounted rides and dedicated vehicles for medical emergencies, ensuring timely access to healthcare facilities.

8. **Google Pay**: Google Pay, a digital payments platform, launched the "India Stands With COVID-19" campaign to raise funds for COVID-19 relief efforts. They facilitated donations to reputable NGOs and organizations working to provide medical supplies, oxygen concentrators, and other essential resources to hospitals and frontline workers.

9. **Reliance Industries**: Reliance Industries, a conglomerate with interests in retail, telecommunications, and energy, launched the "Mission Anna Seva" campaign to provide free meals to marginalized communities affected by the pandemic. They set up community kitchens and distributed food packets in urban slums and rural areas across India.

10. **Lifebuoy**: Lifebuoy, a personal hygiene brand, launched the "Hand Hygiene for All" campaign to promote handwashing as a simple yet effective way to prevent the spread of COVID-19. They collaborated with schools, hospitals, and local authorities to raise awareness about the importance of hand hygiene and provided free hand sanitizers and soap to underserved communities.

These campaigns exemplify how companies in India stepped up to support communities, healthcare workers, and vulnerable populations during the COVID-19 crisis, demonstrating corporate social responsibility and solidarity in the face of adversity.

33. Why is it necessary for a company to have a marketing department?

Having a marketing department is vital for a company as it serves as the driving force behind brand recognition and customer engagement. Through strategic planning and execution, marketing teams acquire and retain customers by understanding their needs and preferences. They conduct market research to stay abreast of industry trends and competitor strategies, enabling the company to innovate and stay competitive. Marketing efforts directly contribute to revenue generation by driving sales and expanding market reach. Additionally, marketing departments handle communication with various stakeholders, ensuring a positive corporate image and fostering strong relationships within the market. Overall, a dedicated marketing department is indispensable for a company's success in today's dynamic business environment.

34. What do you know about Digital Marketing? (lead generation, click per thousands, impressions, engagement etc.)

Digital marketing encompasses various strategies and techniques used to promote products or services online. It includes activities such as search engine optimization (SEO), social media marketing, email marketing, content marketing, and pay-per-click (PPC) advertising. In digital marketing, lead generation refers to the process of identifying and attracting potential customers through targeted campaigns and content. Clicks per thousand (CPM) and impressions are metrics used to measure the effectiveness of online advertising campaigns, indicating the number of times an ad is shown to users and the number of clicks it receives. Engagement metrics measure how users interact with digital content, including likes, shares, comments, and time spent on a website or social media platform. Overall, digital marketing allows businesses to reach a broader audience, track campaign performance in real-time, and optimize strategies for better results.

35. What are a few types of pricing strategies used by companies for their products?

Certainly! Here are a few types of pricing strategies commonly used by companies for their products:

1. **\*\*Cost-Plus Pricing\*\***: This strategy involves setting prices based on the cost of production, including materials, labor, and overhead expenses, plus a markup for profit.
2. **\*\*Competitive Pricing\*\***: Companies use competitive pricing to set their prices in line with competitors' prices, aiming to stay competitive in the market while considering factors such as product differentiation and perceived value.
3. **\*\*Penetration Pricing\*\***: Penetration pricing involves setting initial low prices to quickly gain market share and attract customers. Once established, prices may be gradually increased.
4. **\*\*Price Skimming\*\***: Price skimming involves setting high initial prices to target early adopters or customers willing to pay a premium for new or innovative products. Prices are later lowered to attract more price-sensitive customers.
5. **\*\*Value-Based Pricing\*\***: Value-based pricing focuses on setting prices based on the perceived value of the product or service to the customer, rather than its production costs or competitors' prices.
6. **\*\*Dynamic Pricing\*\***: Dynamic pricing involves adjusting prices in real-time based on changes in demand, competitor pricing, or other market factors. This strategy is commonly used in industries such as e-commerce and travel.
7. **\*\*Bundle Pricing\*\***: Bundle pricing involves offering multiple products or services together as a package at a discounted price compared to purchasing each item separately. This strategy encourages customers to buy more and can increase overall revenue.

These pricing strategies offer different approaches for companies to price their products effectively based on market conditions, customer preferences, and business objectives.

36. Some advertising controversies you can talk about in recent times?

In recent times, there have been several advertising controversies that have sparked public debate and criticism. Here are a few examples:

1. **Gillette's "The Best Men Can Be" Campaign**: In 2019, Gillette released an advertisement challenging toxic masculinity and urging men to hold each other accountable for their behavior. While some praised the campaign for promoting social responsibility, others criticized it for being divisive and alienating certain demographics.

2. **Pepsi's Kendall Jenner Ad**: Pepsi faced backlash in 2017 for an advertisement featuring Kendall Jenner, which depicted a protest where Jenner hands a police officer a can of Pepsi, seemingly resolving tensions. Critics argued that the ad trivialized social justice movements and exploited activism for commercial gain.

3. **H&M's "Coolest Monkey in the Jungle" Hoodie**: In 2018, H&M faced widespread criticism for an online advertisement featuring a young black boy wearing a hoodie with the slogan "Coolest Monkey in the Jungle." Many accused the company of racial insensitivity and perpetuating stereotypes.

4. **Dove's "Real Beauty" Campaign**: While Dove's "Real Beauty" campaign has been widely praised for promoting body positivity, the company faced controversy in 2017 for a Facebook ad that showed a black woman removing her shirt to reveal a white woman underneath. Critics accused Dove of racism and insensitivity.

5. **Burger King's International Women's Day Ad**: Burger King drew criticism in 2021 for an International Women's Day advertisement in which the slogan "Women belong in the kitchen" was prominently featured. While the ad aimed to raise awareness about gender inequality in the culinary industry, many found the execution tone-deaf and offensive.

These advertising controversies highlight the challenges companies face when navigating social and cultural sensitivities in their marketing campaigns, underscoring the importance of thoughtful and responsible advertising practices.

37. Talk about your favorite advertisement?

When transgender actor and social media influencer Dylan Mulvaney shared a sponsored post featuring Bud Light on Twitter, it seemed like typical influencer content at first. However, the post quickly stirred up negative reactions from conservative social media personalities, politicians, and celebrities. They criticized Bud Light for what they perceived as "woke" advertising, especially amidst a political climate marked by increased anti-LGBTQ rhetoric and policy. Mulvaney, boasting over 10.8 million

followers, found herself unexpectedly at the center of the controversy. The backlash led to calls for a boycott of Bud Light and its parent company, Anheuser-Busch, with some individuals even sharing videos of themselves destroying Bud Light products in protest.

<https://www.indianbusinesscouncil.org/post/5-controversial-ads-from-2022-the-lessons-we-learned>  
<https://technians.com/blog/controversial-advertisement-campaigns-india/>

38. You are the marketing head of an XYZ company, How would you market a famous product of the company?

39. Why do you think you are a good fit for the role of marketing?

While I lack direct experience in marketing and have never worked full-time before, I possess a strong desire to learn and grow in the field. I am a quick learner, adaptable, and eager to take on new challenges. My academic background has equipped me with foundational knowledge in business and communication, which I am confident will serve as a solid basis for transitioning into marketing. Furthermore, my enthusiasm, dedication, and willingness to put in the effort to acquire new skills make me a promising candidate for this role.

40. Sales or Marketing?

I'm more into marketing because I'm really interested in how people think and making strategies that work for them. Even though I haven't done it before, I'm keen to give it a shot and learn along the way. I'm pretty good at talking to people, coming up with ideas, and figuring things out, which seems useful for marketing stuff. I'm excited about the chance to help out with cool campaigns and help the business grow. I'm ready to put in the work and be part of your marketing team.

### **Microeconomics**

1. What is elasticity of demand, elasticity of supply, cross-price elasticity?

Elasticity of demand refers to how much the quantity demanded of a good or service changes in response to a change in price. If demand is elastic, a small change in price leads to a large change in quantity demanded, while if demand is inelastic, quantity demanded changes little in response to price changes.

Elasticity of supply measures how much the quantity supplied of a good or service changes in response to a change in price. A product with elastic supply means that suppliers can easily adjust production in response to price changes, while inelastic supply indicates that production is difficult to adjust quickly.

Cross-price elasticity measures how the quantity demanded of one good changes in response to a change in the price of another good. If the cross-price elasticity is positive, it means the goods are substitutes (an increase in the price of one leads to an increase in demand for the other), while a negative cross-price elasticity indicates they are complements (an increase in the price of one leads to a decrease in demand for the other).

2. Difference between Income and Substitution effect?

The income effect and substitution effect are two concepts used to explain how consumers respond to changes in the price of a good or service:

1. Income Effect: The income effect refers to the change in quantity demanded of a good or service due to a change in purchasing power resulting from a change in its price.

When the price of a good decreases, consumers effectively have more real income, allowing them to buy more of the good or other goods. Conversely, when the price of a good increases, consumers have less real income, leading them to buy less of the good or other goods.

2. Substitution Effect: The substitution effect refers to the change in quantity demanded of a good or service due to a change in its price relative to the prices of other goods.

When the price of a good decreases, it becomes relatively cheaper compared to other goods, prompting consumers to substitute it for more expensive alternatives. Conversely, when the price of a good increases, consumers switch to other, relatively cheaper goods.

In summary, the income effect focuses on changes in purchasing power resulting from price changes, while the substitution effect focuses on changes in consumer behavior driven by relative price changes among goods.

3. What are the exceptions to the law of demand?

Exceptions to the law of demand are rare but exist. For instance, Giffen goods, like cheap food staples, may see people buying more when their prices rise because they can't afford better alternatives. Veblen goods, such as luxury items, might become more desirable when their prices increase because they're seen as exclusive. Sometimes, if people think prices will shoot up soon, they might buy more now, even if it's costly. These exceptions show that people's buying habits can be influenced by things other than just price changes.

4. Difference between inferior and Giffen goods?

The main difference between inferior and Giffen goods lies in how consumers respond to changes in price:

1. Inferior Goods: Inferior goods are those for which demand decreases as consumer income increases. This is because as people become wealthier, they tend to prefer higher-quality alternatives. Examples of inferior goods include generic brands, low-cost

products, and public transportation. When consumer income rises, demand for these goods decreases, and vice versa.

2. Giffen Goods: Giffen goods are rare exceptions where demand increases as the price rises. This phenomenon typically occurs with goods that are considered inferior and essential for survival, such as basic food staples like rice or bread. When the price of a Giffen good increases, consumers may be forced to allocate more of their budget to the essential item, leading them to buy more of it despite the higher price, and vice versa.

In summary, while both inferior and Giffen goods may be of lower quality or desirability, the key distinction is in how consumers respond to changes in price: for inferior goods, demand decreases as income increases, while for Giffen goods, demand increases as the price rises, regardless of changes in income.

5. Factors affecting demand and factors affecting the supply of a product?  
Several factors influence both the demand and supply of a product:

Factors Affecting Demand:

1. Price: The most significant factor affecting demand is the price of the product itself. Generally, as the price decreases, demand increases, and vice versa.
2. Consumer Income: Higher incomes tend to increase demand for most goods, while lower incomes may decrease demand, especially for luxury items.
3. Preferences and Tastes: Changes in consumer preferences and tastes can significantly impact demand for a product.
4. Prices of Related Goods: The prices of substitutes and complements can affect demand. For example, an increase in the price of one good may lead consumers to demand more of its substitutes.
5. Consumer Expectations: Expectations about future prices or changes in income can influence current demand. For instance, consumers may buy more now if they expect prices to rise in the future.
6. Demographics: Factors such as population size, age distribution, and cultural trends can affect demand patterns.

Factors Affecting Supply:

1. Price: The price of a product also affects supply, with higher prices typically leading to increased supply and vice versa.
2. Production Costs: Costs of inputs such as labor, raw materials, and technology directly impact supply. Higher production costs usually reduce supply, while lower costs increase it.
3. Technology: Advances in technology can improve production efficiency, leading to higher supply levels.
4. Government Policies: Taxes, subsidies, regulations, and trade policies can affect production costs and influence supply.

5. Natural Factors: Natural disasters, weather conditions, and other environmental factors can disrupt production and affect supply levels.
6. Expectations: Producers' expectations about future prices and market conditions can influence current supply decisions, such as stockpiling goods in anticipation of price increases.

These factors interact to determine the equilibrium price and quantity of a product in the market.

6. What is consumer surplus, producer surplus and total surplus?

Sure! Let's break it down:

1. Consumer Surplus: This is like a win for consumers. It's the extra satisfaction or benefit that consumers get when they buy something for less than they're willing to pay. For example, if you buy a sweater for \$20 but you would've happily paid \$30 for it, that \$10 difference is your consumer surplus.

2. Producer Surplus: This is a win for the producers or sellers. It's the extra profit they make when they sell something for more than it cost to produce. For instance, if a company sells a chair for \$50 but it only cost them \$30 to make, their producer surplus is \$20.

3. Total Surplus: This is like the big picture. It's the sum of consumer surplus and producer surplus. In other words, it's the overall benefit to society from buying and selling goods or services. When both consumers and producers are happy and getting what they want, total surplus is maximized.

7. What are the characteristics of Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly? Examples of all of them.

Sure, here's a brief overview:

1. Perfect Competition:

- Many buyers and sellers with identical products.
- Easy entry and exit from the market.
- No individual firm can influence the market price.
- Examples: Agricultural markets, stock exchanges.

2. Monopoly:

- Single seller with unique product.
- High barriers to entry, giving the seller control over price.
- Examples: Local utilities, patented drugs.

3. Monopolistic Competition:

- Many buyers and sellers with differentiated products.

- Easy entry and exit, but products are slightly different.
- Each seller has some control over price.
- Examples: Restaurants, clothing brands.

4. Oligopoly:

- Few large firms dominate the market.
- High barriers to entry, giving firms significant market power.
- Interdependence among firms' pricing and output decisions.
- Examples: Automobile industry, cell phone service providers.

8. What is the law of diminishing marginal utility?

The law of diminishing marginal utility basically says that the more you have or use of something, the less satisfaction you get from each extra bit. So, if you love pizza and you're super hungry, that first slice tastes amazing. But if you keep eating more slices, the enjoyment starts to fade, and you might even feel a bit queasy. This is why people usually buy more when things are cheaper and less when they're pricier – because they get less satisfaction the more they have to pay.

9. What is the law of diminishing returns?

The law of diminishing returns, also known as the law of diminishing marginal returns, states that as you add more of one input, such as labor or capital, while keeping other inputs constant, the marginal increase in output will eventually decrease. In simpler terms, it means that there comes a point where adding more of something doesn't lead to proportional increases in output and may even lead to decreased efficiency. For example, if you keep adding more workers to a factory without increasing machinery or space, at some point, adding more workers will result in less additional output per worker, and overall productivity will decline. This law helps businesses optimize their production processes and resource allocation.

10. What is the Slutsky Equation?

The Slutsky equation is an economic concept used to analyze the effects of price changes on consumer demand. It decomposes the total effect of a price change into two components: the substitution effect and the income effect. The substitution effect measures the change in quantity demanded due to the relative price change, assuming that the consumer's purchasing power remains constant. The income effect measures the change in quantity demanded due to the change in real income resulting from the price change. By understanding these effects, economists can better predict how consumers will respond to changes in prices and incomes.

11. What is the difference between Hicksian and Slutsky decomposition?

The main difference between Hicksian and Slutsky decomposition lies in their focus and purpose within economic analysis.



Hicksian decomposition focuses on decomposing the total change in consumer demand resulting from a price change into two components: the income effect and the substitution effect. It assumes that the consumer's purchasing power remains constant (i.e., real income is held constant) as prices change.

Slutsky decomposition, on the other hand, also decomposes the total change in consumer demand into income and substitution effects, but it considers changes in both prices and real income. It accounts for the fact that when prices change, the consumer's real income also changes, influencing their purchasing decisions.

In summary, while both decompositions analyze how changes in prices affect consumer demand, Hicksian decomposition assumes constant real income, whereas Slutsky decomposition accounts for changes in real income resulting from price changes.

12. What is the difference between Hicksian and Marshallian demand functions?

Sure, let's break it down in simple terms. Hicksian demand functions look at how people change their buying habits when prices go up or down, focusing on how much they buy compared to what they can afford. It's like seeing if you'd buy more of something if it got cheaper, assuming your overall taste or preferences stay the same. Marshallian demand functions, on the other hand, consider not just how much you buy, but also how much you enjoy what you're buying. They take into account both your preferences and how prices affect what you can afford, giving a fuller picture of how people make decisions about what to buy.

13. What is an Indifference curve and its properties?

An indifference curve is a graphical representation used in microeconomics to show combinations of two goods that give a consumer equal satisfaction or utility. Here are its key properties:

1. Downward Sloping: Indifference curves slope downwards from left to right, indicating that as the quantity of one good increases, the quantity of the other good must decrease to maintain the same level of satisfaction.

2. Convex to the Origin: Indifference curves are typically convex to the origin, which reflects the principle of diminishing marginal rate of substitution. This means that as a consumer has more of one good, they are willing to give up less of another good to maintain the same level of satisfaction.

3. Non-Intersecting: Indifference curves do not intersect each other, as this would violate the assumption that more of both goods is always preferred to less.

4. Indifference Map: A collection of indifference curves, known as an indifference map, represents a consumer's preferences and allows analysis of how changes in prices and income affect their choices.

5. Marginal Rate of Substitution (MRS): The slope of an indifference curve at any point represents the marginal rate of substitution, indicating the rate at which a consumer is willing to trade one good for another while remaining indifferent.

Overall, indifference curves provide a powerful tool for understanding consumer preferences and analyzing consumer behavior in response to changes in prices and income.

14. What is Marginal Rate of Substitution? How does it affect the shape of the indifference curve?

The Marginal Rate of Substitution (MRS) is the rate at which a consumer is willing to exchange one good for another while remaining indifferent, i.e., maintaining the same level of satisfaction. It represents the amount of one good a consumer is willing to give up in exchange for an additional unit of another good.

The MRS affects the shape of the indifference curve in the following ways:

1. Slope: The slope of an indifference curve at any point is equal to the MRS. As the consumer moves along the indifference curve, the slope (MRS) typically decreases. This reflects the principle of diminishing marginal rate of substitution, meaning that as the consumer has more of one good, they are willing to give up less of another good to maintain the same level of satisfaction.

2. Convexity: The convex shape of indifference curves is directly related to the behavior of the MRS. The diminishing MRS implies that the curve is convex to the origin. This convexity indicates that as the consumer has more of one good, the amount of the other good they are willing to give up decreases at a decreasing rate.

In summary, the Marginal Rate of Substitution influences the slope and shape of the indifference curve, reflecting the consumer's preferences and trade-offs between goods.

15. What is an Isoquant?

An isoquant is a graphical representation used in production theory to show all possible combinations of two inputs (typically labor and capital) that result in producing the same level of output. In other words, an isoquant represents different input combinations that yield a constant level of output.

Key characteristics of isoquants include:

1. Downward Sloping: Isoquants typically slope downwards from left to right, indicating the inverse relationship between inputs and output. As more of one input is used, less of the other input is needed to maintain the same level of output.

2. Convex Shape: Isoquants are often convex to the origin, reflecting the principle of diminishing marginal rate of technical substitution. This means that as more of one input is substituted for another, the marginal rate of substitution decreases.

3. Non-Intersecting: Isoquants do not intersect each other, as this would imply that different input combinations produce the same level of output, which is not feasible.

4. Isoquant Map: A collection of isoquants, known as an isoquant map, provides a comprehensive view of the production possibilities for a firm and allows analysis of how changes in input combinations affect output.

Overall, isoquants are essential tools for understanding production decisions, input substitution, and the technology choices available to firms.

16. What is a Budget Line? How does IC and Budget Line help in finding equilibrium?

A budget line, also known as a budget constraint, is a graphical representation of the combinations of two goods that a consumer can afford given their income and the prices of the goods. It shows all possible combinations of two goods that can be purchased, given the consumer's budgetary constraints.

The budget line is typically depicted as a straight line in a two-dimensional graph, with one good plotted on the horizontal axis and the other on the vertical axis. The slope of the budget line represents the relative prices of the two goods.

Indifference curves (IC) represent different combinations of goods that provide the same level of satisfaction or utility to the consumer. The consumer's optimal choice, or equilibrium, occurs where the highest possible indifference curve (indicating the highest level of satisfaction) is tangent to the budget line. This point represents the combination of goods that the consumer can afford given their budget constraints and that maximizes their utility.

In summary, the combination of an indifference curve and a budget line helps identify the consumer's equilibrium point, where they achieve the highest level of satisfaction possible given their budget constraints.

17. What is the theory of revealed preferences?

The theory of revealed preferences suggests that people's preferences can be inferred from their actions and choices. Instead of asking directly about preferences, economists look at what people actually do in the marketplace to determine their preferences. If someone consistently chooses one option over another when they have the opportunity to choose, it's assumed that they prefer that option. It's like understanding someone's favorite color by noticing the colors they wear most often.

18. How do firms take their production decisions?

Firms make production decisions by considering factors like the cost of inputs, technology available, and expected demand for their products. They aim to produce the quantity of goods that maximizes profits or minimizes costs. For example, a bakery might decide how many loaves of bread to bake based on the cost of flour, the price they can sell the bread for, and how much bread customers are likely to buy.

19. What are different returns to scale?

Returns to scale refer to the change in output resulting from a proportional change in all inputs. There are three types of returns to scale:

1. Increasing returns to scale: When a proportional increase in inputs leads to a more than proportional increase in output. For example, if a firm doubles its inputs and output more than doubles, it experiences increasing returns to scale.

2. Constant returns to scale: When a proportional increase in inputs results in a proportional increase in output. For instance, if a firm doubles its inputs and output also doubles, it experiences constant returns to scale.

3. Decreasing returns to scale: When a proportional increase in inputs leads to a less than proportional increase in output. If a firm doubles its inputs but output increases by less than double, it experiences decreasing returns to scale.

20. What is the shape of Total Cost curve, average cost curve, Marginal cost curve, total fixed cost, total variable cost?

The shapes of different cost curves are as follows:

1. Total cost curve: It typically starts from the origin, increases at a decreasing rate, then increases at an increasing rate. It forms a U-shaped curve due to economies of scale followed by diseconomies of scale.

2. Average cost curve: It also starts from the origin, decreases at first due to economies of scale, reaches a minimum point, then increases due to diseconomies of scale. It forms a U-shaped curve similar to the total cost curve.

3. Marginal cost curve: It intersects the average total cost and average variable cost curves at their minimum points and cuts the average cost curves from below. It initially decreases due to increasing returns to scale, reaches a minimum, then increases due to diminishing returns to scale.

4. Total fixed cost curve: It is a horizontal line parallel to the x-axis, indicating that total fixed cost remains constant regardless of the level of output.

5. Total variable cost curve: It starts from the origin and increases linearly with output. It reflects the variable costs associated with producing different levels of output.

21. What is the relationship between average cost, marginal cost & average variable cost?

The relationship between average cost (AC), marginal cost (MC), and average variable cost (AVC) is as follows:

1. When MC is below AC, AC is falling.
2. When MC is above AC, AC is rising.
3. When MC equals AC, AC is at its minimum.
4. When MC is below AVC, AVC is falling.
5. When MC is above AVC, AVC is rising.
6. When MC equals AVC, AVC is at its minimum.

In summary, the marginal cost intersects both the average cost and average variable cost curves at their minimum points. When MC is below the average, it pulls the average down, and when it's above the average, it pulls the average up.

22. What is the break-even point for a firm? What are sunk costs?

The break-even point for a firm is the level of output or sales at which total revenue equals total costs, resulting in zero profit or loss. It's the point where a firm covers all its costs but doesn't make any profit.

Sunk costs are costs that have already been incurred and cannot be recovered or changed by any current or future action. These costs are irrelevant to decision-making because they cannot be changed, regardless of the course of action taken. For example, if a company spends money on research and development for a product that ends up being unsuccessful, the money spent on R&D is considered a sunk cost.

23. What is the long run competitive equilibrium for firms?

In the long run competitive equilibrium for firms, each firm in a perfectly competitive market earns zero economic profit. This occurs when firms produce at the minimum point of their average total cost curve (where average total cost equals marginal cost) and when price equals marginal cost.

In this equilibrium, firms produce where price equals marginal cost, ensuring efficient allocation of resources. Additionally, there is no incentive for firms to enter or exit the market since they are earning zero economic profit. Thus, the number of firms remains constant, and the market achieves allocative efficiency.

24. What is game theory? What are different game theories and strategies?

Game theory is a branch of mathematics that studies strategic interactions between rational decision-makers. It analyzes situations where the outcome of an individual's decision depends on the decisions of others.

Some different game theories include:

1. Normal-form games: These represent games in matrix form, where players simultaneously choose their strategies without knowing the choices of others.
2. Extensive-form games: These represent games in tree-like structures, where players make sequential decisions, knowing the previous choices of others.
3. Cooperative games: These involve players forming coalitions and making joint decisions to maximize their collective payoffs.

Some strategies commonly used in game theory include:

1. Dominant strategy: A strategy that yields the highest payoff for a player regardless of the choices made by other players.
2. Nash equilibrium: A set of strategies, one for each player, where no player has an incentive to unilaterally deviate from their chosen strategy.
3. Tit for tat: A strategy in repeated games where players cooperate initially and then mimic the opponent's previous move in subsequent rounds.

Game theory is applied in various fields such as economics, political science, biology, and computer science to analyze strategic interactions and make predictions about the behavior of rational agents.

#### 25. What is Nash Equilibrium?

Nash Equilibrium is a concept in game theory that describes a stable state in a game where no player has an incentive to change their strategy unilaterally. In other words, it's a situation where each player's strategy is the best response to the strategies chosen by the other players.

In a Nash Equilibrium, no player can improve their payoff by changing their strategy while the strategies of the other players remain unchanged. It represents a balance of strategies where each player is doing the best they can given the choices of others.

For example, in the classic game of "Prisoner's Dilemma," a Nash Equilibrium occurs when both prisoners choose to betray each other, as neither prisoner can benefit by changing their decision if the other prisoner's decision remains the same.

#### 26. What is the difference between Cournot Model, Bertrand Model & Stackelberg Model?

The Cournot, Bertrand, and Stackelberg models are three different models used in industrial organization and microeconomics to analyze competition among firms. Here are the key differences between them:

1. Cournot Model:

- In the Cournot model, firms compete by choosing quantities of output simultaneously.
- Firms are assumed to set their quantities strategically, taking into account the quantities set by other firms but not their prices.
- It assumes that firms have market power and can influence prices through their output decisions.
- The Cournot equilibrium occurs when each firm's output choice maximizes its profit given the output choices of other firms.

2. Bertrand Model:

- In the Bertrand model, firms compete by setting prices simultaneously.
- Firms are assumed to be price setters, and consumers purchase from the firm with the lowest price.
- It assumes perfect substitutability between products and no capacity constraints.
- The Bertrand equilibrium occurs when all firms set their prices equal to their marginal costs, resulting in zero profits.

3. Stackelberg Model:

- In the Stackelberg model, firms compete sequentially, with one firm acting as a leader and the other(s) as followers.
- The leader firm sets its quantity or price first, and then the follower(s) react to the leader's decision.
- It assumes that firms have different levels of market power, with the leader having more market power than the follower(s).
- The Stackelberg equilibrium occurs when the leader's chosen quantity or price maximizes its profit, considering the reaction of the follower(s) to its decision.

In summary, the Cournot model focuses on quantity competition, the Bertrand model focuses on price competition, and the Stackelberg model focuses on sequential competition with a leader-follower structure.

27. What is deadweight loss? In which market structure deadweight loss is minimum?

Deadweight loss refers to the loss of economic efficiency that occurs when the equilibrium quantity of a good or service is not at the level that maximizes total surplus. It represents the welfare loss to society that arises from market inefficiency, such as when there is a difference between the quantity produced and consumed at the market equilibrium and the quantity that would be produced and consumed at the socially optimal level.

In perfect competition, deadweight loss is minimized because the market is in equilibrium where the marginal cost equals the marginal benefit for each unit of production. In perfect competition, resources are allocated efficiently, and there is no market power, resulting in the absence of deadweight loss. Therefore, perfect competition is often considered the market structure where deadweight loss is minimized.

28. What is price discrimination? What are the different types of price discrimination?

Price discrimination is a strategy used by firms to charge different prices to different customers for the same product or service, based on their willingness to pay. The goal of price discrimination is to capture more consumer surplus and increase profits for the firm.

There are several types of price discrimination:

1. First-degree price discrimination: Also known as perfect price discrimination, this occurs when a firm charges each customer the maximum price they are willing to pay for each unit of the product or service. The firm captures all consumer surplus and maximizes profits.
2. Second-degree price discrimination: In this type of price discrimination, firms charge different prices based on the quantity consumed or purchased. For example, bulk discounts or quantity discounts are common forms of second-degree price discrimination.
3. Third-degree price discrimination: This occurs when firms segment the market into different groups based on characteristics such as age, income, location, or willingness to pay. Each group is charged a different price based on their perceived value or demand elasticity. Examples include student discounts, senior citizen discounts, or different pricing for different geographical regions.

Overall, price discrimination allows firms to capture more consumer surplus and increase profits by tailoring prices to different segments of the market based on their willingness to pay.

29. What are public goods and their characteristics?

Public goods are goods or services that are non-excludable and non-rivalrous in consumption. This means that once provided, individuals cannot be excluded from using the good, and one person's use of the good does not diminish its availability for others.

Characteristics of public goods include:

1. Non-excludability: It is difficult or impossible to exclude individuals from using the good once it is provided. For example, national defense or street lighting.
2. Non-rivalrous consumption: Consumption of the good by one individual does not reduce its availability for others. For example, enjoying clean air or public parks.



3. Public goods are often provided by the government because private firms have little incentive to produce them due to the free-rider problem, where individuals can benefit from the good without paying for it.

4. Public goods often have positive externalities, meaning that their provision benefits society as a whole beyond the individuals who directly consume them.

Overall, public goods play a crucial role in society by providing benefits that are enjoyed collectively and cannot easily be provided by the market alone.

30. How does asymmetric information and externalities affect the market?

Asymmetric information and externalities can both lead to market failures and inefficiencies.

1. Asymmetric information occurs when one party in a transaction has more information than the other, leading to an imbalance of knowledge. This can result in adverse selection and moral hazard problems, where one party may take advantage of the other due to their superior information. For example, in the market for used cars, sellers may have more information about the quality of the car than buyers, leading to a "lemons problem" where buyers are unwilling to pay a fair price for fear of purchasing a low-quality car.

2. Externalities occur when the actions of one party in a transaction affect a third party who is not directly involved in the transaction. Externalities can be positive (beneficial) or negative (harmful). Negative externalities, such as pollution from a factory, can lead to overproduction of goods that generate harmful effects on society, as the cost of these externalities is not borne by the producer. Positive externalities, such as education or vaccination programs, may result in underproduction of goods or services because the full social benefits are not captured by the producers.

In both cases, asymmetric information and externalities can lead to market inefficiencies, such as overproduction or underproduction of goods, misallocation of resources, and reduced overall welfare. Government intervention, such as regulation, taxation, subsidies, or provision of public goods, may be necessary to correct these market failures and promote efficiency and welfare.

31. What is the difference between shifting the demand curve and movement along the demand curve?

Shifting the demand curve and movement along the demand curve are two different concepts in economics that describe changes in demand under different circumstances:

1. Shifting the demand curve: This occurs when there is a change in demand due to factors other than price. These factors can include changes in consumer preferences, income levels, population size, prices of related goods (substitutes or complements), or

expectations about the future. When any of these factors change, the entire demand curve shifts to the left or right, indicating a change in the quantity demanded at every price level. A shift to the right represents an increase in demand, while a shift to the left represents a decrease in demand.

2. Movement along the demand curve: This occurs when there is a change in quantity demanded due to a change in the price of the good or service itself, holding all other factors constant. When the price of a good or service changes, consumers typically adjust their quantity demanded accordingly. As the price decreases, the quantity demanded increases, resulting in a movement down along the demand curve. Conversely, as the price increases, the quantity demanded decreases, resulting in a movement up along the demand curve.

In summary, shifting the demand curve reflects changes in demand due to factors other than price, while movement along the demand curve reflects changes in quantity demanded in response to changes in price, holding other factors constant.

32. What is perfectly elastic and perfectly inelastic demand?

Perfectly elastic and perfectly inelastic demand are two extreme cases that describe the responsiveness of quantity demanded to changes in price:

1. Perfectly elastic demand: This occurs when a small change in price leads to an infinite change in quantity demanded, meaning consumers are extremely sensitive to price changes. In a perfectly elastic demand curve, any increase in price would result in consumers completely abandoning the good or service in favor of alternatives. The demand curve would be horizontal, indicating that consumers are willing to buy an unlimited quantity at a specific price but none at even a slightly higher price. This situation is rare in the real world but can be seen in highly competitive markets where identical substitutes are readily available.

2. Perfectly inelastic demand: This occurs when quantity demanded remains constant regardless of changes in price. In other words, consumers are entirely insensitive to price changes. In a perfectly inelastic demand curve, the quantity demanded does not respond at all to changes in price, resulting in a vertical demand curve. This situation typically arises when a good or service is essential or has no substitutes, such as life-saving medications or basic utilities like electricity or water.

In summary, perfectly elastic demand means consumers are extremely responsive to price changes, while perfectly inelastic demand means consumers are entirely unresponsive to price changes. These extreme cases help economists understand the dynamics of demand and pricing in different market conditions.

33. What are price ceilings and price floors? Give real life examples?

Price ceilings and price floors are government-imposed regulations on the maximum and minimum prices that can be charged for goods and services in a market:

1. Price ceiling: A price ceiling is a legal maximum price set by the government, below which the price of a good or service cannot legally rise. Price ceilings are typically implemented to protect consumers from high prices, particularly for essential goods and services. A real-life example of a price ceiling is rent control in some cities, where the government sets a maximum allowable rent that landlords can charge for rental properties. Another example is maximum retail prices set for essential commodities during times of crisis, such as during natural disasters or emergencies.

2. Price floor: A price floor is a legal minimum price set by the government, above which the price of a good or service cannot legally fall. Price floors are usually established to support producers and ensure they receive a fair income for their products. One common example of a price floor is the minimum wage, which sets the lowest hourly wage rate that employers are legally allowed to pay their workers. Another example is agricultural price supports, where governments guarantee a minimum price for agricultural products to protect farmers from low market prices and income instability.

In summary, price ceilings and price floors are government interventions in markets aimed at regulating prices to achieve specific economic and social objectives, such as protecting consumers or supporting producers.

### Macroeconomics

1. Which is better: GDP or GNP?

The superiority of GDP (Gross Domestic Product) or GNP (Gross National Product) depends on the specific context and the purpose of the analysis. GDP measures the total value of goods and services produced within a country's borders, regardless of the nationality of the producers. GNP, on the other hand, measures the total value of goods and services produced by the citizens of a country, whether domestically or abroad.

In terms of assessing a country's economic performance and productivity within its borders, GDP is often preferred because it provides a more direct measure of domestic economic activity. However, GNP may be more relevant when analyzing a country's overall economic well-being, particularly in cases where a significant portion of the population works abroad and remits income back home.

Ultimately, the choice between GDP and GNP depends on the specific objectives of the analysis and the factors being considered.

## 2. 3 methods to calculate GDP?

There are three main methods to calculate GDP:

1. **Production Approach:** This method calculates GDP by summing up the value-added at each stage of production within an economy. It focuses on the value of goods and services produced, excluding intermediate inputs to avoid double counting.
2. **Income Approach:** This method calculates GDP by summing up the total income earned by all factors of production within an economy. This includes wages and salaries, rents, interest, and profits.
3. **Expenditure Approach:** This method calculates GDP by summing up the total expenditure on goods and services within an economy. It includes consumption expenditure by households, investment expenditure by businesses, government spending, and net exports (exports minus imports).

These three approaches should theoretically yield the same result when calculating GDP, providing a comprehensive view of the economy's output and income.

## 3. Real vs Nominal Interest rate?

The real interest rate refers to the interest rate adjusted for inflation, reflecting the purchasing power of money over time. It represents the growth rate of purchasing power derived from an investment or loan, accounting for changes in prices. In contrast, the nominal interest rate is the interest rate unadjusted for inflation, representing the absolute rate charged or earned on an investment or loan.

For example, if a savings account offers a nominal interest rate of 5% and inflation is 2%, the real interest rate would be 3%. This means that after accounting for inflation, the purchasing power of the investment increases by 3% annually. The nominal interest rate doesn't consider inflation, so it doesn't reflect the true increase in purchasing power.

## 4. What is the difference between Keynesian theory and classical theory?

Keynesian theory and classical theory are two fundamental perspectives in economics that offer different explanations for economic phenomena and policy prescriptions.

Classical theory, often associated with economists like Adam Smith and David Ricardo, emphasizes the idea of laissez-faire economics, where markets operate efficiently without government intervention. It emphasizes the importance of supply-side factors such as production, wages, and prices in determining economic outcomes. According to classical economists, markets tend towards equilibrium, and government intervention can lead to inefficiencies.

In contrast, Keynesian theory, developed by John Maynard Keynes, emerged in response to the Great Depression. It highlights the importance of aggregate demand in

driving economic activity. Keynes argued that in times of economic downturns, insufficient aggregate demand leads to unemployment and underutilization of resources. Keynes advocated for active government intervention through fiscal policy (government spending and taxation) and monetary policy (central bank actions) to stabilize the economy and promote full employment.

Overall, the key difference lies in the role of government intervention: classical theory favors minimal government involvement, while Keynesian theory supports active government intervention to manage economic fluctuations.

5. What is the shape of the aggregate supply curve in the short run and long run?  
In the short run, the aggregate supply curve typically slopes upward from left to right. This upward slope indicates that as the price level increases, producers are willing to supply more goods and services due to factors like nominal wage stickiness, resource utilization, and capacity constraints. However, this relationship is subject to diminishing returns, meaning that as output increases, the cost of production tends to rise, leading to higher prices.

In the long run, the aggregate supply curve is often depicted as vertical or close to vertical. This vertical shape indicates that in the long run, changes in the price level have little to no effect on the quantity of goods and services supplied. Instead, the level of output is determined by factors such as technological progress, labor force growth, and capital accumulation, which influence the economy's potential output or full employment level. Therefore, in the long run, the economy tends toward its potential output level regardless of changes in the price level.

6. What is disposable Income? How do you calculate it from national income?  
Disposable income refers to the amount of money that households have available for spending and saving after taxes have been deducted from their total income. It represents the income that households can actually use for consumption and savings purposes.

To calculate disposable income from national income, you start with the national income, which includes all income earned by individuals and businesses within a country's borders. Then, you subtract taxes and other mandatory deductions, such as Social Security contributions and Medicare taxes, from the national income. The resulting amount is the disposable income available to households for spending and saving.

7. What is CPI and WPI? What is India's current CPI and WPI?  
8. Difference between cyclical, structural, classical & frictional unemployment?  
Cyclical unemployment occurs due to fluctuations in the business cycle, where economic downturns lead to decreased demand for goods and services, resulting in layoffs. Structural unemployment arises from a mismatch between the skills workers possess and the requirements of available jobs. Classical unemployment refers to voluntary

unemployment due to factors like individual choice or wage negotiations. Frictional unemployment occurs when individuals are between jobs or entering the workforce for the first time, seeking better opportunities.

9. Why is GDP not a good measure? What does it not include?

GDP, while widely used, has limitations as a measure of economic well-being. It doesn't account for non-market transactions like household work or volunteer activities, which contribute to welfare but aren't monetarily valued. Moreover, it doesn't consider income distribution among citizens, meaning it may not reflect inequalities. Additionally, it doesn't capture the informal economy, including under-the-table transactions, leading to an incomplete picture of economic activity. Finally, GDP growth doesn't necessarily indicate improvements in quality of life or environmental sustainability.

Examples of work not calculated under GDP include unpaid household work such as cooking, cleaning, and childcare, volunteer work, and informal economic activities like bartering or favors exchanged between friends. These activities contribute to societal well-being but are not directly monetized or captured in GDP measurements.

10. What is MPC and what is autonomous consumption?

MPC stands for Marginal Propensity to Consume, which refers to the proportion of an additional unit of income that a consumer spends on consumption. Autonomous consumption is the minimum level of consumption that occurs even when income is zero, representing the basic needs and fixed expenses that individuals have. It reflects the consumption that would still occur even if there were no income, such as spending on essential goods like food and housing.

11. What is secular stagnation?

Secular stagnation refers to a prolonged period of slow economic growth and persistently high unemployment rates, often accompanied by low inflation or deflation. It suggests that an economy is facing structural challenges that hinder its ability to achieve sustained growth over the long term. These challenges can include factors like demographic shifts, declining productivity growth, inadequate investment, and insufficient consumer demand. Secular stagnation can pose significant challenges for policymakers and businesses as they seek to stimulate economic activity and foster sustainable growth.

12. What is the life cycle hypothesis?

The life cycle hypothesis is an economic theory that suggests individuals plan their consumption and savings over their lifetime, taking into account their expected future income and expenses. According to this hypothesis, people aim to maintain a relatively stable standard of living throughout their lives by adjusting their saving and spending patterns. Specifically, individuals are expected to save during their working years when their income is high and spend their savings during retirement when their income decreases. The life cycle hypothesis helps explain patterns of saving and consumption observed across different age groups and income levels.

13. How changes in the real interest rate affects consumption?

Changes in the real interest rate can significantly impact consumption behavior. When real interest rates increase, the cost of borrowing rises, making it more expensive for individuals and businesses to take out loans for purchases such as homes, cars, or equipment. As a result, consumption tends to decrease because people are less inclined to borrow money for big-ticket items. Conversely, when real interest rates decrease, borrowing becomes cheaper, leading to an increase in consumption as people are more willing to take advantage of lower borrowing costs. Therefore, changes in the real interest rate can influence the level of consumption in the economy.

14. What is the problem of twin deficits? Is India facing the same problem? How can we overcome it?

The problem of twin deficits refers to a situation where a country experiences both a fiscal deficit (government spending exceeds revenue) and a current account deficit (imports exceed exports). India has faced challenges related to twin deficits in the past due to factors such as high government spending, trade imbalances, and reliance on foreign capital inflows. To overcome this, India can implement policies to boost exports, reduce imports through import substitution or trade agreements, improve fiscal discipline to reduce government spending, attract foreign investment through structural reforms, and enhance productivity and competitiveness in key sectors of the economy. Additionally, prudent management of macroeconomic policies and strengthening domestic industries can help address the twin deficits issue over time.

15. What is the fiscal deficit? How is it different from Trade Deficit?

The fiscal deficit refers to the difference between the government's total expenditure and its total revenue, excluding borrowing. It reflects the amount of money the government needs to borrow to meet its expenses. On the other hand, the trade deficit, also known as the balance of trade deficit, refers to the difference between a country's imports and exports of goods and services. In simpler terms, fiscal deficit pertains to government finances, while trade deficit focuses on the balance of trade between a country and its trading partners.

16. What are the uses of money?

In macroeconomics, money serves several crucial functions:

1. **\*\*Medium of Exchange\*\***: Money facilitates transactions by acting as a medium of exchange. It allows goods and services to be traded without the need for bartering.
2. **\*\*Unit of Account\*\***: Money provides a common unit of measurement for expressing the value of goods, services, assets, and liabilities. It enables individuals and businesses to compare prices and make informed economic decisions.

3. **\*\*Store of Value\*\***: Money serves as a store of value, allowing individuals to save their wealth for future consumption. Unlike perishable goods or assets with volatile values, money retains its value over time.

4. **\*\*Standard of Deferred Payment\*\***: Money allows individuals to defer payments and debts into the future. Contracts, loans, and other financial agreements are denominated in monetary terms, providing a standard for future payment obligations.

Overall, these functions make money essential for facilitating economic transactions, promoting economic efficiency, and supporting overall economic activity.

17. What is the quantity theory of money?

The quantity theory of money is a concept in economics that suggests a direct relationship between the supply of money in an economy and the price level of goods and services. It is expressed by the equation:  $MV = PQ$ , where M represents the money supply, V represents the velocity of money (the rate at which money circulates in the economy), P represents the price level, and Q represents the quantity of goods and services produced.

According to this theory, changes in the money supply lead to proportional changes in the price level, assuming that the velocity of money and the quantity of goods and services produced remain constant. In other words, an increase in the money supply will lead to inflation, while a decrease will lead to deflation.

The quantity theory of money is often used to explain long-term changes in the price level and inflation rates, particularly in the context of monetary policy and central banking. However, critics argue that it may oversimplify the complex relationship between money supply, economic output, and prices, and that other factors such as changes in velocity and productivity also play significant roles in determining inflation.

18. What are the different methods of measuring money supply?

The different methods of measuring money supply, also known as monetary aggregates, typically include:

1. M0: This represents the narrowest definition of money supply and includes only physical currency (coins and banknotes) in circulation. It is also referred to as the monetary base.
2. M1: This includes M0 along with demand deposits (checking accounts) and other liquid assets that can be quickly converted into cash.
3. M2: In addition to M1, M2 includes savings deposits, time deposits (certificates of deposit), and money market funds. It represents a broader measure of money supply.



and is often used by economists to assess the availability of money for spending and investment.

4. M3: This is the broadest measure of money supply and includes M2 along with large time deposits, institutional money market funds, and other large liquid assets. However, many countries have stopped reporting M3 due to concerns about its usefulness and accuracy.

These different measures provide insights into the liquidity and availability of money within an economy, and policymakers often use them to assess the effectiveness of monetary policy and its impact on economic activity and inflation.

19. What is the IS curve? What is LM Curve?

The IS-LM model is a macroeconomic framework used to analyze the relationship between real output (GDP) and the interest rate in an economy.

The IS curve, short for "Investment-Saving" curve, represents the equilibrium in the goods market. It shows all combinations of interest rates and levels of real output where total spending (investment plus consumption) equals total output (production) in the economy. The downward slope of the IS curve indicates the negative relationship between the interest rate and real output, reflecting the fact that lower interest rates stimulate investment and consumption, leading to higher output.

The LM curve, short for "Liquidity-Money" curve, represents the equilibrium in the money market. It shows all combinations of interest rates and levels of real output where the demand for money (liquidity preference) equals the supply of money (determined by the central bank). The upward slope of the LM curve indicates the positive relationship between the interest rate and real output, reflecting the fact that higher interest rates reduce the demand for money, leading to lower output.

The intersection of the IS and LM curves determines the equilibrium interest rate and level of real output in the economy. This equilibrium represents the point where desired saving equals desired investment and the money market is in balance. Changes in fiscal or monetary policy can shift the IS and LM curves, affecting the equilibrium interest rate and output level.

20. What is crowding out?

Crowding out refers to a phenomenon in macroeconomics where increased government spending or borrowing leads to reduced investment or consumption in the private sector.

When the government increases its spending, it often needs to borrow money by issuing bonds to finance its expenditure. This increases the demand for loanable funds in the financial market, causing interest rates to rise. Higher interest rates make borrowing

more expensive for businesses and households, leading to a decrease in private investment and consumption.

As a result, the increase in government spending "crowds out" private sector spending, meaning that resources that could have been used for private investment or consumption are instead diverted to finance government projects. This can lead to a decrease in overall economic activity and may offset the intended stimulative effect of government spending.

Crowding out is particularly relevant when an economy is operating close to full capacity, as there are limited resources available for borrowing. However, in times of economic downturn or underutilized resources, crowding out may be less pronounced.

21. What is a liquidity trap and what is the classical case?

A liquidity trap is a situation in which monetary policy becomes ineffective because nominal interest rates are very low and saving money becomes more attractive than spending or investing it. In a liquidity trap, individuals and businesses hoard cash instead of spending or investing it, even when interest rates are low. This behavior undermines the central bank's ability to stimulate economic activity through conventional monetary policy tools, such as lowering interest rates.

The classical case refers to the traditional understanding of how monetary policy works, based on the ideas of classical economists. In the classical view, changes in the money supply directly affect interest rates, which in turn influence investment and consumption decisions. However, in a liquidity trap, the effectiveness of monetary policy is limited because interest rates are already near zero and cannot be lowered further to stimulate spending or investment. This concept gained prominence during the Great Depression of the 1930s when many economies experienced prolonged periods of high unemployment and low economic activity despite efforts by central banks to stimulate growth through monetary policy.

22. How to derive AD curve from ISLM framework?

To derive the Aggregate Demand (AD) curve from the IS-LM framework, we need to understand how changes in the real interest rate affect both the goods market (IS curve) and the money market (LM curve).

1. **\*\*Start with the IS curve:\*\*** The IS curve represents equilibrium in the goods market, showing the combinations of income and the real interest rate at which planned expenditure equals output. It slopes downwards because as the real interest rate decreases, investment increases, leading to higher output and income. So, a lower real interest rate leads to higher planned expenditure and shifts the IS curve to the right.

2. **\*\*Consider the LM curve:\*\*** The LM curve represents equilibrium in the money market, showing combinations of income and the real interest rate at which money demand

equals money supply. It slopes upwards because as income increases, the demand for money increases (due to higher transactions), pushing up the real interest rate. So, an increase in income shifts the LM curve to the left.

3. **Intersection of IS and LM curves:** The AD curve is derived from the intersection of the IS and LM curves. It represents combinations of income and the real interest rate at which both the goods market and the money market are in equilibrium. At this point, planned expenditure equals output, and money demand equals money supply.

4. **Shifts in AD curve:** Changes in factors such as fiscal policy (government spending and taxation) or monetary policy (money supply) can shift the AD curve. For example, an increase in government spending shifts the IS curve to the right, leading to higher income levels and shifting the AD curve to the right.

In summary, the AD curve is derived from the IS-LM framework by analyzing the interaction between the goods market (IS curve) and the money market (LM curve) to determine the equilibrium level of income and the real interest rate.

## 23. What is the slope and position of the IS and LM curve?

In the IS-LM framework:

### 1. **IS Curve:**

- **Slope:** Negative (downward sloping)
- **Position:** Represents equilibrium in the goods market, showing combinations of income and the real interest rate at which planned expenditure equals output.
- **Reason for Slope:** The negative slope is due to the inverse relationship between the real interest rate and planned expenditure. As the real interest rate decreases, investment increases, leading to higher output and income.

### 2. **LM Curve:**

- **Slope:** Positive (upward sloping)
- **Position:** Represents equilibrium in the money market, showing combinations of income and the real interest rate at which money demand equals money supply.
- **Reason for Slope:** The positive slope is due to the relationship between income and money demand. As income increases, people need more money for transactions, pushing up the real interest rate.

Both curves intersect at a point where the goods market and money market are in equilibrium, determining the equilibrium level of income and the real interest rate.

## 24. What is a BoP account? What does it all include?

The Balance of Payments (BoP) account is a systematic record of all economic transactions between residents of a country and the rest of the world during a given period. It includes:

1. **\*\*Current Account:\*\*** This records transactions related to the import and export of goods and services, income receipts and payments, and unilateral transfers (gifts, grants, aid).
2. **\*\*Capital Account:\*\*** This accounts for transfers of financial assets and liabilities between a country and the rest of the world, including foreign direct investment, portfolio investment, and changes in reserve assets.
3. **\*\*Financial Account:\*\*** This records cross-border transactions involving financial assets and liabilities, such as foreign direct investment, portfolio investment, and changes in reserve assets.
4. **\*\*Reserve Account:\*\*** This accounts for changes in official reserve assets like foreign currencies, gold reserves, and Special Drawing Rights (SDRs) held by the central bank.

The BoP account helps policymakers and analysts understand a country's economic relationships with other nations and its overall external position.

25. Why is the current account + capital account balance always 0?

The current account + capital account balance is theoretically expected to be zero due to the accounting principles applied in the Balance of Payments (BoP) framework, specifically the double-entry bookkeeping system. In this system:

1. **\*\*Current Account:\*\*** Records transactions related to the import and export of goods and services, income receipts and payments, and unilateral transfers.
2. **\*\*Capital Account:\*\*** Accounts for transfers of financial assets and liabilities between a country and the rest of the world, including foreign direct investment, portfolio investment, and changes in reserve assets.

The sum of the current account and capital account balances should theoretically equal zero because any surplus or deficit in one account is offset by an equal and opposite surplus or deficit in the other account, ensuring that all transactions are accounted for and the overall balance remains zero. However, in practice, due to data collection limitations and statistical discrepancies, the actual sum may not always be precisely zero.

26. What is the J curve?

The J curve is a graphical representation used in economics to depict the short-term effect of a devaluation or depreciation of a country's currency on its trade balance. Initially, after a currency depreciation, the trade balance typically worsens before improving. This pattern resembles the shape of the letter "J" when plotted on a graph.

Here's how it works:

1. **\*\*Immediate Impact:\*\*** Initially, after a currency depreciation, the prices of imported goods rise, leading to an increase in the cost of imports. Conversely, exports may not immediately benefit from the currency depreciation due to existing contracts and other factors.
2. **\*\*Short-Term Response:\*\*** In the short term, the demand for imports may remain relatively inelastic, meaning that consumers and businesses continue to purchase imports despite the higher prices. Similarly, the demand for exports may not respond immediately to the currency depreciation.
3. **\*\*Adjustment Period:\*\*** Over time, as importers and exporters adjust to the new exchange rate, the demand for exports may increase as they become more competitively priced in foreign markets, while the demand for imports may decrease as consumers and businesses seek cheaper domestic alternatives or reduce consumption.
4. **\*\*Improvement in Trade Balance:\*\*** Eventually, the trade balance is expected to improve as the volume of exports increases and the volume of imports decreases. This adjustment process may take time, hence the initial dip in the trade balance followed by a subsequent improvement, resembling the shape of a "J" on a graph.

The J curve phenomenon highlights the dynamic and nonlinear nature of the relationship between exchange rates and trade balances in the short term.

## 27. What is the impossible trinity?

The impossible trinity, also known as the trilemma, refers to the concept in international economics that states a country cannot simultaneously maintain all three of the following policy goals:

1. **\*\*Fixed Exchange Rates:\*\*** Ensuring a fixed exchange rate to stabilize the value of its currency relative to other currencies.
2. **\*\*Free Capital Movement:\*\*** Allowing capital to flow freely across its borders, meaning there are no restrictions on capital movements such as investments and loans.
3. **\*\*Independent Monetary Policy:\*\*** Pursuing an independent monetary policy to control domestic interest rates and manage inflation or economic growth.

According to the impossible trinity, a country can only achieve two out of these three objectives at any given time, but not all three simultaneously. If a country chooses to maintain a fixed exchange rate and free capital movement, it must give up its ability to control its monetary policy. Conversely, if it wants to pursue an independent monetary policy and allow free capital movement, it must allow its exchange rate to float freely.

This concept has significant implications for policymakers and central banks when making decisions about exchange rate regimes, capital controls, and monetary policy, as they must carefully consider the trade-offs involved in choosing which policy objectives to prioritize.

## Finance

### **1. Why Finance? What is the difference between Finance and Accounting? What are the different?**

Finance and accounting are related fields but serve different purposes within an organization:

1. Finance: Finance deals with managing money and assets. It involves making decisions about investments, raising capital, budgeting, and analyzing financial data to maximize profitability and ensure long-term financial stability. Finance professionals focus on strategic planning, risk management, and optimizing the use of financial resources to achieve organizational goals.

2. Accounting: Accounting, on the other hand, focuses on recording, summarizing, and reporting financial transactions. It involves preparing financial statements, such as balance sheets, income statements, and cash flow statements, to provide stakeholders with accurate information about a company's financial performance. Accounting professionals ensure compliance with financial regulations and standards, track expenses, and manage financial records.

In summary, while finance focuses on managing financial resources and making strategic decisions to create value, accounting focuses on recording and reporting financial information in a systematic and transparent manner to facilitate decision-making and ensure accountability.

### **2. branches of Finance?**

Finance is a broad field with several branches, each focusing on different aspects of financial management and analysis. Some common branches of finance include:

1. **Corporate Finance:** Corporate finance involves managing the financial activities of corporations, including capital budgeting, investment decisions, financing strategies, and dividend policies. Professionals in this field work to maximize shareholder value and ensure the long-term financial health of the organization.

2. **Investment Management:** Investment management, also known as asset management or portfolio management, involves managing investment portfolios on behalf of individuals, institutions, or organizations. Professionals in this field analyze

financial markets, select appropriate investment strategies, and monitor portfolio performance to achieve investment objectives.

3. **Financial Markets:** Financial markets comprise various markets where financial assets are bought and sold, such as stock markets, bond markets, and commodity markets. Professionals in this branch of finance analyze market trends, assess risk and return, and facilitate the trading of financial instruments.

4. **Financial Planning:** Financial planning involves helping individuals and families achieve their financial goals through effective budgeting, saving, investing, and retirement planning. Financial planners provide personalized advice and recommendations to clients based on their financial situation and objectives.

5. **Risk Management:** Risk management focuses on identifying, assessing, and mitigating financial risks faced by individuals, businesses, or financial institutions. Professionals in this field develop risk management strategies to protect against potential losses from market fluctuations, credit defaults, and other adverse events.

6. **Banking and Financial Institutions:** Banking and financial institutions provide a range of financial services, including lending, deposit-taking, wealth management, and investment banking. Professionals in this sector work in commercial banks, investment banks, credit unions, and other financial institutions to facilitate financial transactions and services.

These are just a few branches of finance, and the field continues to evolve with advancements in technology, regulations, and global economic trends.

### **3. What are the contents of an Annual Report of a company? What are key numbers or information you look for in an Annual Report?**

The contents of an Annual Report of a company typically include:

1. **Introduction and Letter to Shareholders:** This section provides an overview of the company's performance during the fiscal year, along with messages from the CEO or board of directors.

2. **Financial Highlights:** This section presents key financial metrics and performance indicators for the year, such as revenue, net income, earnings per share, and dividends.

3. **Management Discussion and Analysis (MD&A):** The MD&A section offers management's analysis and interpretation of the company's financial results, strategic initiatives, and operational performance.

4. **Financial Statements:** The financial statements include the balance sheet, income statement, cash flow statement, and statement of changes in equity, providing detailed information about the company's financial position, performance, and cash flows.
5. **Notes to Financial Statements:** These notes provide additional explanations and disclosures related to specific items in the financial statements, such as accounting policies, contingent liabilities, and related party transactions.
6. **Corporate Governance Report:** This section outlines the company's corporate governance practices, including board composition, executive compensation, and risk management policies.
7. **Auditor's Report:** The auditor's report provides an independent assessment of the company's financial statements and the auditor's opinion on their fairness and compliance with accounting standards.

Key numbers or information to look for in an Annual Report include:

1. **Revenue Growth:** Assessing the company's top-line growth over time provides insights into its market performance and competitive position.
2. **Profitability Metrics:** Examining metrics like net income margin, return on equity (ROE), and return on assets (ROA) helps gauge the company's profitability and efficiency in generating returns for shareholders.
3. **Cash Flow:** Analyzing the cash flow statement reveals the company's ability to generate cash from its operating activities, invest in growth opportunities, and meet its financial obligations.
4. **Debt Levels:** Evaluating the company's debt levels, debt-to-equity ratio, and interest coverage ratio helps assess its financial leverage and solvency risk.
5. **Dividends:** Reviewing dividend payouts and dividend yield provides insights into the company's dividend policy and its commitment to returning value to shareholders.
6. **Key Performance Indicators (KPIs):** Understanding specific KPIs relevant to the company's industry and business model helps assess operational performance and management effectiveness.
7. **Risks and Challenges:** Identifying and understanding potential risks and challenges disclosed in the MD&A and risk factors sections helps investors evaluate the company's risk profile and resilience.



By examining these key numbers and information in an Annual Report, investors can gain a comprehensive understanding of the company's financial health, performance, and prospects.

#### **4. What key financial ratios do you consider in comparing two companies?**

When comparing two companies, key financial ratios provide valuable insights into their financial health, operational efficiency, and profitability. Some key financial ratios to consider include:

##### **1. \*\*Liquidity Ratios:\*\***

- Current Ratio: Compares a company's current assets to its current liabilities, indicating its ability to cover short-term obligations.
- Quick Ratio: Measures a company's ability to meet short-term liabilities using its most liquid assets, excluding inventory.

##### **2. \*\*Profitability Ratios:\*\***

- Gross Profit Margin: Shows the percentage of revenue retained after deducting the cost of goods sold, indicating efficiency in production and pricing.
- Net Profit Margin: Reflects the percentage of revenue that remains as net income after deducting all expenses, including taxes and interest.

##### **3. \*\*Efficiency Ratios:\*\***

- Inventory Turnover: Measures how efficiently a company manages its inventory by comparing the cost of goods sold to average inventory.
- Accounts Receivable Turnover: Indicates how quickly a company collects cash from credit sales by comparing credit sales to average accounts receivable.

##### **4. \*\*Debt Ratios:\*\***

- Debt-to-Equity Ratio: Compares a company's debt to its shareholders' equity, reflecting its leverage and financial risk.
- Interest Coverage Ratio: Evaluates a company's ability to meet interest payments on its debt by comparing its earnings before interest and taxes (EBIT) to its interest expense.

##### **5. \*\*Investment Ratios:\*\***

- Price-to-Earnings (P/E) Ratio: Measures the relationship between a company's stock price and its earnings per share, indicating its valuation relative to its earnings.
- Price-to-Book (P/B) Ratio: Compares a company's market value to its book value, reflecting its valuation relative to its net assets.

##### **6. \*\*Market Performance Ratios:\*\***

- Return on Equity (ROE): Measures a company's profitability relative to shareholders' equity, indicating how effectively it generates profits with shareholder investments.

- Return on Assets (ROA): Evaluates a company's profitability relative to its total assets, reflecting its efficiency in utilizing assets to generate earnings.

By analyzing these key financial ratios, investors can compare the financial performance, risk profile, and valuation of two companies within the same industry or across different sectors. This comparison helps inform investment decisions and identify opportunities for potential investment or further analysis.

## **5. Describe the broad categories of accounting ratios used in financial analysis.**

In financial analysis, accounting ratios are broadly categorized into several key groups, each providing insights into different aspects of a company's financial performance, stability, and efficiency. These categories include:

### **1. \*\*Liquidity Ratios:\*\***

- Liquidity ratios assess a company's ability to meet its short-term financial obligations. Examples include the current ratio and quick ratio, which measure the company's ability to cover immediate liabilities with its current assets.

### **2. \*\*Profitability Ratios:\*\***

- Profitability ratios evaluate a company's ability to generate profits relative to its revenue, assets, and equity. Key ratios in this category include gross profit margin, net profit margin, return on equity (ROE), and return on assets (ROA).

### **3. \*\*Efficiency Ratios:\*\***

- Efficiency ratios measure how effectively a company utilizes its resources to generate sales and income. Examples include inventory turnover, accounts receivable turnover, and asset turnover ratios.

### **4. \*\*Solvency Ratios:\*\***

- Solvency ratios assess a company's long-term financial health and its ability to meet its long-term obligations. Debt-to-equity ratio, interest coverage ratio, and debt ratio are common solvency ratios used by analysts.

### **5. \*\*Activity Ratios:\*\***

- Activity ratios, also known as turnover ratios, analyze how efficiently a company manages its assets and liabilities to generate revenue. These ratios include inventory turnover ratio, accounts receivable turnover ratio, and accounts payable turnover ratio.

### **6. \*\*Market Value Ratios:\*\***

- Market value ratios provide insights into the market perception and valuation of a company's stock. Examples include price-to-earnings (P/E) ratio, price-to-book (P/B) ratio, and dividend yield.

### **7. \*\*Coverage Ratios:\*\***

- Coverage ratios evaluate a company's ability to meet its financial obligations, such as debt service and interest payments. Examples include the interest coverage ratio and debt service coverage ratio.

These broad categories of accounting ratios offer a comprehensive view of a company's financial performance, allowing analysts and investors to assess its operational efficiency, profitability, liquidity, and overall financial health. By analyzing these ratios in conjunction with other financial metrics and industry benchmarks, stakeholders can make informed decisions regarding investment, lending, or strategic planning.

## **6. What is the difference between NPV & IRR? Which is better & why? (F)**

Net Present Value (NPV) and Internal Rate of Return (IRR) are both widely used methods for evaluating the profitability of investment projects, but they differ in their approach and interpretation:

### **1. \*\*Net Present Value (NPV):\*\***

- NPV calculates the present value of all cash inflows and outflows associated with an investment project, discounted at a specified rate (usually the cost of capital or a required rate of return). A positive NPV indicates that the project is expected to generate value and increase the wealth of the investor.
- NPV considers the timing and magnitude of cash flows, providing a measure of the absolute value added by the investment. It is expressed in monetary terms, such as dollars or euros.

### **2. \*\*Internal Rate of Return (IRR):\*\***

- IRR is the discount rate at which the NPV of an investment project equals zero. In other words, it is the rate of return at which the present value of cash inflows equals the present value of cash outflows.
- IRR represents the project's inherent rate of return and is often used as a hurdle rate to compare against the cost of capital or required rate of return. If the IRR exceeds the cost of capital, the project is considered financially viable.

### **\*\*Which is Better and Why?\*\***

The superiority of NPV or IRR depends on the context and specific characteristics of the investment project:

#### **- \*\*NPV Advantages:\*\***

- NPV accounts for the explicit consideration of the cost of capital or required rate of return, making it a more suitable method for projects with multiple investment options or where capital constraints exist.
- NPV provides a clear indication of the absolute value added by the investment and facilitates comparison between mutually exclusive projects with different scales or durations.

- **IRR Advantages:**

- IRR offers a straightforward measure of the project's rate of return, which is often easier for stakeholders to interpret and communicate.
- IRR is particularly useful when comparing investment opportunities with similar risk profiles, as it directly measures the project's return relative to the cost of capital.

In practice, NPV and IRR are often used together, with NPV serving as the primary decision criterion and IRR used as a supplementary measure or a sensitivity analysis tool. While NPV provides a comprehensive assessment of value creation, IRR offers insights into the project's internal rate of return and financial attractiveness. Ultimately, the choice between NPV and IRR depends on the specific requirements and objectives of the investment decision-makers.

**7. What is : (i) WACC, (ii) Beta, (iii) CAPM Model**

(i) **Weighted Average Cost of Capital (WACC):**

- WACC is a calculation representing the average cost of capital for a company, taking into account its cost of equity and cost of debt, weighted by their respective proportions in the capital structure.
- It is used to discount future cash flows in investment appraisal, serving as the discount rate for NPV calculations.
- WACC reflects the minimum rate of return required by investors to compensate for the risk associated with investing in the company.

(ii) **Beta:**

- Beta is a measure of a stock's volatility in relation to the market, typically represented by a numerical value.
- A beta of 1 indicates that the stock's price moves in line with the market, while a beta greater than 1 suggests higher volatility, and a beta less than 1 indicates lower volatility.
- Beta helps investors assess the systematic risk or market risk associated with a particular stock when constructing investment portfolios.

(iii) **Capital Asset Pricing Model (CAPM):**

- CAPM is a financial model used to determine the expected return on an investment based on its risk profile and the overall market's return.
- The model incorporates the risk-free rate of return, the market risk premium, and the stock's beta to calculate the required rate of return.
- CAPM equation: 
$$\text{Expected Return} = \text{Risk-Free Rate} + \beta \times (\text{Market Return} - \text{Risk-Free Rate})$$
- CAPM helps investors evaluate whether an investment offers an adequate return relative to its risk, considering the opportunity cost of investing in the overall market.

**8. What is the Discounted cash flow model? Can you explain the same briefly? (F)**

The Discounted Cash Flow (DCF) model is a valuation method used to estimate the value of an investment based on its future cash flows. Here's a brief explanation:

1. **Future Cash Flows:** DCF begins by projecting the future cash flows expected from the investment, typically over a certain period.
2. **Discounting:** These future cash flows are then discounted back to their present value using a discount rate, usually the company's cost of capital or another appropriate rate.
3. **Present Value:** The present value of all future cash flows is then calculated by summing up the discounted cash flows.
4. **Terminal Value:** Additionally, a terminal value may be estimated for cash flows beyond the projection period, often based on the assumption of a perpetual growth rate.
5. **Summation:** Finally, the present value of the projected cash flows and the terminal value are added together to determine the total value of the investment.

The DCF model provides a comprehensive way to assess the worth of an investment by considering both its anticipated future earnings and the time value of money.

## **9. How would you value a bond? (F)**

Valuing a bond involves estimating its present worth by considering its future cash flows and discounting them back to their present value. Here's a basic approach:

1. **Future Cash Flows:** Determine the bond's future cash flows, including periodic coupon payments and the final principal repayment at maturity.
2. **Discount Rate:** Choose an appropriate discount rate, often the bond's yield to maturity (YTM), which represents the market interest rate for similar bonds.
3. **Discounting:** Discount each future cash flow back to its present value using the chosen discount rate. The present value of the coupon payments can be calculated using the bond's coupon rate, while the present value of the principal repayment is its face value discounted to the present.
4. **Summation:** Sum up the present values of all future cash flows to find the bond's total present value, which represents its fair value in the market.

By applying these steps, an analyst can determine the fair value of a bond based on its expected cash flows and prevailing market interest rates.

## **10. How can we measure risk? (F)**

Risk can be measured in various ways, depending on the context. Here are some common methods:

1. **Standard Deviation:** In finance, standard deviation is often used to measure the volatility of returns. A higher standard deviation indicates higher risk.
2. **Beta:** Beta measures the sensitivity of an asset's returns to changes in the market. A beta greater than 1 indicates higher risk, while a beta less than 1 suggests lower risk.
3. **Value at Risk (VaR):** VaR measures the maximum potential loss of an investment within a given time frame at a certain confidence level. It provides an estimate of the worst-case scenario loss.
4. **Sharpe Ratio:** The Sharpe ratio measures the risk-adjusted return of an investment. A higher Sharpe ratio indicates better risk-adjusted performance.
5. **Probability Distributions:** Analyzing probability distributions of potential outcomes can help assess the likelihood of different risk scenarios.
6. **Sensitivity Analysis:** Sensitivity analysis involves testing the impact of changes in key variables on the outcome or performance of an investment or project.

By using these and other methods, investors and analysts can quantify and manage risks associated with investments, projects, or other decisions.

**11. Explain what a yield curve is. What do you mean by an inverted yield curve? (F)**

A yield curve is a graphical representation of the relationship between the yield (interest rate) and the maturity (time to maturity) of bonds with the same credit quality but different maturity dates. Typically, the yield curve slopes upwards, indicating that longer-term bonds have higher yields than shorter-term bonds, reflecting the expectation of higher inflation or increased risk over time.

An inverted yield curve occurs when shorter-term bond yields are higher than longer-term bond yields. This is considered unusual because it suggests that investors expect interest rates to fall in the future, possibly due to concerns about economic downturns or recessions. Inverted yield curves have historically been seen as a warning sign of impending economic trouble, as they often precede recessions.

**12. Can you explain a few multiples used in relative valuation? (F)**

In relative valuation, multiples are financial ratios used to compare the value of a company to its peers in the same industry. Some common multiples include:

1. Price-to-Earnings (P/E) ratio: This compares a company's stock price to its earnings per share (EPS), indicating how much investors are willing to pay for each dollar of earnings.
2. Price-to-Book (P/B) ratio: This compares a company's market value (stock price) to its book value (net assets), providing insight into how the market values the company's assets.
3. Enterprise Value-to-EBITDA (EV/EBITDA) ratio: This compares a company's enterprise value (market capitalization plus debt minus cash) to its earnings before interest, taxes, depreciation, and amortization (EBITDA), offering a measure of a company's operating performance relative to its overall value.
4. Price-to-Sales (P/S) ratio: This compares a company's market capitalization to its total sales revenue, indicating how much investors are willing to pay for each dollar of sales generated.

These multiples help investors assess a company's valuation relative to its peers, providing insights into its financial health, growth potential, and market sentiment.

### **13. What is LBO? How is it different from an MBO? Give hypothetical examples for each**

A Leveraged Buyout (LBO) is a financial transaction in which a company is acquired using a significant amount of borrowed funds, often using the assets of the company being acquired as collateral. The goal of an LBO is to increase the returns to the private equity firm or acquiring entity by amplifying the potential returns through leverage.

On the other hand, a Management Buyout (MBO) is a transaction in which the current management team of a company purchases a controlling stake or all of the company's shares from its existing owners. The management team typically partners with a private equity firm or other external investors to finance the acquisition.

Here are hypothetical examples for each:

**Leveraged Buyout (LBO):** A private equity firm identifies a publicly traded company with strong cash flows and undervalued assets. The firm acquires the company using a combination of its own equity investment and borrowed funds, leveraging the company's assets to secure financing. After taking control of the company, the private equity firm implements operational improvements and strategic initiatives to increase its value, with the goal of eventually selling it at a profit.

**Management Buyout (MBO):** The management team of a successful mid-sized manufacturing company decides to pursue an MBO. With the help of a private equity

partner, the management team negotiates a deal to purchase the company from its current owners. The management team believes that they can unlock additional value by implementing operational efficiencies and expanding into new markets, and they are motivated to take ownership to benefit directly from the company's future success.

#### **14. Differentiate an IPO and FPO**

An Initial Public Offering (IPO) and a Follow-on Public Offering (FPO) are both methods through which a company can raise capital by selling shares of its stock to the public. However, they differ in several key aspects:

1. **Timing:** An IPO is the first time a company offers its shares to the public, typically when it decides to become a publicly traded company. It marks the transition from a privately held company to a publicly traded one. On the other hand, an FPO occurs after a company has already conducted an IPO and has been trading on the stock exchange for some time. It involves issuing additional shares to the public.
2. **Purpose:** The primary purpose of an IPO is to raise capital to fund growth opportunities, pay off debt, or provide liquidity to existing shareholders. It allows the company's founders, early investors, and employees to monetize their ownership stakes. Conversely, an FPO is typically conducted to raise additional capital for similar purposes as an IPO, such as funding expansion initiatives, acquiring other businesses, or strengthening the company's financial position.
3. **Regulatory Requirements:** Both IPOs and FPOs are subject to regulatory requirements imposed by securities regulators in the jurisdiction where the company is listed. However, the regulatory scrutiny and disclosure requirements for an IPO are usually more stringent compared to an FPO, as the company is entering the public markets for the first time.
4. **Pricing:** In an IPO, the price of the shares is determined through a process called bookbuilding, where investment banks and underwriters assess investor demand and set the offering price accordingly. This price may or may not reflect the true market value of the company. In contrast, the pricing of shares in an FPO is typically based on the prevailing market price, with the company issuing the shares at or near the current market price.

In summary, while both IPOs and FPOs involve selling shares to the public to raise capital, they differ in terms of timing, purpose, regulatory requirements, and pricing mechanisms.

#### **15. What is the underwriting of shares? What is an oversubscription?**

Underwriting of shares refers to the process by which an investment bank or underwriter agrees to purchase all the shares of a company's stock being offered in an Initial Public Offering (IPO) at a predetermined price. The underwriter assumes the financial risk of



buying the shares from the company and then reselling them to investors. This arrangement provides the company with certainty regarding the amount of capital it will raise through the IPO.

Oversubscription occurs when the demand for shares in an IPO exceeds the number of shares available for purchase. In such cases, investors submit orders to buy more shares than are being offered, leading to oversubscription. This situation often arises when there is significant investor interest in the company's IPO due to factors such as strong financial performance, growth prospects, or industry trends. As a result, the underwriter may allocate shares to investors based on predetermined criteria, such as the size of their orders or their relationship with the underwriter, to ensure a fair distribution of shares.

#### **16. What is PE Ratio? How is it useful?**

The Price-to-Earnings (P/E) ratio is a financial metric used to evaluate the valuation of a company's stock by comparing its current market price per share to its earnings per share (EPS). It's calculated by dividing the market price of a share by the earnings per share.

The P/E ratio provides insight into how much investors are willing to pay for each dollar of a company's earnings. A high P/E ratio may indicate that investors expect strong future earnings growth, while a low P/E ratio may suggest that the stock is undervalued or that the company's growth prospects are limited.

Investors use the P/E ratio to assess whether a stock is overvalued, undervalued, or fairly valued relative to its earnings potential. However, it's essential to consider other factors such as industry trends, growth prospects, and overall market conditions when interpreting the P/E ratio.

#### **17. What is the purpose of Cash Flow Statements?**

The purpose of Cash Flow Statements is to provide a detailed overview of a company's cash inflows and outflows during a specific period. It helps stakeholders, including investors, creditors, and management, understand how cash is generated and utilized by the business.

Cash Flow Statements categorize cash flows into three main sections: operating activities, investing activities, and financing activities. By analyzing these sections, stakeholders can assess the company's ability to generate cash from its core operations, its investments in assets, and its financing activities such as borrowing or issuing equity.

Furthermore, Cash Flow Statements help in evaluating the liquidity, solvency, and overall financial health of a company. They provide valuable insights into the company's ability to meet its short-term and long-term obligations, make strategic investment decisions, and assess its cash management practices.

**18. What are the key metrics you consider in comparing two stocks of a given industry? Why do you use those metrics?**

When comparing two stocks within the same industry, I consider several key metrics to assess their performance and investment potential:

1. **Price-to-Earnings (P/E) Ratio:** This ratio helps assess how much investors are willing to pay for each dollar of a company's earnings. A lower P/E ratio may indicate that a stock is undervalued compared to its earnings potential.
2. **Price-to-Book (P/B) Ratio:** The P/B ratio compares a company's market value to its book value, providing insights into its valuation relative to its assets. A lower P/B ratio may suggest that a stock is undervalued compared to its net asset value.
3. **Dividend Yield:** Dividend yield measures the annual dividend income generated by a stock relative to its current market price. It's crucial for income-oriented investors seeking regular income from their investments.
4. **Return on Equity (ROE):** ROE indicates a company's profitability by comparing its net income to shareholders' equity. It helps assess how effectively a company is utilizing shareholders' equity to generate profits.
5. **Debt-to-Equity (D/E) Ratio:** The D/E ratio assesses a company's financial leverage and risk by comparing its debt to its equity. A lower D/E ratio may indicate a lower risk of default and greater financial stability.
6. **Growth Prospects:** Evaluating factors such as revenue growth, earnings growth, and future expansion plans provides insights into a company's growth potential and future profitability.

These metrics help investors make informed decisions by providing insights into the relative valuation, financial health, profitability, and growth prospects of two stocks within the same industry.

**19. What is a money market? How is it different from the stock market?**

A money market is a segment of the financial market where short-term borrowing and lending of funds occur, typically with maturities of one year or less. It deals with highly liquid and low-risk securities like Treasury bills, commercial paper, certificates of deposit, and short-term bonds. Money market investments are considered safer and provide lower returns compared to other investment avenues.

In contrast, the stock market, also known as the equity market, is where buying and selling of stocks (shares of ownership in a company) take place. Unlike the money market, the stock market deals with long-term investment vehicles representing

ownership in publicly traded companies. Stocks are more volatile and carry higher risks compared to money market instruments but also offer the potential for higher returns over the long term.

In summary, the money market focuses on short-term debt instruments with lower risk and returns, while the stock market involves the trading of ownership stakes in companies and offers the potential for higher returns but with higher risks and volatility.

- 20. What are the highlights of this year's budget? Do you think India is on track to become a USD5 trillion economy? What are the impediments/ challenges?**
- 21. What is the budgeted fiscal deficit (in percentage terms) for the year 2022-23? How is the same being funded?**
- 22. Explain the crisis in India's banking and shadow banking (NBFC) sectors.**
- 23. What is currently happening with the Indian economy? Do you think the current slowdown is Cyclical or structural? Justify. Why do you think the stock market has been rising even though the economy is slowing down?**
- 24. Can you explain the modus-operandi of any recent scam in India?**
- 25. Name some unicorns(start-ups) in India. What do you think is their USP?**
- 26. Explain the sub-prime crisis of 2008. What was the trigger?**

The subprime mortgage crisis of 2008 was a massive financial disaster that rocked the global economy. It all started with banks offering loans to people who had trouble paying them back, known as subprime mortgages. These risky loans were bundled together and sold as investments to banks and other investors. But when many homeowners couldn't keep up with their payments, the housing market crashed, and the value of these investments plummeted.

The crisis spread like wildfire as banks lost billions of dollars and stopped lending money to each other, causing panic in the financial world. Stock markets tanked, businesses struggled, and people lost their homes and jobs. It took years for the economy to recover, and governments around the world had to step in with massive bailouts to stabilize the situation. The subprime crisis serves as a stark reminder of the dangers of reckless lending and the importance of responsible financial practices.

- 27. Explain the concept of a one-person company. Is audit mandatory for a one-person company?**

<https://cleartax.in/s/one-person-company-registration-procedure-india>

- 28. What has been the effect of the trade wars between the US and China? How can this be an opportunity for India?**
- 29. Recent M&A deals in India. What were the reasons behind that transaction?**
- 30. What is the break-even point? Why does the marginal cost curve rise?**

The break-even point is the level of sales or output at which total revenue equals total costs, resulting in zero profit or loss. It's the point where a company covers all its expenses but doesn't make any profit yet.

The marginal cost curve rises because of the law of diminishing returns. As more units of a variable input (like labor or raw materials) are added to a fixed input (like machinery or factory space), the additional output produced by each additional unit of the variable input starts to decrease. This means that the cost of producing each additional unit of output increases, leading to a rising marginal cost curve.

**31. Crisis in banking sectors: Yes bank, PMC. Steps that must be taken to avoid a repeat of these?**

**32. What are deferred tax assets and deferred tax liabilities? Give examples**

**33. What is depreciation? How will depreciation affect the bargaining power of a seller? Explain**

Depreciation is the gradual decrease in the value of an asset over time due to wear and tear, obsolescence, or other factors. It reflects the reduction in the asset's value as it is used or as it ages.

In terms of bargaining power, depreciation can affect the seller's position in several ways. If the seller is offering a depreciated asset, they may need to adjust their pricing expectations downward to account for the reduced value of the asset. Buyers may use the depreciation of the asset as leverage to negotiate a lower price, especially if there are alternative options available.

However, if the asset's depreciation is slower than anticipated, or if it still retains significant value despite depreciation, the seller may still have bargaining power. They could emphasize the remaining useful life or unique features of the asset to justify a higher price. Overall, the impact of depreciation on bargaining power depends on various factors, including market conditions, the specific asset in question, and the negotiating skills of the parties involved.

**34. how depreciation drives bargaining power in the real estate sector. (For last part, think of factors that might nudge real estate dealers to sell their property early instead of the benefit of land appreciation)**

Depreciation can influence bargaining power in the real estate sector in several ways. Firstly, as properties age, they typically require maintenance and repairs, which can increase the overall cost of ownership for the seller. This could prompt them to sell the property earlier to avoid further depreciation-related expenses.

Additionally, changing market conditions or economic factors may lead to a decrease in property values over time, causing depreciation. Sellers may feel compelled to negotiate lower prices to attract buyers in a declining market, thereby reducing their bargaining power.

Furthermore, depreciation can affect the perceived value of a property compared to newer or better-maintained alternatives. Sellers may need to adjust their asking price to

account for depreciation and remain competitive in the market, diminishing their bargaining power.

Finally, the opportunity cost of holding onto a depreciating asset could outweigh the benefits of potential future appreciation. Sellers may prioritize liquidity over long-term investment gains, driving them to negotiate more aggressively to sell the property quickly and minimize losses associated with depreciation.

**35. What is the current status of cryptocurrencies in India from a policy perspective?**

**Explain**

**36. recent events in the crypto space.**

**37. Do you agree with the RBI's monetary policy stance?**

**38. If you were the finance minister, what measures would you have taken for post-covid recovery?**

**39. What is decentralized finance? What are its applications and future potential?**

**40. What is funding winter? Why has there been a reduction in capital availability for start-ups?**

**41. What is the great resignation? Elaborate on recent layoffs across organizations globally. What could the reason for these layoffs be?**

I'm sorry about that. Here's a more detailed version:

In my life, I've learned a lot from the Bhagavad Gita. It taught me about relying on myself and staying strong when things get tough. I grew up in Kolkata, where my dad sold fish and my mom took care of our home. Even though I wasn't naturally talented, I worked really hard in school and also enjoyed playing sports and doing art. But when I struggled with my class 12 exams, I didn't give up. I decided to try again, inspired by the lessons from the Gita.

After a year of hard work, I got into a really good Government College. There, I got involved in organizing events and playing sports. These experiences taught me a lot about leading and working with others. But the biggest challenge came in 2023 when my dad got really sick. I had to step up and take care of everything at home while still keeping up with my studies. It was really tough, but I did my best to handle it all.

Even though I don't have fancy job experience or special skills, I've learned a lot from my life experiences. I'm determined, adaptable, and good at working with others. That's why I think I'd be a great fit for XYZ Institute's MBA program. I'm excited to learn more and grow both personally and professionally. With the skills and knowledge I'll gain from the program, I know I can achieve my goals and make a real difference in the business world.

So, in a nutshell, my life journey reflects the lessons from the Bhagavad Gita about believing in yourself and staying strong. With an MBA, I'm confident I can overcome challenges and succeed in the business world.

In my life, I've learned that determination and resilience can take you far. Growing up in Kolkata, my family didn't have much, but my parents taught me the value of hard work. Despite not being naturally talented, I put in the effort to do well in school and explore my interests in sports and art. But when I struggled with my class 12 exams, I didn't give up. I took another shot and got into a good Government College after a year of hard work.

College wasn't just about classes for me. I got involved in organizing events and sports, which taught me a lot about leadership and teamwork. However, the biggest challenge came when my dad fell seriously ill in 2023. I had to step up and take care of things at home while keeping up with my studies. It was tough, but I managed to handle it all.

Even though I don't have fancy skills or corporate experience, I've learned a lot from these experiences. I'm determined, good at handling pressure, and can work well with others. That's why I believe I'd be a great fit for XYZ Institute's MBA program. I know that with the skills and knowledge I'll gain there, I can take my career to new heights.

In short, my life has taught me to keep pushing forward, no matter what challenges come my way. With an MBA, I'm confident I can make an even bigger impact in the business world. So, I'm excited for the opportunity to learn and grow at XYZ Institute.

My apologies for the oversight. Here's a more expanded version:

Throughout my life, I've held onto a key idea from the Bhagavad Gita: we must rely on ourselves and push through challenges. I grew up in Kolkata in a regular family. My dad sold fish, and my mom took care of our home. Even though I wasn't naturally gifted, I made up for it with hard work. I balanced my studies with sports and art, but I stumbled during my class 12 exams. It was a tough time, but I remembered the Gita's advice and decided to try again.

After a year of hard work, I got into a good Government College. There, I got involved in organizing events and sports. These experiences taught me a lot about leadership and working with others. But the biggest test came in 2023 when my dad got seriously ill. I had to step up and take care of everything. It was hard, but I handled it as best as I could.

I might not have any fancy skills or corporate experience, but I've learned a lot from life. I'm determined, good at handling pressure, and can work well with others. That's why I believe I'd be a great fit for XYZ Institute's MBA program. With the skills and knowledge I'll gain there, I know I can achieve even more in my career.

In short, my life has taught me to keep going, no matter what. With an MBA, I'm sure I can reach new heights and make a difference in the business world.

In my journey, I've learned the importance of perseverance and self-reliance, values echoed in the Bhagavad Gita. Growing up in Kolkata within a modest family background, where my father earned a living selling fish and my mother managed our household, instilled in me the significance of hard work and resilience. Despite lacking innate talents, I compensated with relentless effort, striving to excel in both academics and extracurricular pursuits like sports and art. However, encountering setbacks during my class 12 exams tested my resolve. Yet, drawing inspiration from the Gita's teachings, I resolved to persevere and reattempted the exams with renewed determination.

Securing admission to a prestigious Government College marked a significant milestone, where I actively engaged in organizing events and participating in sports activities. These experiences nurtured my leadership and teamwork skills, preparing me for challenges ahead. However, the most profound test of my capabilities unfolded in 2023 when my father fell seriously ill. Stepping into the role of primary caregiver, I navigated through the adversity with resilience and strength, balancing familial responsibilities with academic pursuits.

While my journey may not boast of corporate accolades or specialized skills, it has equipped me with invaluable life lessons—determination, adaptability, and effective communication. These qualities, I believe, align with the ethos of XYZ Institute's MBA program, where I aspire to further hone my skills and knowledge. With an unwavering commitment to personal and professional growth, I am eager to leverage the opportunities offered by the program to propel my career forward.

In essence, my journey epitomizes the teachings of the Bhagavad Gita, where perseverance and self-belief pave the path to success. With an MBA, I am confident in my ability to navigate through challenges and make a meaningful impact in the business realm, contributing positively to society.

In my life, I've always held onto a lesson from the Bhagavad Gita: we have to rely on ourselves and push through tough times. I grew up in Kolkata in a regular family. My dad sold fish, and my mom took care of our home. Even though I wasn't naturally gifted, I worked hard to make up for it. I balanced my studies with sports and art, but I struggled during my class 12 exams. It was a rough time, but I remembered the Gita's advice and decided to try again.

After a year of hard work, I got into a good Government College. There, I got involved in organizing events and sports. These experiences taught me a lot about being a leader and working with others. But the biggest challenge came in 2023 when my dad got very sick. I had to step up and take care of everything. It was tough, but I did my best.

I might not have fancy skills or experience working in big companies, but life has taught me a lot. I'm determined, good at handling pressure, and can work well with others. That's why I think I'd fit right in at XYZ Institute's MBA program. I know I can learn a lot there and use that knowledge to do even better in my career.

To sum it up, my life has taught me to never give up. With an MBA, I'm confident I can achieve more and make a real difference in the business world. So, I'm really excited about the chance to learn and grow at XYZ Institute.