

Latest Edition

GENERAL STUDIES

FOR ALL SSC & RRB EXAMS



SICE

General Studies



SICE

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of
Competitive Exams**

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INDIAN HISTORY AND CULTURE

HARAPPAN CIVILISATION (2500 BC–1750 BC)

'Indus Civilisation' is the oldest name of the Harappan civilisation. According to archaeological beliefs, the most appropriate name is Harappan Civilisation (Harappa – the first discovered site).

The northernmost sites of the Indus Civilisation were Ropar (Sutlej)/Punjab, and Manda (Chenab)/Jammu-Kashmir. The southernmost sites of this civilisation were Bhagatrav (Kim)/Gujarat; and Daimabad (Pravara)/Maharashtra. The westernmost site of this civilisation was Suktagendor (Dashk)/Makran Coast, Pakistan-Iran border. The easternmost site of this civilisation was Alamgirpur (Hindon)/Uttar Pradesh.

Important Sites

Harappa

Harappa was one of the important urban centres of Indus Civilisation, located in Punjab Province, Pakistan, on an old bed of the River Ravi. The finds of terracotta figurines at Harappa provided the first clues to this ancient civilisation in the 19th century. A specific structure, once regarded as a granary, is now thought to have been a large building with ventilated air ducts.

Mohenjodaro

Mohenjodaro is one of the best known Indus sites, located in Sindh, Pakistan, next to the Indus River. The Indus River may once have flowed to the west of Mohenjodaro, but it is now located to the east. Here the Great Bath, uniform buildings, hidden drains and other distinguishing features of the civilisation were discovered in the 1920s. The maximum number of unicorn seals has been found here. Due to a rising water table, most of the sites remain unexcavated and its earliest levels have not been reached.

Dholavira

This site is located on Khadir Beyt, an island in the Great Rann of Kutch in Gujarat, India. It was excavated in 1990.

The appearance of Dholavira suggested that it had several large reservoirs, and an elaborate system of drains to collect water from the city walls and housetops to fill these water reservoirs.

Lothal

It is located on the top of the Gulf of Khambat in Gujarat, India, near the Sabarmati River and the Arabian Sea. This site is considered as the most extensively researched Harappan coastal site.

Banwali

This site has been located in Ahmedabad, Gujarat, India on the bank of Bhogava River and excavated by the archaeologist, SR Rao in 1954.

Kalibanga

This site is located in Hanumangarh, a district of Rajasthan, India, on the bank of the Ghaggar River. This site was known for the finds of ploughing fields, associated with early Harappan Civilisation.

Rakhigarhi

This site has been discovered recently in Haryana, India. Partial excavations have suggested that it is as large as Harappa, Mohenjodaro and Ganweriwala.

VEDIC LITERATURE (1500 BC–600 BC)

The Four Vedas are the Rig Veda, the Sama Veda, the Yajur Veda and the Atharva Veda, of which the first three are jointly called Vedatrayi, i.e. trio of Vedas. Rig Veda is the oldest text found in the world, which is a collection of lyrics. Therefore, it is also known as 'the first testament of mankind'. The Rig Veda contains 1028 hymns and is divided into 10 mandalas; out of which, six mandalas (2nd to 7th mandalas) are called Gotra/Vamsha Mandalas (Kula Granth).

The Sama Veda, also known as 'the book of chants', has 1549 hymns, of which 1474 have been taken from the Rig Veda. The hymns of the Samahata were recited by Udgatri, one of the important Vedas for Indian music. The Yajur Veda is also known as 'the book of magical formulae', and it contains charms and spells in order to ward off evils and diseases.

Mahajanapadas

Mahajanapada, literally means 'great realm' in which maha stands for 'great' and janapada means 'country'.

Country refers to one of the sixteen kingdoms and oligarchic republics that existed in ancient India from the sixth to fourth centuries BCE. Mahajanapadas evolved around 2500 years ago.

There were sixteen Mahajanapadas, namely Kasi, Kosala, Anga, Magadha, Vajji, Malla, Chedi, Vatsa, Kuru, Panchala, Machcha, Surasena, Assaka, Avanti, Gandhara and Kamboja.

Magadha

Magadha became one of the most powerful Mahajanapadas between sixth and fourth centuries BC. Rajagriha (now Rajgir) was the capital of Magadha for a long time but later shifted to Pataliputra (now Patna). Bimbisara, Ajatasatru and Mahapadma were its three most powerful rulers who went to any extent to conquer other janapadas. About 2300 years ago, Alexander, a ruler from Macedonia in Europe, decided to conquer the territory of Magadha. Later, he abandoned the plan since his soldiers refused to go ahead. They got scared knowing that the Indian rulers had large armies of foot soldiers, chariots and elephants.

New Religious Ideologies**Buddhism**

About 2500 years ago, Siddhartha was born in Lumbini (Nepal) who later came to be known as Gautama Buddha and founded Buddhism. Buddha was a kshatriya and belonged to Sakya gana. In search of knowledge, Buddha left his home at an early age and after a long meditation he attained enlightenment under the peepal tree at Bodh Gaya in Bihar. For the first time, he preached his five disciples in Sarnath, near Varanasi. At the age of 80, he died (Mahaparinirvana) in Kushinagara (Uttar Pradesh).

Jainism

Jainism was founded by Vardhamana Mahavira. Mahavira was born around 600 BC in Vaishali, Bihar and he was a kshatriya prince who belonged to Lichchhavis of Vajji sangha. Mahavira was the 24th tirthankara of Jaina Dharma. Tirthankara is a person who guides men and women who wish to know the truth.

MAJOR ANCIENT INDIAN EMPIRES

The Mauryan Empire

The Mauryan Empire is regarded as the first Empire in India. It was established by Chandragupta Maurya around 321 BC. Mauryan Empire originated from the kingdom of Magadha in the Indo-Gangetic Plain (today's Bihar and eastern Uttar Pradesh). The Mauryan Empire was one of the largest empires of the world in its era, and also the largest empire ever in the Indian subcontinent. Patliputra (now Patna) was the capital city of Mauryan Empire. This empire stretched in the north along the natural boundaries of the Himalayas; in the east, upto Assam; in the west, upto Balochistan (southwest Pakistan) and the Hindu Kush Mountains (now Afghanistan).

Chandragupta Maurya who overthrew the Nanda dynasty with the help of Chanakya was the founder of the Mauryan Empire. Bindusara became the king of the Mauryan Empire after Chandragupta Maurya.

Megasthenes was the ambassador of Seleucus. Seleucus Nicator, a Greek ruler of West Asia, sent Megasthenes to the court of Chandragupta Maurya. "Indica" was a book written by Megasthenes. In this book, he described that the Mauryan Empire was at its zenith during the reign of Chandragupta Maurya.

Ashoka

Ashoka, the son of Bindusara, was the third and the greatest Mauryan Emperor. After the Kalinga war, he became a follower of Buddhism. He was very disappointed and saddened by the violence and bloodshed in Kalinga war.

To promote the idea of Dhamma, he appointed officials known as Dhamma Mahamatta and sent them to other countries, such as Syria, Egypt, Greece and Sri Lanka. Dhamma is a Prakrit word, which means Dharma in Sanskrit. It was a set of proclamations, through which he tried to address the problems of the people.

He was the first ruler who took the common people's message through inscriptions, written in Prakrit language and Brahmi script. Several inscriptions and sculptures of Ashoka's time were found at Kalsi, Lauriya, Rampurwa,

Topra and many other places. Rampurwa bull, a polished sculpture, was a part of the Mauryan pillar. It was found in Rampurwa (Bihar).

The Kushanas and Kanishka

Kushanas belonged the Yuchi tribe of central Asia, who migrated to northwestern part of India. Mathura and Peshawar were among the centres of power of Kushanas and later Taxila was included in their kingdom around 2000 years ago. Kushanas had control over the silk route which extended from Central Asia to the seaport at the mouth of the Indus river. In the whole subcontinent, Kushanas were the earliest rulers who issued gold coins and used it during trade along the silk route. Kanishka was the one of most important rulers of this dynasty. Purushapura or Peshawar (now, in Pakistan) was the capital city of his kingdom and he constructed a city called Kanishkapuram.

Gupta Empire

Gupta Empire was founded by Srigupta about 1700 years ago. Chandragupta was the first great ruler of the Gupta dynasty. He adopted the grand title of maharajadhiraja.

After Chandragupta, his son Samudragupta became the ruler of Gupta empire. Samudragupta's mother Kumar Devi belong to Lichchhavi gana.

After Samudragupta, his son Chandragupta II became the ruler. Samudragupta led an expedition to western India and defeated the Shakas. Samudragupta's prashasti is inscribed on the Ashokan pillar at Allahabad. Prashasti is a Sanskrit word which means 'in praise of'. These were special kind of inscriptions which were written by the court poets and other people in the honour of their ruler and were composed in Sanskrit language.

The reign of Chandragupta II was the golden period of Gupta Empire; the court was full of learned people like Kalidasa—the poet and Aryabhata—the astronomer.

Kalidasa was a well known Sanskrit poet and dramatist in Chandragupta's-II period. *Abhijana Shakuntalam*, which means "Shakuntalam—who is recognised by a token" is a very famous play of Kalidas which depicts the love story between Dushyanta, a king, and a young woman named Shakuntala.

Harshavardhana

Harshavardhana ruled around 1400 years ago. His court poet Banabhatta wrote his biography, the Harshacharita, in Sanskrit. He became the king of Thanesar after the death of his father and elder brother and later he also conquered both Magadha and Bengal. Xuan Zang, came during Harsha's reign and wrote a detailed account of his empire.

The Pallavas and Chalukyas

Around 1400 years ago Pallavas and Chalukyas were the most prominent ruling dynasty in Southern part of India. Pallavas extended their kingdom up to Kaveri delta and Kanchipuram was their capital city, while Chalukyas occupied the Raichur Doab between the Krishna and Tungabhadra rivers and Aihole was the capital of their kingdom, which was an important trade and religious center.

Pulakeshin-II was the most famous king of Chalukya dynasty who stopped Harsha's march in the Deccan. Pulakeshin II also attacked the Pallava kings. History of Pulakeshin II is known from a prashasti, composed by his court poet Ravikirti. Both the Pallavas and the Chalukyas were defeated by new rulers belonging to the Rashtrakuta and Chola dynasties.

The Rashtrakutas (752–973 AD)

Dantidurga overthrew the ruler Kirtivarman of Chalukyan Dynasty and founded the Rashtrakuta Dynasty. The capital of Rashtrakutas was in Malkhand at Gulbarga district of Karnataka. Govinda III and Amoghavarsha were the greatest rulers from this dynasty. One of the earliest Kannada books on poetics *Kavirajamarga* was authored by the king Amoghavarsha himself. Krishna I, one of the Rashtrakuta kings, built the famous rock-cut temple of Kailash in Ellora.

Chola Empire (850–1279 AD)

Vijayalaya was the founder of Chola Empire, who was earlier a feudatory or subordinate of the Pallavas of Kanchipuram. He belonged to the ancient chief family of Cholas from Uraiyur, who were powerful in the Kaveri Delta region. Vijayalaya made his capital at Tanjore, which he had captured in 850 AD. Rajaraja I is regarded

as one of the greatest kings of Chola Empire. During the reign of Rajendra I (son of Rajaraja I), the Chola Dynasty was on its peak and conquered the southern and eastern parts of India. Rajendra I also raided Ganga Valley, Sri Lanka and countries of southeast Asia.

DYNASTIES OF DELHI SULTANATE (1206–1526 AD)

Delhi became the centre of power only with the foundation of Delhi Sultanate in the beginning of thirteenth century. Five dynasties ruled India from Delhi for more than 300 years throughout the existence of the sultanate.

Muhammad-bin-Qasim invaded India in 712 AD. He conquered Sindh at the age of just 17 and established the province that was called the Umayyad Caliphate.

The First Turk Invasion (998 AD–1030 AD) was led by Sultan Mahmud Ghazni. He invaded India 17 times for the chief motive of making himself wealthier by looting the country. In 1025, Ghazni attacked and looted the Somnath Temple situated on the coast of Kathiawar, which was later destroyed in 1026 AD.

The Second Turk Invasion (1175 AD–1206 AD) was led by Mohammad Ghori. It is said that he is the true founder of Muslim dominion in India. Ghori's invasion of India is regarded as the turning point in the country's cultural history as a new political era began with the establishment of Muslim rule in India.

The Chauhan ruler Prithviraj III (1168–1192) defeated Sultan Mohammad Ghori in 1191 but lost to him the very next year, in 1192.

SLAVE DYNASTY

Qutubuddin Aibak founded the Slave Dynasty in 1206 AD, who himself had been a slave of Mohammad Ghori. Aibak was known for his generous nature and so was conferred the title of 'Lakh Bakhsh', a giver of lakhs.

The two mosques, Quwwat-ul-Islam and Adhai Din Ka Jhonpra, were built by him in Delhi and Ajmer respectively, in the honour of Khwaja Qutubuddin

Bakhtiyar Kaki, a Sufi saint. The construction of Qutub Minar was also commenced by him.

Shamsuddin Iltutmish (1211–1236 AD) dethroned Aram Baksh in 1211 and became the new ruler of Delhi Sultanate. He was a slave of Qutubuddin Aibak earlier. He is regarded as the actual founder of Delhi Sultanate. He made Delhi his capital in place of Lahore. Coins such as tanka (silver) and jital (copper) were introduced by him. Iltutmish also introduced the Iqta system of governance, in which territories were governed by military commanders.

Razia Sultana (1236–1240 AD)

After the death of Iltutmish, his son Ruknuddin became the sultan but was soon deposed by his sister, Razia, when he was out to fight a rebellion in Awadh. Razia was always the preferred choice of her father for the crown. She was the 'first and only Muslim lady ruler' of India. Razia Sultana was assassinated in 1240 near Kaithal, Haryana, through a conspiracy.

Ghiyasuddin Balban (1266–1287 AD)

Ghiyasuddin Balban ascended the throne after Nasiruddin's death in 1266. He abolished the authority of the Chalisa started by Iltutmish. He established Diwan-i-Arz as the military department. The title Zil-i-Ilahi (shadow of God) was taken up by him. The salutation traditions of Sijda (prostration before the monarch) and Paibos (kissing the monarch's feet) were also introduced by him.

Alauddin Khilji (1296–1316 AD)

Jalaluddin Khilji was killed by his nephew and son-in-law Alauddin Khilji, who then succeeded the throne of Khilji Dynasty in 1296. He is considered the first Turkish ruler who kept religion aloof from politics and manifested that 'Kingship knows no kinship'. He made many administrative reforms such as collection of land revenue was brought under the direct control of Delhi Sultanate and the rights of rich landlords to levy taxes were cancelled. The systems of Dagh (branding of horses) and Chehra (descriptive roll of soldiers) were also introduced by him. For the purpose of revenue collection, he appointed a separate officer called Mustakhraj.

Tughlaq Dynasty (1320–1414 AD)

Ghazi Malik established the Tughlaq Dynasty after killing Khusrau Khan, the last ruler of Khilji Dynasty. Like the earlier dynasties of Delhi Sultanate, the Tughlaq Dynasty, too, appointed military commanders as the governors of territories of different sizes. These territories were called iqtas, and their holders were called iqtadars or muqtis.

Ghiyasuddin Tughlaq (1320–1325 AD)

Ghazi Malik ascended the throne and took the title of Ghiyasuddin Tughlaq. After his death, his son Jauna (Ulugh Khan) succeeded him under the title of Mohammad-bin-Tughlaq.

Mohammad-bin-Tughlaq (1325–1351 AD)

Ghiyasuddin's elder son Mohammad-bin-Tughlaq became the sultan in 1325 AD. He started taxation in Doab in 1326 AD. Apart from increasing the tax rates, he also created some additional abwabs (cesses). Ghari was the house tax, and charahi was the pasture tax. Diwan-i-Kohi was established as the department for agriculture with an objective to bring more lands under cultivation. Transfer of capital from Delhi to Devagiri took place in 1327 AD. Devagiri was renamed Daulatabad.

Firoz Shah Tughlaq (1351–1388 AD)

He was crowned the new sultan after the death of Mohammad-bin-Tughlaq by the court nobles and theologians. The four types of taxes, as mentioned in the Quran, were imposed, such as kharaj, zakat, jizya and khams during the reign of Firoz Shah. He also imposed water taxes such as hasil-i-sharb or haque-i-sharb and repaired a number of canals.

Firoz Shah set up a new department as Diwan-i-Khairat in order to provide support for girl marriages belonging to poor families. He also established the new towns of Firozpur and Jaunpur. No major wars were fought by him. He died in 1388 AD.

After his death, many provinces revolted against the Sultanate in order to make independent provinces. Timur, a descendant of Chengiz Khan, invaded the Sultanate in 1398 and plundered Delhi. Khizr Khan, a nominee of Timur, had control over Punjab. In 1404 AD, Timur died on his way to invade China.

Lodhi Dynasty (1451–1526 AD)

The Lodhi Dynasty was founded by Bahlul Lodhi in 1451 AD after the dethronement of Alam Shah, the last ruler of Sayyid Dynasty. Bahlul (1451-1488) was an Afghan sardar. He settled in Punjab after the expedition of Timur.

Sikandar Lodhi (1489–1517 AD)

After Bahlul Lodhi, his son Sikandar Lodhi took the charge of the dynasty and conquered Bihar and western Bengal. He is regarded as the founder of the city of Agra where he shifted his capital from Delhi. He destroyed several sacred images of Jwalamukhi Temple situated in Nagarkot and also ordered for the demolition of the temples of Mathura.

Ibrahim Lodhi (1517–1526 AD)

Ibrahim Lodhi is considered to be the last sultan of Lodhi Dynasty and also the last Sultan of Delhi. He ascended the throne after his father Sikandar Lodhi. The governor of Punjab, Daulat Khan Lodhi, negotiated with Babur and defeated Ibrahim Lodhi in the First Battle of Panipat in 1526. The end of Lodhi Dynasty marked the beginning of the Mughal Era.

MUGHAL EMPIRE

The Mughals were the descendants of Genghis Khan (Mongol) and Timur (Turk). Mughal Empire was founded by Babur in 1526 by defeating Ibrahim Lodhi of the Lodhi Sultanate.

Babur (1526–1530)

Babur was offered by Daulat Khan, then governor of Punjab, to fight with Ibrahim Lodhi in the first battle of Panipat. Babur defeated Ibrahim Lodhi and established the foundation of the Mughal Empire. Babur established control of Mughal Empire over Agra and Delhi. After establishing the Empire, he won three consecutive wars, in which he defeated Rana Sanga of Mewar (at Khanua) in 1527, Rajputs at Chanderi in 1528 and Muhammad Lodhi (uncle of Ibrahim Lodhi) of Ghaghra in 1529. The Tuzuk-i-Baburi is an autobiography of Babur in Turkish language, in which he mentioned an excellent account of India and his Empire. This was later translated in Persian by Abdur Rahim Khanekhana as the Baburnama.

Humayun (1530–1540) and (1555-1556)

After the death of Babur, his eldest son, Humayun, succeeded him. According to the will of his father Humayun divided his kingdom between his brothers Kamran, Hindal, Askari and Khalil, each becoming the governor of a province. His brother Kamran created problems for him in the northwest region. In consecutive years 1539 and 1540, he fought with Sher Shah at Chausa and Kannauj, respectively and he faced defeat. He regained his empire in 1555 after the death of Sher Shah. His biography, Humayun Nama, was written by his sister Gulbadan Begum.

Sher Shah (1540–1545)

Sur Empire was founded by Sher Shah in 1540 by defeating Humayun of the Mughal Empire in the battle of Kannauj. Sher Shah was the son of a Jagirdar of Sasaram, Hasan Khan. The Rupiah, a coin was issued by him and he made fixed and standard measures of coin all over his empire. The Grand Trunk Road which runs from Calcutta (now Kolkata) to Peshawar (in Pakistan) was built by him. The Purana Quila of Delhi was built by him. His tomb is located in Sasaram.

Akbar (1556–1605)

Akbar ascended the throne at the age of 14, as the eldest son of Humayun under the title of Jalaluddin Muhammad Akbar Badshah Ghazi at Kalanaur. His tutor Bairam Khan was appointed as the regent. In the second battle of Panipat (1556) which was fought between Hemu, the Hindu General of Adil Shah and the appointed regent of Akbar, Bairam Khan, Hemu was defeated. Akbar at the age of 18, assumed charge as the ruler of the Mughal Empire and ended the regency of Bairam Khan in 1560.

In the year 1576, the Mughal army led by Man Singh fought the Battle of Haldighati with Rana Pratap of Mewar. In the year 1581, Akbar proclaimed a new religion named Din-i-Ilahi, which was based on composition of the values of various religions, like Islam, Hinduism, Jainism and Christianity. The monuments built by him are Fatehpur Sikri, Agra Fort, Lahore Fort and Allahabad Fort, etc. Navaratna of his court were Birbal, Abul Fazl, Faizi, Todarmal, Dahsala, Bhagwandas, Man

Singh, Tansen, Abdur Rahim Khanekhana and Mulla Do Pyaja.

Akbar Nama (history of Akbar's reign) was written by Abul Fazl. The third volume of Akbar Nama is Ain-i Akbari. It deals with Akbar's administration, household, army, the revenues and the geography of his empire. Akbar propagated the idea of sulh-i kul or "universal peace" that is the principle of tolerance, honesty, justice and peace. It was universally applicable. His tomb is located in Sikandarabad in Uttar Pradesh.

Jahangir (1605–1627)

After Akbar's death in 1605, his son Salim (Jahangir) succeeded him as the emperor of the Mughal Empire. In the rule of Jahangir, Mewar came under Mughal Empire. He married Mehrun-Nisa, and later she was given the title of Nurjahan. Prince Khurram (Shah Jahan) rebelled against Jahangir while Nurjahan unsuccessfully tried to control this rebellion.

He gave permission to Sir Thomas Roe, an ambassador of king James I, to establish a trading port at Surat. A memoirs, Tuzuk-i-Jahangiri was written by him in Persian.

Shah Jahan (1628–1658)

Shah Jahan was the son of Jahangir and his mother was a Rathore princess of Marwar (Jodhpur). He ascended the throne in 1628 after his father's death. In the year 1631, his beloved wife Mumtaj Mahal died. In her memory, he built the Taj Mahal in Agra during the year 1632-1653. He always promoted art, culture and architecture and his reign is considered as the pinnacle of the Mughal Empire.

Monuments such as the Red Fort, and Jama Masjid in Delhi are among the magnificent buildings built by him. In the year 1666, he died and was buried at the Taj Mahal, Agra.

Aurangzeb (1658–1707)

For the crown, Shah Jahan's four sons fought a war of succession from 1657 to 1659, and finally Aurangzeb emerged as the victor among the four. Aurangzeb put his father Shah Jahan in imprisonment in Agra. The last war was fought between Aurangzeb and Dara at Deorai near Ajmer in 1659 in which Dara was defeated and

Aurangzeb was crowned at Delhi with the title of Alamgir. He was also called as the Zinda Pir, the living saint. Aurangzeb died in 1707. His tomb is situated in Daulatabad.

MUGHAL ADMINISTRATION

Mughal administration was based on Mansabdari and Jagirdari system. Mansab is a position or a rank. The individuals who held mansab were called Manasabdar. Rank, salary and military responsibilities of Mansabdars were decided according to their 'Zat' (numerical value). Manasabdar had to maintain a specified number of sawar (cavalrymen). Mansabdars received their salaries as revenue assignments called jagirs. In the Mughal administration intermediaries, headmen of villages or powerful chieftains were called Zamindars. These people used to collect taxes from the farmers. In Akbar's time, his revenue minister, Todar Mal, divided each province into revenue circles with its own schedule of revenue rates for individual crops. This revenue system was known as zabt.

DECLINE OF MUGHALS

After Aurangzeb, no Mughal ruler was able to make a mark as a powerful and strong administrator. Certain policies made by the earlier rulers, such as Aurangzeb's religious policies led to revolts against the Mughal Empire. The growth of provincial powers, such as Maratha, Bengal, Mysore, Hyderabad and Avadh, also played a major role in the decline of the Mughal empire. Apart from British conquests, Nadir Shah and Abdali's invasion also led to the decline of Mughal power.

ESTABLISHMENT OF COMPANY POWER BRITISH EAST INDIA COMPANY

The British East India Company acquired a charter from the ruler of England, Queen Elizabeth I, to trade with countries of the east. The Company followed the route of the west coast of Africa, round the Cape of Good Hope and crossed the Indian Ocean to enter eastern countries. This sea route to India was discovered by the Portuguese explorer Vasco da Gama in 1498.

Mercantilist business enterprises of the time made profit mainly through trade, by buying cheap goods and selling them at higher rates. The Portuguese had also established their trade with India. Goa was their base. At the same time, the French had also arrived in India for trade..

They all were interested in the trading of cotton, silk and spices, such as pepper, clove, cardamom and cinnamon, because of their great demand in the European market. Therefore, they often fought with each other to gain hold of the Indian market.

East India Company Begins Trade in Bengal

In 1651, the first English factory was set up near the Hugli River of Bengal from where the Company's traders operated their business activities. As the Company expanded its trade operations, the merchants began to settle down near the factory, and by the year 1696, the Company had started to build a fort around the factory.

The British also succeeded in persuading Aurangzeb, the then Mughal emperor, to give them zamindari rights over three villages (one of the villages was Kalikata, which is now named Kolkata). This was the beginning of small conflicts between the Company and the Nawab of Bengal.

After the death of Aurangzeb in 1707, the Bengal nawabs kept on declaring their power and autonomy against the Mughal Empire. Murshid Quli Khan was succeeded by Alivardi Khan who was succeeded by Sirajuddaulah as the Nawab of Bengal.

Trade Leads to Battles

The nawabs of Bengal refused to grant the Company any concession in trade, stopped it from minting of coins and also warned it against its extension of the fortification process. When the Company refused to follow the orders of Sirajuddaulah, he attacked the English factory at Kasim Bazar furiously with 30,000 soldiers and captured it, and then marched towards Calcutta's Fort William.

In 1757, under the leadership of Robert Clive, the Battle of Plassey was fought against Sirajuddaulah. The latter was defeated because Mir Jafar, one of his commanders, shook hands with Clive for the throne. After the

assassination of Sirajuddaulah, Mir Jafar became the new Nawab of Bengal and acted as a puppet of the Company. When Mir Jafar protested against the Company, he was replaced by Mir Qasim. The latter fought the Battle of Buxar with the Company in 1764 in which he was defeated, and Mir Jafar was reinstalled as the Nawab of Bengal.

In 1765, the Company obtained Diwani rights from the Mughal Emperor Shah Alam Shah II. They now had the permit to use the vast revenue and resources of Bengali provinces.

Company Rule Expands

After the 1764 Battle of Buxar, the East India Company fully established its roots in India by appointing 'residents' in every province. The main role of residents was to act as political and commercial agents for the Company. These residents also decided who was to be the successor to a throne and who was to be appointed for administrative posts. With the help of residents, the Company's officials began to interfere in internal state affairs.

The states were forced into a 'subsidiary alliance' by the Company, according to which Indian rulers did not have the right to own independent armies, and they had to pay for the Company's subsidiary forces in return for their protection. If they were unable to make this payment, a part of their territory was taken away from them by the Company.

The nawabs of Awadh and Hyderabad became victims of this alliance during the term of Richard Wellesley, the Governor-General (1798-1805). The Nawab of Awadh was forced to give more than half of his territory to the Company.

TIPU SULTAN – THE TIGER OF MYSORE

Tipu Sultan ruled from 1782 to 1799 in Mysore and proved to be a very powerful ruler like his father Hyder Ali (1761-1782). He controlled the trade profits of the Malabar Coast from where the Company purchased pepper and cardamom. During the term of Tipu Sultan, the export of sandalwood, pepper and cardamom was banned through the Mysore Port. He also barred local merchants from trading with the Company.

In order to modernise his army, Tipu established a strong relationship with the French in India. The British were now worried of Tipu's administrative policies because he was tampering with their image and trade. As a result, the Company waged four wars lasting 1767–69, 1780–84, 1790–92 and 1799 against Tipu. He was defeated and killed in the Battle of Seringapatam in 1799.

After his death, Mysore was again ruled by the Wodeyer Dynasty, and the Company imposed the subsidiary alliance on them.

WAR WITH THE MARATHAS

The Marathas were defeated by the Afghans in the Third Battle of Panipat in 1761. After the defeat, the Marathas were divided into many states led by different sardars (chiefs), and they all worked together in a confederacy under a peshwa (principal minister) and made a strong military.

In 1782, the Marathas fought their first war against the Company in which no one was declared winner. So, the war ended with the Treaty of Salbai. The Marathas lost Orissa (Odisha) and the territories of north of River Yamuna including Agra and Delhi in Second Anglo-Maratha War from 1803 to 1805.

The Maratha power was completely subdued in the Third Anglo-Maratha War, 1817–19, after which the peshwa was removed and sent to Bithur near Kanpur with a pension.

CLAIM TO PARAMOUNTCY

A new policy of 'Paramountcy' came into effect under the reign of Lord Hastings, the Governor-General of India from 1813 to 1823. According to this policy, the Company's authority was paramount or supreme in India and it had the right to annex any Indian kingdom.

A small state of Kittoor (Karnataka) led by Rani Chennamma challenged this policy and fought with the Company. She was captured. She died in the prison in 1829. In north-west India, the Company fought two wars

with the Sikh kingdom (1839) and, finally, annexed Punjab in 1849.

DOCTRINE OF LAPSE

Lord Dalhousie, the Governor-General from 1848 to 1856, affected a policy of 'Doctrine of Lapse', according to which, if an Indian ruler died without a male heir, his kingdom would lapse, which meant it would be considered a part of the Company's territory. Satara (1848), Sambalpur (1850), Udaipur (1852), Nagpur (1853) and Jhansi (1854) were annexed by applying this doctrine. Awadh was taken over by the Company in 1856.

A NEW ADMINISTRATION

Warren Hastings, the Governor-General from 1773 to 1785, divided the Company's territories into administrative units called presidencies, such as Bengal, Bombay and Madras. These were three presidencies, and each was to be ruled by a governor. The Governor-General was the supreme head of this administration system.

A new justice system was set forth from 1772. In pursuance of this system, each district would have two courts, i.e. a faujdari adalat (criminal court) and a diwani adalat (civil court). Civil courts would be headed by European district collectors, for whom the Indian laws would be interpreted by maulvis and Hindu pandits. On the other hand, a quazi (a judge) and a mufti (a jurist of the Muslim community responsible for expounding the law that the qazi would administer) would look after criminal cases under the supervision of collectors.

A collector was the main head of an Indian district whose key role was to collect revenue and taxes and to maintain law and order in his district with the help of the judge, police officers and darogas.

A new Supreme Court and a court of appeal (Sadar Nizamat Adalat) were established in Calcutta (Kolkata) under the Regulating Act of 1773.

LAND REVENUE POLICY

Before the British rule in India, villages served as self-sufficient units and people were able to satisfy their daily needs. This was because products used by people in their day-to-day life were produced in villages itself. Every village was assigned a panchayat for settling any kind of dispute. Farmers were given rights on lands and had to pay only a part of their produce to the state as revenue. This revenue was, however, waived off in case of natural disasters like floods and droughts.

However, after the British rule in India, the revenue collection policy was changed. Now, the East India Company was made liable for collecting revenue from farmers. Moreover, the revenue amount was fixed and there was no remission in the case of crises. It was compulsory for peasants to pay the fixed amount even in times when their crops were spoilt due to natural disasters.

THE PERMANENT SETTLEMENT

The East India Company was appointed as the Diwan of Bengal on 12 August 1765 by the Mughal emperor. As diwan, the Company became the chief financial administrator of the territory under its control. Later, the Company acquired the diwani of Bihar and Orissa (Odisha) too. However, at that time, the Company kept on using the traditional style of revenue collection, which was through bidding. But this system failed as the Company never received the amount for which the bid was made.

Thus, in 1793, the British East India Company introduced permanent settlement to make improvement in revenue collection from agriculture. In permanent settlement, rajas and taluqdars were appointed as zamindars whose main work was to collect revenue from peasants on behalf of the Company. It was called a permanent settlement because the revenue was fixed permanently, which was a regular source of revenue and encouraged zamindars to invest in the improvement of land and agriculture. Cornwallis was the Governor General of India when the permanent settlement was

introduced. However, the peasants suffered the most as they were oppressed to pay more revenue. Any failure to pay revenue led to the eviction of the peasants.

The Mahalwari System

Holt Mackenzie, an Englishman, devised a new system to collect revenue in the North Western provinces (Uttar Pradesh, Madhya Pradesh and Punjab), which came into operation in 1822. It was called the Mahalwari Settlement. According to this settlement, the collector visited all the villages of his area where he inspected the lands, measured the fields and recorded the customs and rights of various groups. On the basis of this survey, each village (mahal) had to pay the revenue. In this settlement, revenue was not fixed, it had to be revised periodically and the village headman was responsible for collecting the revenue and paying it to the Company.

The Ryotwari System

The Ryotwar or Ryotwari (cultivator) System was implemented by Captain Alexander Read in the small region of Mysore. It was developed by Thomas Munro in the southern part of India. In this settlement, there was no mediator, the Company directly collected the revenue from the cultivator and their land was carefully surveyed before the assessment was made.

In this system, the revenue was fixed for the period of 30 years depending on the value of the crop and the quality of soil. The Company was liable for collecting 50% of the net value of the crop as revenue. Such high revenue led to harsh conditions for peasants.

Impact of new revenue collection systems

New revenue collection policies led to many changes in the economy of villages. The condition of farmers kept on worsening as now the land became a commodity, which could be easily bought, sold or mortgaged. The British government did not take any actions for the welfare of the peasants.

High revenue always compelled peasants to sell a part of their land or borrow money from moneylenders. For this, they had to pay a high rate of interest for the money lent. In such cases, it became difficult for peasants to make both ends meet.

COMMERCIALISATION OF AGRICULTURE

Commercial crops like indigo, jute, oilseeds, tea, coffee, cotton and sugarcane were profitable for the Company as these crops were widely used in British industries. Thus, the company pressurised cultivators to grow these commercial crops in their field; however, the cultivators were not happy with this and so they started a revolt against the Company.

Indigo cultivation

In Europe, woad was used as cloth dyer. It gave pale and dull colour. On the other hand, indigo, which was produced in India, gave rich blue colour. Earlier, supplies of Indigo came from West Indies and America, which could not be continued for a variety of reasons. When the demand was increased in European markets, the Company expanded the cultivation area of indigo in India. In Bengal, the cultivation of indigo was increased rapidly. By 1810, Britain imported 95 per cent indigo from India. Many Scottish and English people came in India to invest in indigo cultivation.

In India, cultivation of indigo had two systems, namely nij and ryoti. Under the nij system, land was directly controlled by the planter or it was cultivated on the rented land of zamindars by hired labourers. On the other hand, under the ryoti system, planters forced the ryots to sign a contract, an agreement (satta).

Loan was given to farmers for the cultivation of indigo and the farmers were caught in the endless and vicious cycle of loans. But the loan committed the ryots to cultivate indigo on at least 25 per cent of the area under their holding. Planters pressurised the farmers to grow indigo on fertile land, which was earlier used for the cultivation of rice. However, farmers were not in favour of this and so opposed the planters. This is because after the indigo harvest, the land could not be used to produce rice because the deep roots of indigo exhausted the soil.

Blue Rebellion and after

In March 1859, thousands of farmers in Bengal refused to grow indigo and said no to pay rent to *gomasthas* (agents of planters). Local zamindars and village headmen were also in support of rebels because they were also forced to sign the indigo contract and were

unhappy with the increasing power of planters. Due to this revolt, a notice was issued by the magistrate Ashley Eden. According to this notice, the ryots would not be compelled to accept the indigo contracts. In 1917, Mahatma Gandhi visited Champaran in Bihar where he started a movement against the cultivation of Indigo by planters.

COLONIALISM AND TRIBAL SOCIETIES

Tribes were the societies that were not divided on the basis of caste and class and did not follow the social rules and customs prescribed by Brahmans. Tribals were found in almost every region of the Indian subcontinent. The area and influence of a tribe varied at different points of time, such as:

- In Punjab, Khokhar and Gakkhars tribes were very influential during the thirteenth and fourteenth centuries.
- In Multan and Sind, Langahs and Arghuns were very influential.
- The Balochis were large and powerful tribes of the northwest part of the subcontinent.
- Gaddis (shepherd tribe) lived in western Himalaya.
- In the north-eastern part, the Nagas, Ahoms and many other tribes were found.
- Mundas and Santals lived in Bihar, Jharkhand, Orissa and Bengal.
- Kolis and Berads lived in Maharashtra, Gujarat and Karnataka.
- In South India, there was a large tribal population of Koragas, Vetars, Maravars and many others.
- The large tribes of Bhils and Gonds were found in the states of Chhattisgarh, Madhya Pradesh, Maharashtra and Andhra Pradesh.

These tribals were mainly dependent on forest resources for their livelihood and their main occupations were hunting and fishing. Many tribal societies were dependent on shifting (jhum) cultivation, which was found in hilly and forested areas. Many tribal groups lived by herding and rearing animals. Some tribal groups like the Gonds and Santhals took to settled cultivation.

COLONIAL RULE AFFECTED TRIBAL LIVES

With increased political power and geographical expansion of the East India Company, the natural habitat of tribals was intruded. The Company had taken all the powers of the tribal head, so they had to follow the Company rules and orders. It took the land of tribals in order to grow its profitable crops such as indigo, jute and poppy on it. Such landless tribals were forced to work as labourers at very low wages.

Such miserable conditions of tribals made them initiate a revolt against the British rule for its strict revenue collection policies, exploitation by traders, forest law, etc. These revolts were driven primarily by the following tribes:

- Bhils in Madhya Pradesh and Maharashtra
- Kols in Maharashtra, Bihar, Bengal and Orissa (Odisha)
- Mundas in Bihar
- Gonds and Khonds in Orissa (Odisha)
- Mers in Rajasthan
- Khasis in Meghalaya
- Santhals in Bihar and Bengal

Let us now discuss some of the important tribal rebellions.

The Santhal Rebellion

The Santhals were the tribals who migrated from Birbhum, Bankura, Hazaribagh and Rohtas to settle in the present day Jharkhand. Land was important for the Santhals as it was related to their ancestors. However, with the introduction of the 'permanent settlement' in 1793, the Santhals became deprived of their land and had to pay high revenue to the British. Zamindars also interfered in the activities of tribals. All these factors led to the outburst of the Santhal rebellion in 1855.

On 30 June 1855, a large number of Santhals gathered in the Bhagnadihi village of Santhal Praganas. They declared a fight against the British unto the last. Such militant approach of the Santhals terrified the British authorities. Initially, the Santhal rebels captured control over a large tract of the country. For some time, the British rule in this vast area was completely paralysed.

As a result of the revolt, the Santhal Parganas Tenancy Act came into effect, which provided some kind of protection to tribals from colonial exploitation.

The Munda Rebellion

The Munda rebellion was one of the most prominent tribal revolts against the British rule. Birsa Munda was the main leader of the rebellion, which was fought in the South of Ranchi in 1899–1900. The main aim of Munda was to encourage the tribals to protect their land from non-tribals. He also revolted against moneylenders and zamindars, who oppressed the tribals by demanding a high rate of interest.

Birsa also led the tribal movement in the region of Chhotanagpur. The rebels under his leadership attacked police stations, Company officials and missionaries. However, the entire movement ended weakly once Birsa was captured. However, the government attempted to reduce the grievances of the Mundas by introducing the Chhotanagpur Tenancy Act of 1908, which banned forced labour.

REVOLT OF 1857-58

The policies of the East India Company had a very adverse impact on people, especially peasants and sepoys. This led to the beginning of the revolt of 1857-58. Many historians regard this revolt as the first freedom struggle of India.

Peasants and Sepoys

Zamindars and peasants were losing their lands due to the Company's methods of collecting revenue. The Indian sepoys who were employed in the Company's army were dissatisfied, too, because of their salary, state of services and some of the rules that were against their religious beliefs. The Company forced sepoys to go to overseas countries to serve its interests, which was one of the major causes of unhappiness among the sepoys. Many sepoys were from peasant families so the 1857 Revolt spread like a forest fire in the nation.

Responses to Reforms

Many laws were passed to reform Indian societies, such as ban on sati system and promotion of widow remarriage. The Company also enacted that if an Indian

converted into Christianity, then he or she could take over his or her ancestral property. English language education was publicised in India, and many Christian missionaries operated freely. The Indians saw it as sabotage of their religion, culture and tradition, which only added to the nationwide fury.

A MUTINY TURNS INTO A POPULAR REBELLION

A large-scale rebellion against the Company started in May 1857 from Meerut. It was referred to as the Sepoy Mutiny. A mutiny can be defined as a rebellion when a group of soldiers in an army refuse to obey their officers. The immediate cause of this mutiny was that a soldier named Mangal Pandey was hanged to death on 29 March 1857 because he attacked his British officer.

Another cause was that some Indian soldiers refused to use cartridges which they believed were coated by the fat of cow or pig, and this would outrage the religious sentiments of Hindus and Muslims. The soldiers who disregarded the command were put behind bars. This sparked the revolt in the whole regiment. The soldiers killed many British officers and released the prisoners from the jail.

After that, the soldiers marched towards Delhi to meet the Mughal emperor. The sepoy unit declared Bahadur Shah Zafar as their commander, who then beseeched the rulers of the other states to join the rebellion, but they did not take part because they did not want to be ruled by a Mughal.

THE REBELLION SPREADS

The revolt spread in almost all the northern parts of India, mainly Delhi, Kanpur and Lucknow, whose soldiers joined the battle. The villagers, zamindars and local leaders also banded themselves. Nana Sahib declared himself a peshwa and assembled the armed forces, after which he attacked the British unit and also proclaimed himself as a governor under the Mughal emperor.

Birjis Qadr, the son of Nawab Wajid Ali Shah, announced himself the new Nawab of Lucknow, and Begum Hazrat Mahal, his mother, also participated in the Revolt of

1857. Rani Avantibai Lodhi of Ramgarh in the Mandla region of Madhya Pradesh built her own army against the British because they acquired her state.

Many new leaders emerged during this revolt such as Ahmadullah Shah, a maulvi of Faizabad, who gathered a large number of people to fight against the British; Ghazi or religious warriors also united in Delhi to uproot the British; Bakht Khan, a soldier from Bareilly, became the head of a large army force and fought bravely against the British; and Kunwar Singh, a zamindar of Bihar, also took part in Indian sepoys' struggle with the British.

Rani Lakshmibai of Jhansi

Rani Lakshmibai's real name was Manikarnika. She was the daughter of Moropant Tambe who was the Peshwa's council member. Lakshmibai married Gangadhar Rao Newalkar, the Maharaja of Jhansi, who called her Lakshmi. She became the Queen of Jhansi after her husband's death.

Lakshmibai combatted against the British because they refused to recognise her adopted son Damodar Rao as the heir to the kingdom under the Doctrine of Lapse and consequently ejected her from her own territory.

Tantia Tope, who was a military aide of Nana Sahib, cooperated with Lakshmibai in her fight of rights against the British. Rani Lakshmibai died in June 1858 while fighting with British soldiers. Sir Huger Rose, a senior British army officer described her as "the best and bravest military leader of the rebellion".

SUPPRESSION OF THE REVOLT

To suppress the rebellion, the Company passed new laws. In September 1857, the Company gained control over Delhi and arrested Bahadur Shah Zafar. He was sent to jail in Rangoon, where he died in 1862. The Governor-General Lord Canning assembled forces from Bombay, Madras, Calcutta and Punjab to stifle the revolt.

Bithur and Kanpur were recaptured from Nana Sahib, while Tantia Tope fled from there and continued a guerrilla war with support from the tribal people and farmers. In April 1859, he was arrested and killed. The British announced that those landlords who did not

take part in the rebellion could continue to enjoy traditional rights over their land.

FAILURE OF THE REVOLT

The revolt failed due to the non-participation of Scindias, Holkars, Nizams and others who supported the British. There was insufficient coordination among sepoys, peasants, zamindars and local people, which weakened the revolt. There was also an absence of the primary objective of the revolution due to which everyone could not stay connected to each other for long.

AFTER THE REVOLT

In 1858, a new act was passed in the British Parliament as per which the East India Company's rule had ended and now India would be controlled by the British Crown. The Secretary of the State for India was made responsible for the governance of India, and an Indian council was established to assist him. The title of viceroy was changed to the Governor-General of India.

The Doctrine of Lapse was abolished, and the princely states were assured against annexation. The British increased the proportion of European soldiers in the army and reduced the number of Indian soldiers. Gurkhas, Sikhs and Pathans were the groups from where the most number of Indian soldiers were recruited. Policies were devised in order that zamindars and landlords could maintain rights over their lands. It was also decided that the local culture and religion should be given due respect.

SOCIAL AND RELIGIOUS MOVEMENTS

The Brahma Samaj

Raja Rammohan Roy was born in 1774 in Bengal. He believed in one god and opposed the idol worship and blind faith. He founded the Brahma Sabha, which was later known as Brahma Samaj. It was divided into several sects after the death of Raja Rammohan Roy. Maharshi Debendranath Tagore established the Adi Brahma Samaj, Keshav Chandra Sen established the Bharatiya Brahma Samaj and Sadharan Brahma Samaj was also established, parallel to the idea of the Brahma Samaj.

The Tatva Bodhini Sabha was established by Debendranath Tagore. The Sangat Sabha and the Indian Reform Society were established by Keshav Chandra Sen which served as associated societies of the Brahma Samaj. Raja Rammohan Roy wrote several books like a gift to monotheists, the precepts of Jesus, the guide to peace and happiness, brief remarks regarding encroachment to the Ancient Rights of female, etc.

Prathna Samaj

Dr Atmaram Pandurang established the Prathna Samaj in Maharashtra in 1857. It received the support of few eminent persons like RG Bhandarkar and MG Ranade. Prathna Samaj established societies and educational institutions to promote its religious and social ideas.

The Young Bengal Movement

The Youth Bengal Movement was inspired by the reform work of Raja Rammohan Roy. The Young Bengal Movement was led by a young Anglo-Indian Henry Vivian Derozio, who was a teacher at Hindu College in Calcutta. He encouraged his students to raise questions on traditions and customs, demanded women education and fought for freedom of thoughts and expression.

The Arya Samaj

Swami Dayanand Saraswati was born in 1824 in Gujarat. In 1875, he founded Arya Samaj in Bombay. Arya Samaj opposed idol-worship, ritualism, the practice of animal sacrifice, the idea of heaven and hell and the concept of fatalism. Arya Samaj succeeded in banning anti-social practices such as child marriage act, male polygamy, purdah, caste system, the practice of sati, etc.

Arya Samaj encouraged girl education and worked in the direction of lower class upliftment. The members of Arya Samaj practiced inter-caste marriages and inter-dining and they started converting Muslims and Christians into Hindu fold through the process of Suddhi Movement.

The Ramakrishna Mission

The Ramakrishna Math was established by the disciple of Ramakrishna, Swami Vivekananda at Baranagar in 1887. The mission worked to promote primary and higher education, health care, tribal welfare, etc.

The Theosophical Society

This society was established by Madame H.P. Blavatsky and Colonel HS Olcott in the US in 1875, which was inspired by Indian thought and culture. In 1892, the Theosophical Society established headquarters near Madras in India. The society encouraged discussion, debate, inquiry about religion, philosophy and science and demanded social and economic upliftment of women and backward classes.

The Veda Samaj

In 1864, the Veda Samaj was founded in Madras (Chennai) which was inspired by Brahma Samaj. It worked for the eradication of casteism and supported widow remarriage and women's education. Its members believed in one God and opposed superstition and anti-social practices.

The Aligarh Movement

Sayyid Ahmed Khan established Mohammedan Anglo-Oriental College in 1875 at Aligarh, which was later known as Aligarh Muslim College. Modern education including Western Science was offered in this institution. Aligarh Movement had great impact on educational reform.

The Singh Sabha Movement

This movement was organised by Sikhs at Amritsar in 1879. The member of Singh Sabha tried to abolish superstitions and caste discrimination. The Singh Sabha movement promoted education among Sikhs through modern teaching techniques.

CASTE REFORM

In the mid-19th century, many non-Brahmin castes organised themselves and started opposing the Brahmin dominance in the society. They opposed caste discrimination and demanded social justice and equality. Some of the important non-Brahmin caste organisations were Satnami movement started by Ghasidas in Central India, Haridas Thakur's Matua Group in Eastern Bengal, etc. Shri Narayana Guru, a guru from the Ezhava caste of Kerala, said that there is one caste, one religion and one god for humankind.

Major campaigns for caste reform before Independence are listed as follows:

- Jyotirao Phule, one of the prominent social reformers, united the Shudras (labouring castes) and Ati Shudras (untouchables) people and formed Satyashodhak Samaj. He fought for caste equality. In 1873, he wrote a book "Gulamgiri" in which he compares the conditions of American slaves and the lower caste people of India.
- In Southern India, EV Ramaswamy or Periyar organised "Self Respect Movement" for the upliftment of the lower caste society.
- In Maharashtra, Gopal Hari Deshmukh also known as Lokhitavadi, was a great social reformer. He said that if the reform was not allowed within the religion then the region should be hanged itself.
- Ranade and Vivekananda were the two distinctive social workers who denounced the anti-social practices and challenged caste distinctions which were perpetuated in the Indian society.
- In the northern part of India, Swami Dayanand Saraswati founded Arya Samaj and tried to change the concept of Varna system.
- Regional cast movements like Kayastha Sabha and the Sarin Sabha were also active in the regions of Uttar Pradesh and Punjab respectively.
- Bhimrao Ramji Ambedkar was a Dalit who also suffered from casteism. In 1927, Ambedkar began a temple entry movement.

Women Reform

Raja Rammohan Roy was one of the earliest reformers who opposed Sati Pratha. He described sati as a murder according to every Sastra. With his help, the British government passed the anti-sati system rule for the sake of women's life and the sati system was banned in 1829.

Ishwar Chander Vidyasagar raised his voice in favour of marriages of widows. Due to his effort, Widow Remarriage Act was passed in 1856. Under his supervision, the first lawful Hindu widow remarriage among the upper caste was celebrated in Calcutta on 7 December, 1856. He also protested against polygamy

and child marriage. Ishwar Chandra Vidyasagar was also a scholar of Sanskrit and a great social reformer.

Swami Dayanand Saraswati established Arya Samaj that supported widow marriage and practiced inter-caste marriages in the society. In the 19th century, many people thought that education would morally corrupt girls so girls were prohibited from education. However, a few women were taught at their homes by liberal fathers or husbands. From the 1880s, the Indian women began to enter universities and a few of them trained to be doctors and teachers.

Pandita Ramabai, a great Sanskrit scholar, wrote a book about the poor condition of Hindu women and founded a home for widowed women and trained them economically at Poona. Tarabai wrote a book *Stipurushtulna* in which she denounced social differences between men and women. Many Muslim women played an important role in promoting education among women in the early 20th century. Mumtaz Ali reinterpreted the Koran verses and advocated for women education, the Begum of Bhopal established a primary school for girls at Aligarh and Begum Rokeya Sakhawat Hossain founded schools in Patna and Calcutta (now Kolkata) for Muslim girls.

By the early 20th century, women started demanding for female suffrage (right to vote) better health care and education in which Jawaharlal Nehru and Subhas Chandra Bose supported women. In 1929, the Child Marriage Restraint Act was passed. According to the Act, the age for the marriage was fixed at 18 years for the men and 16 years for the women.

Women and Political Participation

Gandhiji encouraged the active participation of Indian women in freedom movement and many women enthusiastically took part in the struggle of freedom fight. The Swadeshi movement (1905), the Non-Cooperation (1920-22) movement, the Civil Disobedience movement (1930-34) and the Quit India (1942) movement drew a large number of women.

Annie Besant, Madame Cama and Sarojini Naidu formed the Women's Indian Association to motivate women participation in the legislation process. At present times,

women still constitute a mere 10% of legislators in the Parliament and State Assemblies.

THE NATIONALIST MOVEMENTS

The Emergence of Nationalism

After the 1850s, the emergence of nationalism in India started with the formation of Poona Sarvajanik Sabha, the Indian Association, Madras Mahajan Sabha, Bombay Presidency Association and the Indian National Congress.

In 1878, the Vernacular Act was passed that enabled the British to shut down newspapers and printing press which were critical to them. In 1883, Ilbert Bill, which allowed the trials of British officers by Indian judges, was withdrawn. This exposed the racial attitude of the British government.

A NATION IN THE MAKING

The Indian National Congress was established in 1885 in Bombay by AO Hume. Dadabhai Naoroji, Pherozeshah Mehta, Badruddin Tyabji, WC Bonnerjee, Surendranath Banerjee, Romesh Chandra Dutt and S Subramania Iyer were the earliest stalwarts of the Indian National Congress. In the beginning, the main demands of the Congress were:

- Greater role for Indians in the government and administration
- Civil service examinations to be held in India, not in London
- Separation of the judiciary from the executive, the repeal of the Arms Act and the freedom of speech and expression
- Reduction of revenue, cut in military expenditure and more funds for irrigation
- Change in the law of salt tax, better treatment of Indian labourers abroad, non-interference in tribal affairs

Extremist Groups

In Bengal, Maharashtra and Punjab, leaders such as Bipin Chandra Pal, Bal Gangadhar Tilak and Lala Lajpat Rai criticised moderates for their "politics of prayers",

and emphasised the importance of self-reliance and constructive work. Bal Gangadhar Tilak raised the slogan, "Freedom is my birth right and I shall have it!"

In 1905, Viceroy Curzon partitioned Bengal that led to the start of the Swadeshi movement. In Andhra region, it was known as the Vandemataram Movement. Swadeshi movement emphasised education in Indian languages, fight for Swaraj, mass mobilisation and boycott of British institutions and goods.

Other Major Developments (1905–1916)

The major campaigns and events of this period are listed as follows:

- All India Muslim League was established in Dacca in 1906.
- In 1909, the government provided separate electorates for Muslims. It means that some seats in the councils were reserved for Muslims, who would be elected by Muslim voters.
- In 1907, the Congress was divided between moderate and extremist groups. Moderates were against any action that could lead to violence.
- In 1915, moderate and extremist factions of congress reunited. In 1916, the Congress and Muslim League signed the Lucknow Pact to work together.

EMERGENCE OF MAHATMA GANDHI

Gandhiji arrived in India in 1915 from South Africa. Mahatma Gandhi spent his first year in India travelling throughout the country. Gandhiji first participated in the Champaran movement in 1917 which was about the imposition of Indigo cultivation on the farmers of Bihar. He also participated in Kheda (1918) and Ahmedabad (1919) movements. In Ahmedabad, he supported the millworkers strike.

DEVELOPMENT DURING FIRST WORLD WAR

The First World War was broke out in 1914. Britain declared that the war was fought for the defence of liberty and democracy in the world. The Congress fully

cooperated with the Indian government. But before the close of war, several important events took place in the politics of India. Annie Besant organised her home rule league at Poona. Tilak organised another home rule league. However, the two leagues joined together and demanded self-government. Annie Besant also attempted to unite the moderates and the extremists under the banner of Congress in 1916.

Montague's Declaration of 1919 was another important event of this period. The position of Britain and its allies had become critical in the war in 1917. While in India, the government failed to suppress the terrorist movement.

The Rowlatt Satyagraha and Jallianwala

British passed a new law which curbed fundamental rights such as the freedom of expression and strengthened police power. This law was called the Rowlatt Act. In 1919, Gandhiji called for Satyagraha Against Rowlatt Act, hartal and demonstrations held across the country. In one such demonstration in Jallianwala Bagh (Amritsar) on Baisakhi day hundreds of innocent people were killed by the order of General Dyer. Rabindranath Tagore returned his knighthood to protest the atrocity.

KHILAFAT AGITATION AND THE NON-COOPERATION MOVEMENT

Turkish sultan was known as Khalifa who had control over the Ottoman Empire. In 1920, the British abolished the post of Khalifa. However, Indian Muslims supported Khalifa. Mohammad Ali and Shaukat Ali were the main leaders of the Khalifat Movement. Gandhiji supported their agitation and protested along with the leaders of the Khilafat movement.

The Non-Cooperation Movement started with Khalifa Agitation in 1920. Teachers and students left government schools and colleges, lawyers (Motilal Nehru, CR Das, C Rajagopalachari and Asaf Ali gave up their practices; British titles were surrendered and legislatures boycotted; foreign cloth burned publicly. Non-violent protests were organised in Kheda (Gujarat) by Patidar peasants against the high land revenue

demand of the British. Liquor shops were picketed in Andhra and Tamil Nadu.

Gandhiji was strictly against violent movements. When a crowd of peasants set fire to a police station in Chauri Chaura, Gorakhpur (Uttar Pradesh), he abruptly called off the Non-Cooperation movement in 1922. At the same time, forest satyagrahas were staged by tribals and peasants in Guntur (Andhra Pradesh). Protests were also held at Sind (Pakistan), Punjab, Assam and various other places across India. These protests were closely identified with the Non-Cooperation Movement.

THE HAPPENINGS OF 1922–1929

Major campaigns and events of this period are listed as follows:

- Leaders such as Motilal Nehru and Chitta Ranjan Das wanted that the Congress party should fight elections to the councils. In that way, the Congress can influence government policies. When the Congress did not accept its views, they formed a new party called the Swaraj Party, which participated in the election and gained good success.
- Rashtriya Swayamsevak Sangh (RSS), a Hindu nationalist organisation and the Communist Party of India, were formed in 1925.
- In 1927, the Simon Commission came to India. The Commission had no Indian representatives. All political groups boycotted the Commission. The Commission faced demonstrations with banners saying "Simon Go Back".
- In 1929, the Congress declared Purna Swaraj (complete independence) under the leadership of Jawaharlal Nehru. Independence Day was observed on 26 January 1930 all over the country.

Bhagat Singh

Bhagat Singh founded the Hindustan Socialist Republican Association (HSRA) in 1928 at Delhi. Chandrasekhar Azad, Sukhdev and Thapar were the others prominent leaders of HSRA. To take revenge of the death of Lala Lajpat Rai, Bhagat Singh and Rajguru assassinated John P Saunders, an Assistant Superintendent of Police. Bhagat Singh and BK Dutt

threw a bomb in the Central Legislative Assembly on 8 April 1929. Bhagat Singh was tried and executed at the age of 23 on 23 March 1931.

CIVIL DISOBEDIENCE MOVEMENT

Gandhiji started a new non-violent movement called civil disobedience movement in 1930. Women, peasants, tribals and workers all participated in a large number in this movement. Gandhiji started Dandi March in 1930 for that Gandhiji along with his 78 followers marched for over 390 km from Sabarmati to the coastal town of Dandi to break the salt law. The British government tried to crush this movement, thousands of people were sent to jail.

GOVERNMENT OF INDIA ACT 1935

The Act of 1935 established the provincial autonomy. Being ensured by the government that the governor would not interfere in the day today working of Indian ministers, the Congress participated in the elections. In 1937, provincial elections were held and Congress formed governments in 7 out of 11 provinces. In 1939, Second World War broke out and the British put India into the war without the consent of the leadership of Congress. The Congress ministries resigned in protest.

CRIPS MISSION 1942

The British Government deputed Crips Mission to India to find out a workable solution with a view to gain the support of the Indians in the Second World War. The Crips Mission proposed that full dominion status would be granted to India after the close of war. It would have the right to cede itself from the British Commonwealth of Nations and a constituent assembly would be formed after the close of war. Gandhi rejected the Crips Mission and described it as a post-dated cheque of a crashing bank. The league also rejected because his demand of Pakistan was not accepted.

QUIT INDIA MOVEMENT

The Quit India Movement was started on 8 August 1942. Gandhiji delivered Quit India speech in Mumbai at

the Gowalia Tank Maidan in which he called for 'Do or Die' in your effort to fight the British. Immediately after the start of the movement, Gandhiji, Nehru, Patel and other leaders were put behind the bar but the movement spread.

Peasants and the youth joined Quit India Movement in large numbers. Government offices, jail, rail line, post offices and other symbols of state authority were attacked all over the country. In many areas like Satara (Maharashtra), Ballia (Uttar Pradesh) and Midnapore (West Bengal), the people set up their own governments.

RAJGOPALACHARI FORMULA

In March 1944, Rajgopalachari evolved a formula with the concurrence of Gandhi. The scheme suggested that the league should cooperate with the Congress in its demand of complete independence and after the close of war, a plebiscite would be held in the Muslim majority provinces to decide whether or not they should form a separate state. However, the formula was rejected by the league.

BOSE AND THE INA

Subash Chandra Bose is a radical nationalist who did not believe in the Gandhiji's method of non-violence. He along with other leaders established Azad Hind Fauj or the Indian National Army (INA) in Singapore in 1942. In 1944, INA captured Burma and Andaman and Nicobar with the help of Japan. In 1945, INA was defeated by the British and INA members were imprisoned and tried.

SHIMLA CONFERENCE AND THE WAVELL PLAN, 1945

In 1943, Lord Wavell had come to India as the Viceroy. Wavell attempted to find out some solutions to the Indian problems. He called the All Party Conference at Shimla and proposed a plan in 1945. It was proposed that an interim government should be formed which would have equal numbers of members of the Congress and the Muslim League. The Congress nominated Maulana Abul Kalam Azad as one of its representatives

in the proposed Interim government. Jinnah refused to accept it because he claimed that Muslim League alone represented Indian Muslims. Therefore, Wavell plan failed.

TOWARDS INDEPENDENCE AND PARTITION

In 1940, the Muslim League passed a resolution demanding independent states for Muslims in the north-western and eastern areas of the country. Muslim League saw itself as the sole spokesperson of India's Muslims. Elections for the provinces were held in 1946 and the Muslim league secured nearly all the seats reserved for the Muslims that intensified its demand for the separate state of Pakistan. The Congress captured 199 seats in the elections and Muslim League 73.

Cabinet Mission Plan 1946

A three-member Cabinet mission came to India in 1946 to create a framework for the freedom of India but it failed. The cabinet mission proposed that a federal government should be established at the centre which would include native states as well. It would look after the defence, foreign affairs and communications. The plan was criticised by all political parties.

Indian Independence Act 1947

The Muslim league announced direct action day on 16 August 1946 to press the demand of Pakistan. Due to this, a large riot and violence took place in Calcutta and many people died. In such conditions, the Prime Minister of Britain, Mr Atlee announced on 20 Feb 1947 that Britain would leave India before June 1948 in every case. Gandhi asked for the immediate withdrawal of Britain.

Mountbatten was sent to India as viceroy. He put up his plan in June 1947, which included the partition of India. Gandhi did not accept the partition of India but other leaders of Congress accepted it. The British government then passed the Indian Independence Act 1947; it created two independent states in the Indian sub-continent. On 15th August 1947, India and Pakistan got freedom as two separate nations.

PRACTICE QUESTIONS

Answer the following questions by selecting the most appropriate option.

1. The site of Bhimbetka located in which of the following states?
 (1) Gujarat (2) Madhya Pradesh
 (3) Rajasthan (4) Bihar
2. Which one of the following was an ancient port of Indus Civilisation?
 (1) Harappa (2) Manda
 (3) Ropar (4) Lothal
3. The earliest evidence of farming of wheat and barley found at
 (1) Mehrgarh (2) Mahagara
 (3) Burzahom (4) Chirand
4. Which one the following is known as the oldest text in the world?
 (1) Rigveda (2) Sama Veda
 (3) Yajur Veda (4) Atharva Veda
5. In which places the rice was grown first?
 (1) North of the Garo hills
 (2) East of the Kirthar hills
 (3) West of the Vindhya
 (4) North of the Vindhya
6. What was the capital of Vajji Mahajanapada?
 (1) Viratnagar (2) Kausambi
 (3) Rajgriha (4) Vaishali
7. The first three vedas are called?
 (1) Vedatrayi (2) Shruti
 (3) Aitareya (4) Panchvisha
8. Who established the Nanda dynasty?
 (1) Shisunaga (2) Kalashoka
 (3) Dhanananda (4) Mahapadma
9. Buddhist Scriptures are contained in 'Tri-Pitakas'. What is the meaning of 'Pitaka'?
 (1) Baskets (2) Bank
 (3) Box (4) Book
10. Who built the fort of Rajgriha?
 (1) Ajatashatru (2) Bimbisara
 (3) Udayin (4) Prasenjit
11. Which of the following work of the Sangam literature is known as 'The Bible of Tamil Land'?
 (1) Pattupattu (2) Ettutogai
 (3) Patinenkilakanakku (4) Kural
12. Who wrote 'Mudra Rakshasa'?
 (1) Visakha Datta (2) Pliny
 (3) Justine (4) Kautilya
13. Who was the founder of Haryanka dynasty?
 (1) Ajatashatru (2) Bimbisara
 (3) Udayin (4) Prasenjit
14. Which one of the following is the author of 'Indica', a description about India?
 (1) Kautilya (2) Megasthenes
 (3) Fa-hien (4) Marco-Polo
15. Who among the following was the first Tirthankara of Jainism?
 (1) Mahavira (2) Rishabhadeva
 (3) Arishtanemi (4) Ajinath
16. Who sent Megasthenes as a Greek ambassador to the court of Chandragupta Maurya?
 (1) Seleucus Nikator
 (2) Alexander the Great
 (3) Antiochus
 (4) Antigonus Monophthalmus
17. Who among the following presided over the Fourth Buddhist Council?
 (1) Ashoka (2) Kanishka
 (3) Ashvaghosha (4) Vasumitra
18. The Christians of which of the following state of India is known as the 'Syrian Christians'?
 (1) Karnataka (2) Odisha
 (3) Andhra Pradesh (4) Kerala
19. Which of the following work is also called as the 'Iliad of Tamil poetry'?
 (1) Manimekalai (2) Sivaga Sindamani
 (3) Silappadikaram (4) Bharatam
20. Which one of the following pairs is not correctly matched?
 (1) Harshvardhan – Hiuen Tsang
 (2) Chanakya – Chandragupta
 (3) Akbar – Todarmal
 (4) Vikramaditya – Chaitanya
21. In which of the following place a building was built to mark Buddha's first delivered teachings?
 (1) Sarnath (2) Sachi
 (3) Gaya (4) Pataliputra
22. Who is considered the founder of the Gupta Empire?
 (1) Srigupta (2) Chandra Gupta II
 (3) Samudra Gupta (4) Chandra Gupta I
23. Who is the last tirthankara of the Jainism?
 (1) Rishabha
 (2) Ajitnath
 (3) Abhinandannath
 (4) Mahavira (Vardhamana)
24. The reference of sati first appeared in
 (1) Mauryan period (2) Gupta period
 (3) Satavahana period (4) Kushana period

- 25. The capital of Yadava kings was**
 (1) Varanasi (2) Kanchipuram
 (3) Krishnagiri (4) Devagiri
- 26. Who laid the foundation of the city of Pataliputra?**
 (1) Ajatashatru (2) Bimbisara
 (3) Udayin (4) Prasenjit
- 27. In which of the following place, Gautam Buddha took his last breathe?**
 (1) Kushinagara (2) Sarnath
 (3) Gaya (4) Kapilvastu
- 28. Where is the cave of Karle located?**
 (1) Gujarat (2) Maharashtra
 (3) Madhya Pradesh (4) Bihar
- 29. Which of the following is not a Buddhist literature?**
 (1) Anguttara Nikaya (2) Mahavastu
 (3) Sutta-Pitaka (4) Bhagavati Sutta
- 30. Which one of the following states of India has the site of Rampurwa?**
 (1) Bihar (2) Uttar Pradesh
 (3) Odisha (4) Madhya Pradesh
- 31. Who among the following Delhi sultans introduced token currency?**
 (1) Mohammad-bin-Tughlaq
 (2) Alauddin Khilji
 (3) Qutubuddin Aibak
 (4) Shamsuddin Iltutmish
- 32. Who invited Babur to overthrow Ibrahim Lodhi?**
 (1) Sikandar Lodhi
 (2) Daulat Khan Lodhi
 (3) Khizr Khan
 (4) Alam Shah
- 33. Who was the founder of the Lodhi Dynasty?**
 (1) Bahlol Lodhi
 (2) Ibrahim Lodhi
 (3) Sikandar Lodhi
 (4) Daulat Khan Lodhi
- 34. Who introduced the Iqta?**
 (1) Mohammad Ghori
 (2) Mahmud Ghaznavi
 (3) Shamsuddin Iltutmish
 (4) Qutubuddin Aibak
- 35. Which of the following cities was not built by Firoz Shah Tughlaq?**
 (1) Firozabad (2) Fatehabad
 (3) Tughlaqabad (4) Jaunpur
- 36. In which of the following years was the English East India Company (EIC) established in India?**
 (1) 1598 (2) 1599
 (3) 1600 (4) 1602
- 37. Who was the chief leader in Bihar during the Revolt of 1857?**
 (1) Begum Hazrat Mahal (2) Rani Laxmibai
 (3) Kunwar Singh (4) Bahadur Shah Zafar
- 38. Who built the Allahabad Fort?**
 (1) Shah Jahan (2) Humayun
 (3) Akbar (4) Sher Shah Suri
- 39. The Battle of Buxar was fought in**
 (1) 1750 (2) 1756
 (3) 1757 (4) 1764
- 40. Who among the following granted permission to the English to establish their factory in India?**
 (1) Akbar (2) Jahangir
 (3) Shah Jahan (4) Aurangzeb
- 41. Who was the father of Tipu Sultan?**
 (1) Hyder Ali (2) Mir Qasim
 (3) Jagat Seth (4) Manikchand
- 42. Chhau is the traditional folk dance of**
 (1) West Bengal (2) Jammu Kashmir
 (3) Punjab (4) Odisha
- 43. To which of the following was the blue rebellion of 1859 related?**
 (1) Indigo cultivation
 (2) Tribal movement
 (3) Fishermen of Bengal
 (4) Olive cultivation
- 44. Who among the following was not a nawab of Bengal?**
 (1) Murshid Quli Khan (2) Saadat Ali
 (3) Alivardi Khan (4) Sirajuddaulah
- 45. Who became the Governor-General of Bengal after Warren Hastings?**
 (1) William Bentinck (2) Lord Curzon
 (3) Wellesley (4) Cornwallis
- 46. When was the First Anglo-Mysore War fought?**
 (1) 1762-65 (2) 1764-66
 (3) 1767-69 (4) 1770-72
- 47. The Battle of Plassey was fought in the year**
 (1) 1576 (2) 1757
 (3) 1761 (4) 1775
- 48. Which of the following battles led to the establishment of Company rule in India?**
 (1) Third Battle of Panipat
 (2) Battle of Buxar
 (3) Battle of Plassey
 (4) Battle of Bedara
- 49. In which of the following years was the East India Company (EIC) established in India?**
 (1) 1598 (2) 1599
 (3) 1600 (4) 1602

- 50. The Second Battle of Panipat was fought in the year**
 (1) 1761 (2) 1556
 (3) 1757 (4) 1526
- 51. When was the first Battle of Panipat fought?**
 (1) 1761 A.D. (2) 1857 A.D.
 (3) 1526 A.D. (4) 1556 A.D.
- 52. Who is known as the 'Tiger of Mysore'?**
 (1) Hyder Ali (2) Tipu Sultan
 (3) Nanjarajar (4) Shujaudaulah
- 53. The Bharatanatyam dance originated from**
 (1) Tamil Nadu (2) Karnataka
 (3) Andhra Pradesh (4) Manipur
- 54. Kuchipudi is the dance form of**
 (1) Tamil Nadu (2) Karnataka
 (3) Andhra Pradesh (4) Manipur
- 55. Bhangra is the popular folk dance of**
 (1) West Bengal (2) Jammu Kashmir
 (3) Punjab (4) Odisha
- 56. The earliest examples of miniature paintings were on**
 (1) Papers (2) Walls
 (3) Palm leaves (4) Cloths
- 57. From which of the following words was the word 'Kathak' derived?**
 (1) Katha (2) Kata
 (3) Kripa (4) Karam
- 58. The most powerful Peshwa was**
 (1) Baji Rao (2) Madhava Rao
 (3) Balaji Vishwanath (4) Balaji Baji Rao
- 59. Civil and criminal courts in each district were established by**
 (1) Warren Hastings (2) Wellesley
 (3) William Bentinck (4) Lord Curzon
- 60. Warren Hastings became the Governor-General of Bengal in**
 (1) 1773 (2) 1774
 (3) 1775 (4) 1776
- 61. When was the Portuguese East India Company established in India?**
 (1) 1498 (2) 1499
 (3) 1500 (4) 1505
- 62. Who among the following Governor-Generals of Bengal shifted the treasury of the East India Company from Murshidabad to Calcutta?**
 (1) William Bentinck (2) Lord Curzon
 (3) Warren Hastings (4) Cornwallis
- 63. The East India Company introduced permanent settlement in**
 (1) 1793 (2) 1795
 (3) 1798 (4) 1802
- 64. In which of the following years did Tipu Sultan become the ruler of Mysore?**
 (1) 1767 (2) 1780
 (3) 1782 (4) 1799
- 65. The French East India Company came to India in**
 (1) 1602 (2) 1616
 (3) 1651 (4) 1664
- 66. The legislation about widow remarriage was first made in**
 (1) 1829 (2) 1842
 (3) 1854 (4) 1856
- 67. The Tamil epic Silappadikaram was composed by**
 (1) Tuncattu Eruttacchan (2) Kalidas
 (3) Sattana (4) Ilango
- 68. In which century was Lilatilakam composed?**
 (1) Twelfth century (2) Thirteenth century
 (3) Fifteenth century (4) Sixteenth century
- 69. Who constructed the Jagannath Temple?**
 (1) Anangabhima III (2) Anantavaraman
 (3) Chavundaraya (4) Narshimha I
- 70. To which state did the Khond tribe belong?**
 (1) Orissa (Odisha) (2) Madhya Pradesh
 (3) Jharkhand (4) Andhra Pradesh
- 71. Ghumura is the traditional folk dance of which of the following states?**
 (1) West Bengal (2) Jammu Kashmir
 (3) Punjab (4) Odisha
- 72. Karakattam is the traditional folk dance of**
 (1) Maharashtra (2) Chhatisgarh
 (3) Madhya Pradesh (4) Tamil Nadu
- 73. The tribal freedom fighter Birsa Munda died in**
 (1) 1899 (2) 1900
 (3) 1902 (4) 1905
- 74. Paintings of which period were a fusion of Persian and Indian traditional styles?**
 (1) Mauryan period (2) Gupta period
 (3) Delhi Sultanate (4) Mughal period
- 75. Tutinama is the painting of which of the following periods?**
 (1) Mauryan period (2) Gupta period
 (3) Delhi Sultanate (4) Mughal Period
- 76. Raja Ram Mohan Roy was the founder of**
 (1) Brahma Samaj
 (2) Prathna Samaj
 (3) Ram Krishna Mission
 (4) Arya Samaj
- 77. Which of the following governor-generals, as part of his administrative reforms, separated judicial and police powers from the collector?**
 (1) William Bentinck (2) Lord Curzon
 (3) Dalhousie (4) Cornwallis

- 78. In 1773, the Treaty of Banaras was signed by**
(1) William Bentinck (2) Lord Canning
(3) Warren Hastings (4) Cornwallis
- 79. Kathak grew into a major art form in the rule of**
(1) Shuja Ud Daula (2) Siraj ud daula
(3) Wajid Ali Shah (4) Saadat Khan
- 80. The British government intervened in the affairs of the Company and passed an Act in 1773 A.D., known as the**
(1) Pitt's India Act (2) Charter Act
(3) Company Act (4) Regulating Act
- 81. At the time of the Battle of Plassey, who was the commander of Sirajuddaulah's army?**
(1) Mir Qasim
(2) Mir Jafar
(3) Syed Mir Mohammad Qazim Ali
(4) Mir Madan
- 82. Who among the following governor-generals established circuit courts in India?**
(1) Warren Hastings (2) Cornwallis
(3) Lord Ripon (4) Lord Curzon
- 83. Which of the following statements is correct about Mahalwari settlement?**
(1) It was first introduced in 1825.
(2) It started in Punjab and Haryana.
(3) The charge of collecting revenue was given to the village headman.
(4) Thomas Munro introduced this system.
- 84. Which one of the following statement is incorrect about Ryotwari settlement?**
(1) This system was first implemented in south India.
(2) Thomas Munro propagated this system.
(3) Revenue was directly collected from the cultivators.
(4) This system improves the condition of peasants.
- 85. The blue rebellion of Indigo cultivation was against**
(1) Zamindars (2) East India Company
(3) Village headmen (4) Planters
- 86. Which of the following revolts happened against the colonial forest laws?**
(1) Mopla Revolt (2) Songram Sangma
(3) Kuka Revolt (4) Sanyasi Rebellion
- 87. Which of the following books of Mughal era mentioned Gond kingdom?**
(1) Baburnama (2) Akbarnama
(3) Humayun-Nama (4) Tazkiratul-Waqiat
- 88. The Partition of Bengal was announced in**
(1) 1901 (2) 1905
(3) 1909 (4) 1912
- 89. In which of the following years was the Civil Disobedience Movement launched?**
(1) 1925 (2) 1926
(3) 1927 (4) 1930
- 90. Who gave the name of 'Mahatma' to Gandhi?**
(1) Sri Aurobindo Ghose
(2) Bal Gangadhar Tilak
(3) Rabindranath Tagore
(4) Lala Lajpat Rai
- 91. Who is the author of Anandamath?**
(1) Bankim Chandra Chatterjee
(2) Surendranath Banerjee
(3) Rabindranath Tagore
(4) Harish Chandra Mukherji
- 92. In which year was the Indian National Congress formed?**
(1) 1901 (2) 1835
(3) 1875 (4) 1885
- 93. Brahmo Samaj was founded in**
(1) 1810 (2) 1812
(3) 1815 (4) 1828
- 94. The first session of the Constituent Assembly was held on**
(1) 26 November, 1950
(2) 26 November, 1946
(3) 13 December, 1946
(4) 13 December, 1950
- 95. Who initiated the movement to form the Indian National Congress?**
(1) Annie Besant (2) A O Hume
(3) W C Banerjee (4) Gandhi Ji
- 96. Who among the following championed female education?**
(1) Ram Mohan Roy
(2) Ishwar Chandra Vidyasagar
(3) Swami Dayanand Saraswati
(4) Swami Vivekananda
- 97. Who gave the slogan "Swaraj is my birth right, and I shall have it"?**
(1) Dadabhai Naoroji (2) Annie Besant
(3) Dr BR Ambedkar (4) Bal Gangadhar Tilak
- 98. Who assassinated General Michael O'Dwyer?**
(1) Bhagat Singh
(2) Chandrasekhar Azad
(3) Udham Singh
(4) Anant Kare
- 99. Who edited and published the newspaper Indian Mirror in 1861?**
(1) Debendranath Tagore
(2) Raja Radhakanta Deb
(3) Rabindranath Tagore
(4) Harish Chandra Mukherji

- 100. The Gandhi-Irwin Pact, a political agreement, was signed on**
(1) 2 April, 1930 (2) 2 October, 1928
(3) 5 March, 1931 (4) 8 June, 1931
- 101. Bhagat Singh was hanged to death on**
(1) 30 April, 1930 (2) 2 October, 1931
(3) 5 March, 1931 (4) 23 March, 1931
- 102. Who founded the Gadar Party?**
(1) Bhagat Singh (2) Bal Gangadhar Tilak
(3) Lala Har Dayal (4) V.D. Savarkar
- 103. Saunders was assassinated by**
(1) Bhagat Singh (2) Chandrasekhar Azad
(3) Udham Singh (4) Anant Kare
- 104. Which Governor General was called as the 'Father of Local Self-Government' in India?**
(1) Lord Canning
(2) Lord William Bentinck
(3) Lord Ripon
(4) Lord Wellesley
- 105. Who wrote 'Gita Rahasya'?**
(1) Sri Aurobindo Ghose (2) Bipin Chandra Pal
(3) Bal Gangadhar Tilak (4) Lala Lajpat Rai
- 106. 'My Experiments with Truth' is an autobiography of**
(1) Sri Aurobindo Ghose (2) Mahatma Gandhi
(3) Bal Gangadhar Tilak (4) Lala Lajpat Rai
- 107. Permanent Land Settlement in Bengal was introduced by**
(1) Warren Hastings (2) Thomas Munro
(3) Thomas Reid (4) Lord Cornwallis
- 108. The Home Rule of 1916 was launched by**
(1) Mahatma Gandhi
(2) Mohammad Ali Jinnah
(3) Annie Besant
(4) Gopal Krishna Gokhale
- 109. During the Lahore Session of 1929, who was the president of the Indian National Congress?**
(1) Jawaharlal Nehru
(2) Bal Gangadhar Tilak
(3) Ambika Charan Majumdar
(4) Rajendra Prasad
- 110. During the Lucknow Session of 1916, who was the president of the Indian National Congress?**
(1) Gopal Krishna Gokhale
(2) Mahatma Gandhi
(3) Ambika Charan Majumdar
(4) Mohammad Ali Jinnah
- 111. The Ganapati Festival was started by _____ in 1893.**
(1) Jawaharlal Nehru (2) Lal Bahadur Shastri
(3) Bal Gangadhar Tilak (4) Vinoba Bhave
- 112. Who was referred to as the "Ambassador of Hindu-Muslim Unity" by Sarojini Naidu?**
(1) Abdul Ghaffar Khan
(2) Shaukat Ali
(3) Maulana Azad
(4) Muhammad Ali Jinnah
- 113. During the Surat Session of 1907, the President of Indian National Congress was**
(1) Jawaharlal Nehru (2) Lala Lajpat Rai
(3) Bal Gangadhar Tilak (4) Rashbihari Ghosh
- 114. Who founded the newspaper 'Bande Mataram'?**
(1) Sri Aurobindo Ghose
(2) Bipin Chandra Pal
(3) Bal Gangadhar Tilak
(4) Lala Lajpat Rai
- 115. The journal, Gadar, was first published in**
(1) Urdu (2) Hindi
(3) English (4) Bengali
- 116. The first census was done in India in**
(1) 1856 (2) 1872
(3) 1891 (4) 1921
- 117. Which of the following books was written by Mahatma Gandhi?**
(1) Discovery of India (2) My Truth
(3) Hindu View of Life (4) Hind Swaraj
- 118. The Jallianwala Bagh massacre took place on**
(1) 13 April, 1919 (2) 17 April, 1919
(3) 19 April, 1919 (4) 21 April, 1919
- 119. Who gave the idea of the Indian Constitution first?**
(1) Shri MN Roy (2) Dr BR Ambedkar
(3) Mahatma Gandhi (4) Jawaharlal Nehru
- 120. The Indian Constitution was promulgated on January 26, 1950 because**
(1) it was the day of India's independence
(2) it was the wish of the freedom fighters of the country
(3) on this day in 1930, the Declaration of Indian Independence was passed
(4) on this day, the draft of the Indian Constitution was prepared
- 121. In the Constituent Assembly, members were**
(1) only representatives of the princely states
(2) nominated by the government
(3) elected directly by people
(4) elected by provincial assemblies
- 122. When did the Constituent Assembly of India adopt that the Republic is governed in terms of the Constitution?**
(1) 15 August, 1947 (2) 26 November, 1949
(3) 26 January, 1950 (4) 26 November, 1950

- 123. India Constitution provides three layers of distribution of legislative powers between the Union Government and the State Government. What is the third tier?**
(1) Federalism in the form of Panchayat and Municipalities
(2) Central Government, representing the union of India
(3) State Government
(4) Judiciary
- 124. "Give me blood, I will give you freedom". These words are attributed to**
(1) Khudiram Bose
(2) Subhash Chandra Bose
(3) Bhagat Singh
(4) Veer Savarkar
- 125. Which of the following envisaged the establishment of a Constituent Assembly to frame the Constitution for India?**
(1) Cabinet Mission
(2) Cripps Mission
(3) Simon Commission
(4) Indian Independence Act
- 126. Who established the Brahma Samaj?**
(1) Swami Vivekananda
(2) Raja Ram Mohan Rai
(3) Dayananda Saraswati
(4) Ranade
- 127. Who started schools for Muslim girls in Patna?**
(1) Mumtaz Ali
(2) Muhamad Ali Zinba
(3) Sayyid Ahmad Khan
(4) Begum Rokeya Sakhawat Hossain
- 128. Who urged the British to pass legislation enabling Hindu widows to remarry and prohibiting polygamy?**
(1) Ram Mohan Roy
(2) Ishwar Chandra Vidyasagar
(3) Swami Dayanand Saraswati
(4) Swami Vivekananda
- 129. When was the Hindu Widows' Remarriage Act passed?**
(1) 1828 (2) 1830
(3) 1856 (4) 1857
- 130. Jallianwala Bagh massacre took place at**
(1) Amritsar (2) Lucknow
(3) Allahabad (4) Surat
- 131. Who founded the self-respect movement?**
(1) Periyar
(2) Jyotirao Phule
(3) Haridas Thakur
(4) Mahadev Govind Ranade
- 132. When was the Widow marriage Association founded?**
(1) 1856 (2) 1857
(3) 1861 (4) 1874
- 133. Sharda Sadan was located at**
(1) Delhi
(2) Bengal
(3) Bombay (Mumbai)
(4) Mysore
- 134. Who argued that women could become a powerful regenerative force?**
(1) Ram Mohan Roy
(2) Ishwar Chandra Vidyasagar
(3) Swami Dayanand Saraswati
(4) Swami Vivekananda
- 135. Gandhiji's famous Quit India Movement call to the British was given in**
(1) 1941
(2) 1942
(3) 1943
(4) 1940
- 136. Who founded the widow homes in Pune?**
(1) Tarabai Shinde
(2) Dhondo Keshav Karve
(3) Pandita Ramabai
(4) Mahadev Govind Ranade
- 137. Who founded the first women's university in India?**
(1) Behramji Malabari
(2) Pandita Ramabai
(3) Dhondo Keshav Karve
(4) Mahadev Govind Ranade
- 138. Congress declared Purna Swaraj in**
(1) 1928 (2) 1929
(3) 1930 (4) 1931
- 139. Who founded the National Social Conference?**
(1) Kandukuri Virasalingam Pantulu
(2) JED Bethune
(3) Swami Dayanand Saraswati
(4) Mahadev Govind Ranade
- 140. The Kakori train robbery incident happened in**
(1) 1925 (2) 1926
(3) 1927 (4) 1928
- 141. Who founded the Indian National Association?**
(1) Debendranath Tagore
(2) Surendranath Banerjee
(3) Rabindranath Tagore
(4) Harish Chandra Mukherji
- 142. When was the Women's Indian Association founded?**
(1) 1890 (2) 1910
(3) 1914 (4) 1915

143. Mahatma Gandhi began his political activities in India first from

- (1) Kheda
- (2) Sabarmati
- (3) Dandi
- (4) Champaran

144. During Champaran Satyagraha, who joined Mahatma Gandhi?

- (1) Jawaharlal Nehru
- (2) Bal Gangadhar Tilak
- (3) Subhash Chandra Bose
- (4) Rajendra Prasad

145. Mahatma Gandhi nominated _____ as the first Satyagrahi for Individual Satyagraha of 1940.

- (1) Jawaharlal Nehru
- (2) Lal Bahadur Shastri
- (3) Bal Gangadhar Tilak
- (4) Vinoba Bhave

146. Who founded Satyashodhak Samaj?

- (1) Narayana Guru
- (2) Ambedkar
- (3) Jyotirao Phule
- (4) Ramaswamy Naicker

147. The oldest form of composition of Hindustani vocal music is

- (1) Thumri
- (2) Ghazal
- (3) Dhrupad
- (4) None of these

148. In 1939 Subhash Chandra Bose was elected as President of the Congress Party defeating

- (1) Jawaharlal Nehru
- (2) Pattabhi Sitharamayya
- (3) Maulana Abul Kalam Azad
- (4) VB Patel

149. After the Revolt of 1857, Bahadur Shah Zafar was arrested and sent to prison in

- (1) Rangoon
- (2) Singapore
- (3) London
- (4) Andaman & Nicobar Islands

150. Who founded the Indian Society of Oriental Art?

- (1) Debendranath Tagore
- (2) Surendranath Banerjee
- (3) Rabindranath Tagore
- (4) Abanindranath Tagore

ANSWERS AND EXPLANATIONS

1. (2) The site of Bhimbetka is located in the state of Madhya Pradesh. This was one of the oldest habitation sites.
2. (4) Lothal was an ancient port of Indus Civilisation which was set up to establish overseas trade relation with ancient Mesopotamia and Arabia. Lothal was the most important port since it was the centre for the bead making Industry of the Indus Civilisation.
3. (1) In Mehrgarh, women and men learnt to grow wheat and barley for the first time.
4. (1) Rig Veda, one of the four Vedas, a collection of lyrics, is the world's oldest text due to which it is also known as 'the testament of the mankind'.
5. (4) The Vindhyas form a steep slope in the central upland of India. It is a broken range where agriculture developed 8000 years ago. The evidence of cultivation of rice has also been found in this region.
6. (4) Vaishali was the capital city of Vajji Mahajanapda. It was located on the north of river Ganga. It was governed under different forms of government, known as gana or sanga.
7. (1) First three Vedas Rig Veda, Sama Veda and Yajur Veda are collectively known as the Vedatrayi i.e., trio of Vedas.
8. (4) Mahapadma, who dethroned the Shisunaga dynasty established the Nanda dynasty, is also known as Sarvakshatrantak and Ugrasena.
9. (1) Pitaka is a Sanskrit word meaning a basket that is made of either bamboo or wood.
10. (1) Ajatashatru, son of Bimbisara, was the second king of the Haryanka dynasty. He built the fort of Rajagriha and the watch-fort of Jaladurga at a village called Patali on the bank of the Ganga river.
11. (4) Kural or Muppall which is a treatise on polity, ethics and social norms, was a part of Patinenkilakanakku. This work is regarded as the 'The Bible of Tamil Land'.
12. (1) 'Mudra Rakshasa' was written during the Gupta period by Visakha Datta, which mentions how Chandragupta Maurya was assisted by Chanakya to defeat the Nandas. It also provides the socio-economic conditions of the prevailing period.
13. (2) Haryanka Dynasty was founded by the Magadhan king Bimbisara in 684 BC. Its capital was the Rajagriha, which was later shifted to Patliputra. Later the Shisunaga dynasty succeeded the Haryanka dynasty.
14. (2) Indica was the Megasthenes account, who was a Greek ambassador sent by Seleucus Nikator to the court of Chandragupta Maurya. Indica was mostly about the Mauryan Empire.
15. (2) There were 24 tirthankaras, among them the first tirthankara was Rishabhadeva, also known as Adinatha. Mahavira was the last and 24th Tirthankara.
16. (1) Seleucus was defeated by Chandragupta Maurya and surrendered his vast territory in return for 500 elephants. He sent Megasthenes as a Greek ambassador to the court of Chandragupta Maurya.
17. (2) Kanishka, the Kushan emperor, presided over the Fourth Buddhist Council which took place in either Kashmir or Jalandhar in 1st century CE.
18. (4) According to the belief, the Christians of Kerala probably came from the West-Asia. This is why they were called as the Syrian Christians. The Syrian Christian community is regarded as one of the oldest Christian community in the world.
19. (3) Silappadikaram deals with the story of Kovalan and Madhavi of Kaveripattinam, written by Ilango Adigal, which is also called as the 'Iliad of Tamil poetry'.
20. (4) Vikramaditya - Chaitanya is not correctly matched. The earliest mention of Vikramaditya was by Gunadhya who wrote Brihatkatha.
21. (1) At Sarnath, near Varanasi, a building called as the stupa, was built to mark the place where Buddha delivered his first teachings.
22. (1) Srigupta founded the Gupta Empire in the third century CE in northern India. The period of the reign of Guptas from 320 to 550 CE is known as the Golden Age of India.
23. (4) Mahavira (Vardhamana) is the most famous thinker as well as the last tirthankara of the Jainism.
24. (2) The plight of women turned worse with the beginning of Gupta period. In this period, pre-puberty marriage was in practice. Under the Gupta rule, in 510 AD, first references of sati appeared in Eran, Madhya Pradesh.

25. (4) Devagiri was the capital of Yadava kings. The Yadavas ruled a kingdom stretching from north Karnataka to Maharashtra till some regions of Madhya Pradesh. Devagiri is situated at Daulatabad in Maharashtra.
26. (1) The reign of Ajatashatru, son of Bimbisara, laid the foundation of the city of Pataliputra.
27. (1) Gautam Buddha breathed his last in Kushinagara, the village of the Mallas clan.
28. (2) Cave of Karle is a Buddhist cave which was used by the monks and nuns, located in Maharashtra.
29. (4) The buddhist literature Anguttara Nikaya, one of the Pali text, is a part of Abhidhamma pitaka, a religious discourses of Buddha. Sutta Pitaka is Buddha's saying. Mahavastu is also a Buddhist literature but Bhagavati Sutta is a Jainis literature.
30. (1) Rampurwa bull was the part of a Mauryan pillar found in Rampurwa in the state of Bihar. It is now placed in Rashtrapati Bhawan.
31. (1) Mohammad-bin-Tughlaq introduced the token currency system in 1329. It was withdrawn later from circulation because it could easily be counterfeited.
32. (2) Daulat Khan Lodhi was the governor of Punjab when he invited Babur to overthrow Ibrahim Lodhi. Babur defeated Ibrahim Lodhi in the First Battle of Panipat.
33. (1) The Lodhi Dynasty was founded by Bahlol Lodhi in 1451. He served as the governor of Sirhind, Punjab under Muhammad Shah, the ruler of Sayyid Dynasty. Bahlol Lodhi later replaced the Sayyid Dynasty with the Lodi Dynasty.
34. (3) The Iqta was an Islamic practice of tax farming and a form of administrative grant, started by Shamsuddin Iltutmish.
35. (3) Tughlaqabad, a ruined fort situated in Delhi was built by Ghiyas-ud-din Tughlaq, the founder of the Tughlaq dynasty of the Delhi Sultanate.
36. (3) In the year 1600, EIC set its base in India. The headquarters was situated on the west coast of Surat.
37. (3) Kunwar Singh was a zamindar in Jagdishpur, Bihar. During the Revolt of 1857, he assumed leadership to fight against the British army in his area. He was aged between 75 and 80 then. Eventually, Kunwar Singh's force was suppressed by William Taylor and Vincent Eyre.
38. (3) The Allahabad Fort was built by Akbar in 1583.
39. (4) The Battle of Buxar was fought in 1764, between the British EIC and the contined armies of the Nawabs of Awadh and Bengal, and the Mughal king Shah Alam II.
40. (2) Jahangir granted permission to the British to establish their factory in India in 1612 and requested James I who was the British emperor at that time to send European rare items that were fit to be displayed in his palace.
41. (1) Hyder Ali was the father of Tipu Sultan. He was the faujdar of Dindigul, Mysore.
42. (1) Chhau is one of the most famous dances of West Bengal, which originated in the Purlia district of the state. It is performed during the harvesting of crops.
43. (1) The blue rebellion of 1859 was related to Indigo cultivation. In March 1859, thousands of farmers in Bengal refused to grow indigo and also refused to pay rents to gomasthas (agents of planters).
44. (2) Saadat Ali was the Nawab of Awadh.
45. (4) Lord Cornwallis was appointed as the second Governor-General of Bengal in the year 1786.
46. (3) The First Anglo-Mysore War was fought between Hyder Ali of Mysore and the British during the period of 1767-69.
47. (2) The Battle of Plassey was fought between the British East India Company and the Nawab of Bengal along with his French allies in June 1757. The British East India Company defeated the Nawab of Bengal which helped the Company to consolidate its presence in Bengal.
48. (3) The Battle of Plassey was the first major victory of the East India Company in India. This led to the establishment of Company rule in India.
49. (3) In the year 1600, EIC set its base in India. The headquarters was situated on the west coast of Surat.
50. (2) The second Battle of Panipat was fought between the rules Akbar and Hemu, the Hindu rules of North India, in 1556.
51. (3) The First Battle of Panipat was fought between Babur's army and the Lodi Empire in 1526 A.D. It marked one of the first instances when field artillery and gunpowder were used in a battle fought in India.

52. (2) Tipu Sultan was the ruler of Mysore from 1782 to 1799. He was killed in the battle of Seringapatam in 1799. He was popularly called the 'Tiger of Mysore'.
53. (1) Bharatanatyam is a classical dance form, which originated from the state of Tamil Nadu. In earlier times, it was performed in the temples.
54. (3) The Kuchipudi dance is a famous dance form of Andhra Pradesh. This classical dance is performed on Carnatic music.
55. (3) Bhangra is the traditional folk dance of Punjab. It is mostly performed during harvest or Baisakhi.
56. (3) The earliest examples of miniature paintings were found on palm leaves and wood.
57. (1) The word Kathak was derived from the Sanskrit word 'Katha', which means story.
58. (1) Baji Rao is recognised as one of the finest cavalry generals ever produced by India. He served as Peshwa (Prime Minister) to the fourth Chhatrapati Shahu.
59. (1) Warren Hastings established a high court in Calcutta and civil and criminal courts in each district.
60. (1) Warren Hastings became the first Governor-General of Bengal in 1773 and held this high position till 1784. He was also the first Governor-General of India.
61. (1) The Portuguese East India Company was established in India in 1498. Its headquarter was in Cochin (Kochi).
62. (3) After several administrative reforms by Warren Hastings, the treasury of the Company was shifted to Calcutta where the Company's headquarters was situated.
63. (1) Permanent settlement was a system of revenue collection in which rajas and taluqdars were recognised as zamindars. Zamindars collected taxes from the peasants and paid a fixed amount to the Company.
64. (3) In the year 1782, Tipu Sultan succeeded his father as the new ruler of Mysore.
65. (4) In the year 1664, the French East India Company established their base in India. Its headquarter was on the west coast, i.e. in Surat, and later in Pondicherry (Puducherry).
66. (4) A campaign was launched by Ishwar Chandra Vidyasagar of the Brahmo Samaj, which resulted in the legislation of widow remarriage in the year 1856. This reform was not welcome by the orthodox and conservatives of India.
67. (4) The famous Tamil epic Silappadikaram was composed by a poet named Ilango around 1800 years ago. It is the story of a merchant named Kovalan.
68. (1) Lilatilakam is a text on grammar and poetics that was composed in the twelfth century.
69. (2) Anantavaraman Chodagangadeva constructed the Jagannath Temple for Purushottama Jagannath at Puri, Odisha.
70. (1) The Khond tribe lived in the forests of Orissa (Odisha). They lived by hunting animals and gathering forest products.
71. (4) Ghumura is a tribal folk dance of Odisha. It is performed with the traditional folk music.
72. (4) It is an ancient Tamil folk dance that is performed by balancing the pots on the head.
73. (2) Birsa Munda died of cholera in 1900. The Munda movement faded out with his death.
74. (3) With the arrival of foreign rulers, the evidence of fusion of Persian and Indian traditional styles can be traced in the paintings of the period.
75. (4) Tutanama, the tales of a Parrot, was illustrated between 1560 and 1566. It depicts the components of the imperial Mughal style at a formative stage.
76. (1) Raja Ram Mohan Roy was the founder of Brahmo Samaj, a socio-religious reform movement. It began in August, 1928. The chief aim of Brahmo Samaj was the reformation of the prevailing Brahmanism at that time.
77. (4) Cornwallis with his memorable administrative and judicial reforms separated the judicial and police powers from the collector and confined him to his fiscal duties.
78. (3) The Treaty of Banaras was signed between Warren Hastings and the Nawab of Oudh in the year 1773.
79. (3) Under the patronage of Nawab Wajid Ali Shah, Kathak grew into a major art form.
80. (4) The Regulating Act was passed by the British Government in 1773 CE with the purpose of overhauling the management of the British East India Company's rule in India.
81. (2) Mir Jafar was the commander of Sirajuddaulah's army. Due to Mir Jafar's betrayal, Sirajuddaulah lost the war and was killed by the British. English captain Robert

- Clive had managed to secure his support by promising him the position of the new nawab after Sirajuddaulah.
- 82.** (2) Circuit courts were established in 1790 by the Governor General Cornwallis.
- 83.** (3) Mahalwari settlement was introduced in 1822 in Uttar Pradesh. In this system, the charge of collecting the revenue was given to the village headman. Holt Mackenzie had introduced this system.
- 84.** (4) Ryotwari settlement was first implemented in south India by Thomas Munro. In this system, the revenue was directly collected from the cultivators (ryots). Due to increased taxes, the condition of the peasant's further deteriorated.
- 85.** (4) The blue rebellion of Indigo cultivation was against planters. Cultivators (Ryots) refused to pay rents to the planters and attacked indigo factories.
- 86.** (2) Revolt of Songram Sangma in 1906 in Assam and the forest satyagraha of the 1930s in the Central Provinces took place against the colonial forest laws. Tribal groups were very unhappy with the colonial forest laws, which denied their right on the forests.
- 87.** (2) Akbarnama, a history of Akbar's reign, mentions the Gond kingdom of Garha Katanga that had 70,000 villages.
- 88.** (2) The Partition of Bengal was announced in 1905 by the Viceroy of India, Lord Curzon.
- 89.** (4) The Civil Disobedience Movement was launched on 12th February, 1930 by Mahatma Gandhi.
- 90.** (3) Gandhi was given the name 'Mahatma' by Rabindranath Tagore in 1917.
- 91.** (1) Anandamath is a Bengali novel. It was written by Bankim Chandra Chatterjee and published in 1882.
- 92.** (4) The Indian National Congress (INC) was founded on 28 December, 1885 by Allan Octavian Hume, a British civil servant; Dadabhai Naoroji; and Dinshaw Wacha. There were 65 founding members of INC.
- 93.** (4) Raja Ram Mohan Roy led the crusade against the sati system and founded the Brahma Samaj on 20th August, 1828.
- 94.** (3) The first session of the Constituent Assembly was held on December 13, 1946. Sachchidananda Sinha was elected the temporary President of the Assembly.
- 95.** (2) Allan Octavian Hume initiated the movement to form the Indian National Congress in collaboration with Dadabhai Naoroji and Dinshaw Edulji Wacha.
- 96.** (2) Ishwar Chandra Vidyasagar was a reformer in Bengal. He championed female education in India.
- 97.** (4) Bal Gangadhar Tilak, the first leader of the Indian Independence Movement, gave the slogan "Swaraj is my birth right, and I shall have it".
- 98.** (3) Udham Singh assassinated General Michael O'Dwyer in London. Michael O'Dwyer was responsible for the Jallianwala Bagh Massacre.
- 99.** (1) The newspaper *India Mirror* was edited by Debendranath Tagore and Manmohan Ghosh. It was published in Calcutta (now Kolkata).
- 100.** (3) Gandhi-Irwin Pact, a political agreement between Mahatma Gandhi and Lord Irwin, was signed on 5 March, 1931.
- 101.** (4) Bhagat Singh was hanged to death on 23 March, 1931 in Lahore jail at the age of 23.
- 102.** (3) The Gadar Party was founded by Lala Har Dayal in San Francisco in 1913.
- 103.** (1) Saunders was assassinated by Bhagat Singh in 1928, in Lahore.
- 104.** (3) Lord Ripon is known as the "Father of Local Self-Government" of India. He served as the Governor General of India from 1880-1884. Lord Ripon passed the Local Self Government Act in 1882.
- 105.** (3) Bal Gangadhar Tilak wrote 'Gita Rahasya'. He is also known as the 'Lokmanya Tilak'.
- 106.** (2) 'My Experiments with Truth' is an autobiography of Mahatma Gandhi, which describes the events of Gandhi's life up to 1922.
- 107.** (4) Lord Cornwallis introduced the Permanent Land Settlement of Bengal in 1793. It was an agreement between British East India Company and the landlords of Bengal concerning the settlement of land revenue in the state.
- 108.** (3) The Home Rule of 1916 was launched by Annie Besant along with Bal Gangadhar Tilak.
- 109.** (1) During the Lahore Session of 1929, Jawaharlal Nehru was the President of the Indian National Congress. The Indian National Congress was founded in 1885.
- 110.** (3) Ambika Charan Majumdar was the president of the 31st

- session of the Indian National Congress in 1916.
- 111.** (4) Sarojini Naidu described Muhammad Ali Jinnah as the "Ambassador of Hindu-Muslim unity". She bestowed the title on Jinnah due to the role he played in the Lucknow Pact.
- 112.** (1) The Vernacular Press Act was introduced by Lord Lytton in 1878 to control the freedom of the Indian Press.
- 113.** (4) Rashbihari Ghosh was the President of Indian National Congress for two terms (Surat, 1907 and Madras, 1908).
- 114.** (2) Bipin Chandra Pal founded the *Bande Mataram*, an English newspaper in 1905.
- 115.** (1) The journal, *Gadar*, was published in Urdu in 1913.
- 116.** (2) The first census was done in India in 1872. It did not cover all territories controlled by the British.
- 117.** (4) *Hind Swaraj* was written by Mahatma Gandhi in 1909.
- 118.** (1) The Jallianwala Bagh massacre took place on 13 April, 1919, in which hundreds of innocent people were killed by the British Army.
- 119.** (1) The idea of the Indian Constitution was first given by Shri MN Roy. He was a founder of the Communist Party of India.
- 120.** (3) The Constitution was adopted by the Indian Constituent Assembly on 26 November 1949. It was promulgated on 26 January, 1950 because the Declaration of Indian Independence was passed on this day in 1930.
- 121.** (4) In the Constituent Assembly, members were elected by provincial assemblies. The total membership of the Constituent Assembly was 389.
- 122.** (2) The Constituent Assembly of India adopted that the Republic is governed in terms of the Constitution on 26 November 1949. The Constitution came into effect on 26 January 1950.
- 123.** (1) The Indian Constitution provides three layers of distribution of legislative powers between the Union Government and the State Government. The third tier is federalism in the form of Panchayat and Municipalities
- 124.** (2) Subhash Chandra Bose said the words, "Give me blood, I will give you freedom." He spoke these words to the Indian National Army in Burma in 1944.
- 125.** (1) The Cabinet Mission envisaged the establishment of a Constituent Assembly to frame the Constitution for India. The Cabinet Mission Plan was announced on 16 May 1946.
- 126.** (2) Raja Ram Mohan Roy is credited with having established Brahmo Samaj. Brahmo Samaj is a renaissance movement of Hinduism in the 19th Century.
- 127.** (4) Begum Rokeya Sakhawat Hossain, a great pioneer of women rights, started a Muslim girl's school in Patna and Calcutta. She challenged the conservative ideas of the Muslim society.
- 128.** (2) Ishwar Chandra Vidyasagar urged the British to pass legislation enabling Hindu widows to remarry and prohibiting polygamy. As a result, the Hindu Widows' Remarriage Act was passed.
- 129.** (3) Due to the efforts of Ishwar Chandra Vidyasagar, the British passed the Hindu Widows' Remarriage Act on 26 July 1856. Ishwar Chandra Vidyasagar was an important figure of the Bengal Renaissance.
- 130.** (1) Jallianwala Bagh massacre took place at Amritsar, Punjab on 13 April 1919.
- 131.** (1) EV Ramaswamy Naicker founded the self-respect movement. He was also known as Periyar. He criticised Hindu scriptures especially Manusmriti.
- 132.** (3) Mahadev Govind Ranade founded the Widow Marriage Association in 1861 to encourage widow remarriage, promote education for women and oppose child marriage.
- 133.** (3) The Sharda Sadan is located in Bombay (now Mumbai). It was the first home for widows in Maharashtra.
- 134.** (4) Swami Vivekananda was one of the eminent reformers of the nineteenth century who argued that women could become a powerful regenerative force.
- 135.** (2) The Quit India Movement was launched by Gandhiji on 8th August 1942 in order to protest against the sending of Indian troops to fight in the Second World War and to demand immediate independence for India.
- 136.** (3) Pandita Ramabai founded a widow's home at Pune to provide shelter to widows who had victims of home violence.
- 137.** (3) Dhondo Keshav Karve founded the first Indian university for women in Pune in 1916.
- 138.** (2) In 1929, Congress declared Purna Swaraj (complete independence) under the presidentship of Jawaharlal

Nehru. Independence Day was observed on 26 January 1930 all over the country.

- 139.** (4) The National Social Conference was founded by Mahadev Govind Ranade in 1887. Ranade was a distinguished Indian scholar and social reformer.
- 140.** (1) The Kakori train robbery or Kakori Case took place at Kakori in Uttar Pradesh on 9 August 1925 during the Indian Independence Movement against the British Indian Government. Kakori Conspiracy was planned by Ram Prasad Bismil and Ashfaqulla Khan.
- 141.** (2) Surendranath Banerjee and Ananda Mohan Bose founded the Indian National Association in 1876.
- 142.** (4) The Women's Indian Association was founded in 1915. The Indian and the Europeans were the members of this association.
- 143.** (4) Mahatma Gandhi began his political journey in India with Champaran Satyagraha in Champaran, a district of Bihar in 1917.
- 144.** (4) Mahatma Gandhi reached Champaran on 10 April 1917 with Brajkishore Prasad, Rajendra Prasad, Anugrah Narayan Sinha and Acharya Kripalani.
- 145.** (4) Vinoba Bhave was the first Satyagrahi nominated by Mahatma Gandhi for the Individual Satyagraha of 1940. He is best known for the Bhoodan Movement.
- 146.** (3) Satyashodhak Samaj was founded by Jyotirao Phule. The main emphasis of Satyashodhak Samaj was on caste equality.
- 147.** (3) Dhrupad is the oldest form of composition of Hindustani vocal music. It uses tambura and pakhawaj as musical instruments during performance.
- 148.** (2) Netaji Shubhash Chandra was elected as the President of Indian National Congress at the Tripuri session in 1939 by defeating Patabhi Sitaramaiyya.
- 149.** (1) In September 1857, the Company gained control over Delhi. It arrested Bahadur Shah Zafar and sent him to jail in Rangoon, where he died in 1862.
- 150.** (4) The Indian Society of Oriental Art was founded by Abanindranath Tagore to promote the ancient art traditions of India.

2

GEOGRAPHY

CELESTIAL BODIES

Universe consists of celestial bodies, such as stars, planets, satellites, etc. Celestial bodies are the permanent objects in the sky. Big celestial bodies are made up of gases and have their own heat and light, which they emit in large amounts. Universe consists of millions of galaxies, which are made up of dust and gases. A galaxy consists of billions of stars. Galaxies were formed by accumulation of hydrogen gas in the form of very large clouds called nebula.

The formation of stars happened around 5–6 billion years ago. Sun is also a star which has planets orbiting around it. Planets are those celestial bodies that do not have their own heat and light. They are lit by the light of the stars. Our Earth is such a planet which gets all its heat and light from its nearest star - the sun.

Solar System

Our solar system consists of the Sun, 8 planets, 63 moons, millions of smaller bodies, like asteroids, meteoroids and comets, and vast quantities of dust-grains and gases. It is part of the Milky Way galaxy (Akash Ganga). The solar system was formed from a Nebula around 5–5.6 billion years ago and the planets were created about 4.6 billion years ago. In the solar system, the North Star indicates the north direction. It is also called the Pole Star. It always remains in the same position in the sky.

Sun

Sun is an incredibly huge star and made up of extremely hot gases (hydrogen and helium). Its surface temperature is about 6000 K. It is in the centre of the solar system. It is the only source of heat and light for the entire solar system. The distance between it and the Earth is about 150 million kilometres.

Planets

The solar system consists of eight planets. In order of their distance from the Sun, they are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. All these eight planets move around the Sun, called revolutions, in fixed paths, called orbits. In 2006, Pluto was removed from the list of planets by the International Astronomical Union.

Those planets that lie between the Sun and belt of asteroids are called the inner planets, such as Mercury, Venus, Earth and Mars. The other four planets are called the outer planets, such as Jupiter, Saturn, Uranus and Neptune. The inner planets are also called terrestrial planets. They are made up of rocks and metals, and have relatively high densities. The other name for outer planets is jovian planets or gas giants. They are much larger than the terrestrial planets and have a thick atmosphere, mostly consisting of helium and hydrogen.

The characteristics of some of the planets are as follows:

- Mercury takes 88 days and Neptune takes 60,190 days (164.8 years) to complete one round along their orbits.
- Venus is considered to be the Earth's sister planet because the former's size and shape are very much similar to those of the latter. Venus rotates in the opposite direction. It is known as the Morning Star, when appearing in the east before sunrise, and the Evening Star, when appearing in the west after sunset. It is also the hottest planet.
- Mars is described as the 'red planet' because of its appearance.
- Saturn, Uranus and Neptune have rings around them, which are made up of dust and ice particles.
- Ganymede is Jupiter's largest moon and also the largest moon in the solar system.

Earth

Earth is the fifth largest planet in the solar system. Earlier, it was believed that the Earth was in the centre of the universe. The shape of the earth is described as a Geoid because it is slightly flattened at the poles. It is the only known planet to support life. About 70% of its surface is covered with water, which makes it appear blue from the outer space. Therefore, it is called the 'blue planet'.

Moon

Earth has only one natural satellite, that is, the Moon. Its diameter is only one-quarter that of the Earth. It appears so big because it is nearer to our planet than other celestial bodies. Moon formed as a satellite of the Earth

around 4.44 billion years ago due to a 'great collision' between the Earth and another object with a size one to three times that of Mars. Moon is about 3,84,400 km away from the Earth.

Some important facts about the Moon are as follows:

- Its orbital length is 27 days. It takes the exact same time to complete one spin. Therefore, only one side of the Moon is visible from the Earth.
- It has no air and water on its surface, so no existence of any form of life is possible here.
- It has many mountains, plains and depressions on its surface.
- Its gravity is one sixth that of the Earth.
- It causes the rise and fall of tides on the Earth.

Asteroids

Asteroids are small celestial bodies other than stars, planets and satellites, which move around the Sun too. They are usually found between the orbits of Mars and Jupiter. It is believed that they are the pieces of a planet that exploded many many years ago.

Meteoroids

Meteoroids are small pieces of rocks, which move around the Sun. Sometimes, they hit the Earth or come near it. When they come in the contact of the Earth's atmosphere, due to friction with air, they get heated up and burn. This creates light showers upon the Earth. When a meteor without having fully burnt falls on the Earth, it creates a hollow.

GLOBE

Earth is not a sphere. It is squashed at the North and South Poles and swollen in the middle. The true representation of the Earth is only possible as a globe. A globe is a model of the Earth in miniature form. It is of significant use, as we need certain points or lines of reference to locate a place on the Earth.

Latitudes and Longitudes

The globe is filled with imaginary lines. These lines are latitudes and longitudes and are measured in degrees. The circular imaginary line that divides the globe into two

equal parts is known as the equator. The northern half of the equator is known as the Northern Hemisphere and the southern half is known as the Southern Hemisphere.

The equator represents the zero degrees latitude. Lines that are parallel to the equator are drawn up to the poles. They are therefore called the parallels of latitudes.

The important parallels of latitudes are as follows:

- Tropic of Cancer (23° N) in the Northern Hemisphere
- Tropic of Capricorn (23° S) in the Southern Hemisphere
- Arctic Circle at 66° north of the equator
- Antarctic Circle at 66° south of the equator
- North pole at 90° north of the equator
- South pole at 90° south of the equator

Longitudes

Apart from north and south of the equator, one should also know the east or west of longitudinal lines to correctly locate a place on the globe. This line of reference is called a meridian. All longitudinal lines are of equal length. Distances between meridians are measured in degrees. Each degree is further divided into minutes, and minutes into seconds. Distances between longitudes decrease towards poles, and all longitudes are meeting at poles. The 0° longitude meridian passing through Greenwich (Britain) is called the prime meridian. From east of the prime meridian to 180° is the Eastern Hemisphere and towards west, up to 180° , is the Western Hemisphere. 180° east and 180° west meridians are on the same line.

LONGITUDE AND TIME

All places situated at the same meridians denote the same time. Since the Earth rotates from west to east, places in east of the prime meridian will be ahead of time at the meridian and those in west will be behind it.

The rate of difference of time can be calculated. The Earth moves 360° in one rotation in about 24 hours. So, in an hour, it moves 15° about its axis or 1° in four minutes. That means if it is 12 noon at the prime meridian,

the time at 15° east of it is 1 p.m. and 15° west of it is 11 a.m. At 180° , there will be a difference of 12 hours from the prime meridian.

Standard Time

When the time of a particular place becomes the time for a country or many countries, it is called standard time for those countries. Generally, it is the time of a central place.

Taking the example of India, the local time difference between Dwarka (Gujarat) in the west and Dibrugarh (Assam) in the east is almost 105 minutes, which made it necessary for the country to set a standard time for itself. In India, the meridian of $82^{\circ} 30'$ E is treated as the standard meridian. The local time at this meridian is taken as the standard time for the whole country. It is known as the Indian Standard Time (IST). IST is 5 hours and 30 minutes ahead of the GMT (Greenwich Mean Time). So, it will be 5:30 p.m. in India when it is 12 noon in London.

The boundaries of many countries extend over large lengths and widths. Such countries have more than one standard time for convenience. For example, Russia (11), USA (11), Australia (8) and Canada (6) have more than one standard time.

ENVIRONMENT

Environment consists of both natural and human factors. Natural environment has two components: biotic and abiotic. Biotic components refer to all living organisms; e.g. plants and animals. Abiotic components refer to the world of non-living elements; example: air, water and land. Human environment relates to people; family and society; and human activities, creations and interactions.

Natural environment can be further divided into lithosphere, atmosphere, hydrosphere and biosphere.

LITHOSPHERE

The outer part of the Earth is called lithosphere, which consists of the crust and some portion of the mantle. The crust is the uppermost part. It is in solid state. The mantle is in thick liquid state and lies below the crust.

Lithosphere comprises rocks, minerals and soils. It is necessary for the survival of living beings because it contains all nutrient elements. It can be further divided into continents and oceans. The landmasses of extremely large size are known as continents, while huge water bodies are known as oceans. All the continents are not connected with each other, but oceans of the world are connected with one another. Majorly, there are seven continents and five oceans.

Some important facts about the lithosphere are as follows:

- Average elevation of the landmass is about 800 m above the sea level.
- Average depth of oceans is 4000 m.
- On the Earth, the highest mountain peak, Mt. Everest, is 8,848 m above the sea level.
- Mariana Trench (11000 m) in Pacific Ocean is the deepest point on Earth.

Interior of Earth

Earth has several concentric layers just like an onion. The outermost solid cover or shell of the Earth is known as the crust. The thickness of crust is about 35 km on the continents and 5 km in the regions of oceanic floors. The continental mass of crust consists of silica and aluminum in greater proportions; therefore, it is called sial. The oceanic crust is made up of silica and magnesium; therefore, it is called sima.

Immediately beneath the crust is the mantle about 2900 km thick. The mantle covers about $\frac{2}{3}$ rd of the Earth's mass. Its upper part is solid up to the depth of 100 km. The upper parts of mantle and crust are together known as lithosphere. At a 100–250 km depth, the mantle is partially molten—this is the asthenosphere layer.

The interior layer is the core, 3500 km in radius, and is made up mainly of iron (fe) and nickel (ni), and is

therefore called nife. The outer core is in liquid state, while the inner core is in solid state.

The study of the Earth's interior is required to understand the original rocks in its crust and their later transformation.

Some important facts about the interior of the Earth are as follows:

- The distance from the Earth's surface to its middle is 6370 km.
- The deepest borehole in the Earth's surface is about 12 km deep in Kola Peninsula of Russia.
- The temperature of the central part of the Earth is about 7000° C.
- Earth's core is about as hot as the surface of the Sun.

Rocks and Minerals

Earth's crust is made up of various types of rocks, differing from one another in texture, structure and colour. On the basis of origin and appearance, these rocks can be classified as igneous, sedimentary and metamorphic.

Igneous Rocks

Igneous rocks are formed by the cooling and solidification of molten rock, i.e. magma, from beneath the Earth's crust. They are also called primary rocks. They are normally crystalline in structure. In terms of origin, there are two main classes of igneous rocks: plutonic and volcanic.

When the magma cools and slowly solidifies underneath the Earth's crust, plutonic or 'intrusive igneous' rocks are formed. They are crystalline in nature. Examples of plutonic rocks are granite, diorite and gabbro. Volcanic or 'extrusive igneous' rocks are formed when the magma, which has come outside the volcanoes, solidifies on the surface of the Earth. The crystals of volcanic rocks are small because the magma solidifies rapidly. Basalt is an example of volcanic rocks. The Deccan Plateau of south India is made of volcanic rocks.

Sedimentary Rocks

Sedimentary rocks are formed by deposition of small pieces of rocks and soil one above the other over a

period of time. Sedimentary rocks are formed due to the extreme pressure exerted by the layers above. The materials that form sedimentary rocks are fossils of animals, plants and other microorganisms. These rocks are non-crystalline in nature. Sandstone, limestone, shale are few examples of sedimentary rocks.

Metamorphic Rocks

Metamorphic rocks are formed due to the effects of tremendous heat or pressure on igneous and sedimentary rocks. In the formation process of metamorphic rocks, minerals get restructured on account of heat and pressure. For example, limestone changes into marble.

Other such examples are given in the following table:

Original Rocks	Metamorphic Rocks
Sandstone	Quartzite
Shale	Slate
Granite	Gneiss
Basalt	Schist
Peat	Coal

Earthquake

An earthquake is defined as release of energy from the interior of the earth, which generates waves that travel in all directions. The point where the energy is released is called the focus of an earthquake, it is also called the hypocentre. The point on the surface directly above the focus is called epicentre. It is the first one to experience the waves.

Earthquake Waves are recorded on seismograph. Earthquake waves are basically of two types – body waves and surface waves. The surface waves are the last to report on seismograph. These waves are more destructive. They cause displacement of rocks, and hence, the collapse of structures occurs.

Types of Earthquakes

Tectonic earthquakes: These are generated due to sliding of rocks along a fault plane.

Volcanic earthquake: These are generated due to active volcanoes.

Collapse earthquakes: In the areas of intense mining activity.

Explosion earthquakes: due to the explosion of chemical or nuclear devices.

Earthquakes are measured on the basis of magnitude or intensity of the shock. The magnitude scale is known as the Richter scale. Richter scale is expressed in absolute numbers, 0-10. The intensity scale is named after Mercalli scale. The range of intensity scale is from 1-12.

Volcanoes and Volcanic Landforms

A volcano is a place where gases, ashes and/or molten rock material – lava – escape to the ground. A volcano is called an active volcano if the materials mentioned are being released or have been released in the past. The material that reaches the ground includes lava flows, pyroclastic debris, volcanic bombs, ash and dust and gases such as nitrogen compounds, sulphur compounds and minor amounts of chlorine, hydrogen and argon.

Kilauea Volcano (Hawaii), Mount St. Helens Volcano (Washington), Mount Fuji (Japan), Mount Mayon (Philippines), Krakatoa (Indonesia), Popocatepetl (Mexico) Mount Etna (Italy) and Cotopaxi (Ecuador) are the famous volcanoes of the world.

Landforms

Small to medium tracts or parcels of the earth's surface are called landforms. A landmass passes through stages of development somewhat comparable to the stages of life – youth, mature and old age.

Changes on the surface of the earth owe mostly to erosion by various geomorphic agents. Running water, ground-water, glaciers, wind and waves are powerful erosional and depositional agents shaping and changing the surface of the earth aided by weathering and mass wasting processes.

Running Water

Erosional features: V-shaped valleys, Waterfalls and rapids, Gorge, Canyon, Incised or Entrenched Meanders, River Terraces

Depositional landforms: Alluvial Fans, Deltas, Floodplains, Natural Levees and Point Bars, Meanders, Braided Channels

Groundwater

Any limestone or dolomitic region showing typical landforms produced by the action of groundwater through the processes of solution and deposition is called Karst topography after the typical topography developed in limestone rocks of Karst region in the Balkans adjacent to Adriatic Sea.

Erosional landforms: Pools, Sinkholes and Lapies, Caves

Depositional landforms: Stalactites, Stalagmites and Pillars

Glaciers

Erosional landforms: Cirque, Horns, Glacial Valleys

Depositional Landforms: Moraines, Eskers, Drumlins

Waves and Currents

Erosional landforms: Cliffs, Terraces, Caves and Stacks

Depositional landforms: Beaches and Dunes, Bars, Barriers and Spits

Winds

Erosional landforms: Pediments and Pediplains, Playas

Depositional Landforms: Sand Dunes, Barchans, Seif

ATMOSPHERE

The atmosphere is a collection of layers of gases that surrounds a planet, such as Earth. The main gases present in the atmosphere of the Earth are Nitrogen (78 per cent) and Oxygen (21 per cent). The remaining 1 per cent of the atmosphere contains gases such as argon, carbon dioxide, water vapour, hydrogen, ozone, methane, carbon monoxide, helium, neon, krypton and xenon. There are five layers in the atmosphere, which are troposphere, stratosphere, mesosphere, thermosphere and exosphere.

Troposphere

The lowest layer from the earth's surface is called troposphere. In troposphere, temperature decreases with increasing altitude, with the rate of 5.5°C per 1,000 m (3°F per 1,000 ft.). This is called normal lapse rate.

Most of the atmospheric phenomena, such as clouds, wind, cyclone and precipitation occur only in troposphere. The height of troposphere extends up to about 16 km at equator and 8 km at poles.

Stratosphere

Stratosphere is located just above the troposphere. In the stratosphere, the temperature is almost constant with increasing altitude. Ozone layer is found in the stratosphere, and it protects earth from harmful ultraviolet rays. Stratosphere extends up to 50 km from the surface of the earth.

Mesosphere

Mesosphere is located just above the stratosphere. It extends up to 80 km from the earth's surface. Meteorites coming from the space burn in the mesosphere. In this layer, temperature decreases with increase in altitude. At the top, temperature reaches up to minus 100°C.

Thermosphere

Thermosphere extends from 80 to 400 km. In this layer, temperature increases with increasing altitude. Ionosphere is a part of thermosphere. It contains electrically charged particles known as ions. Ionosphere reflects radio waves back to Earth.

Exosphere

It is the outermost layer of atmosphere, situated just above the thermosphere. Concentrations of gases are very minimal in this layer.

Solar Radiation

The earth's surface receives most of its energy in short wavelengths. The energy received by the earth is known as incoming solar radiation which in short is termed as insolation. On an average the earth receives 1.94 calories per sq. cm per minute at the top of its atmosphere.

The amount and the intensity of insolation vary during a day, in a season and in a year. The factors that cause these variations in insolation are:

1. the rotation of earth on its axis;
2. the angle of inclination of the sun's rays;
3. the length of the day;
4. the transparency of the atmosphere;
5. the configuration of land in terms of its aspect

Heat Budget of the Planet Earth

The amount of heat received by the Earth in the form of insolation equals the amount lost by the earth through terrestrial radiation. Consider that the insolation received at the top of the atmosphere is 100 per cent. While passing through the atmosphere some amount of energy is reflected, scattered and absorbed. Roughly 35 units are reflected back to space even before reaching the earth's surface. Of these, 27 units are reflected back from the top of the clouds and 2 units from the snow and ice-covered areas of the earth. The reflected amount of radiation is called the **albedo of the earth**. The remaining 65 units are absorbed, 14 units within the atmosphere and 51 units by the earth's surface.

Cyclone

Temperate cyclone

The systems developing in the mid and high latitude, beyond the tropics are called the middle latitude or temperate cyclones. Temperate cyclones form along the polar front. Initially, the front is stationary. In the northern hemisphere, warm air blows from the south and cold air from the north of the front. When the pressure drops along the front, the warm air moves northwards and the cold air moves towards the south, setting in motion an anticlockwise cyclonic circulation. The cyclonic circulation leads to a well developed temperate cyclone, with a warm front and a cold front.

Tropical Cyclones

Tropical cyclones are violent storms that originate over oceans in tropical areas and move over to the coastal areas bringing about large scale destruction caused by violent winds, very heavy rainfall and storm surges. This is one of the most devastating natural calamities. They

are known as Cyclones in the Indian Ocean, Hurricanes in the Atlantic, Typhoons in the Western Pacific and South China Sea, and Willy-willies in Western Australia.

Conditions for tropical cyclone are-

1. Large sea surface with temperature higher than 27°C
2. Presence of the Coriolis force
3. Small variations in the vertical wind speed
4. A pre-existing weak low-pressure area or low-level-cyclonic circulation
5. Upper divergence above the sea level system

Difference between temperate and tropical cyclone

1. The temperate cyclones have a clear frontal system which is not present in the tropical cyclones.
2. Temperate cyclone covers a larger area and can originate over the land and sea; whereas the tropical cyclones originate only over the seas and dissipate upon reaching the land.
3. The temperate cyclone affects a much larger area as compared to the tropical cyclone.
4. The wind velocity in a tropical cyclone is much higher and it is more destructive.
5. The temperate cyclones move from west to east, but tropical cyclones move from east to west.

Clouds

Cloud is a mass of minute water droplets or tiny crystals of ice formed by the condensation of the water vapour in free air at considerable elevations. According to their height, expanse, density and transparency or opaqueness clouds are grouped under four types : (i) cirrus; (ii) cumulus; (iii) stratus; (iv) nimbus.

Humidity and Rainfall

When water evaporates from the land, it becomes water vapour. This is known as moisture. Moisture in the air at any time is known as humidity. The percentage of moisture present in the atmosphere as compared to its full capacity at a given temperature is known as the relative humidity. With the increase in temperature, the capacity of air to hold humidity also increases. When water vapour in atmosphere condenses, it releases the

moisture in the form of precipitation. The precipitation in the form of water is called rainfall and precipitation in the form of snow is called snowfall. Sleet and hail are also the forms of precipitation.

Types of Rainfall

Rainfall can be classified into three types – convectional, orographic and cyclonic.

- **Convectional rain:** it occurs in equatorial regions where heavy rainfall takes place with thunder and lightning.
- **Orographic rain:** it occurs when air mass comes across a mountain. The temperature falls with rising air and condensation takes place. Windward slopes of the mountain receive greater rainfall and leeward slopes remain rainless and dry.
- **Cyclonic rainfall:** it happens with cyclones. It is also known as frontal rainfall. Cyclone originates when the front of two different air masses with different temperatures collide with each other.

Wind

The movement of air is called wind. Air moves from high pressure to low pressure areas. The following factors affect the flow of wind:

- Atmospheric heating
- Pressure belts
- Migration of belts
- Distribution of continents and oceans
- Rotation of earth

Winds can be classified into three types:

Permanent Winds

These winds regularly blow throughout the year. The trade winds, westerlies and easterlies are the permanent winds. These winds blow constantly throughout the year in a particular direction.

Seasonal Winds

These winds blow according to the season and change their direction in different seasons. South-west monsoon

in the Indian subcontinent is an example of seasonal wind.

Local Winds

These winds blow during a particular period of the day or year in a small area. They are influenced by the local atmospheric condition of the place and have different names in different places. The local wind in the northern plane of India is called 'loo'. Land and sea breeze, mountain and valley winds are the other examples of local winds.

Classification of Climate

Tropical Wet Climate: Amazon Basin in South America, western equatorial Africa and the islands of East Indies

Tropical Monsoon Climate: Indian sub-continent, North Eastern part of South America and Northern Australia.

Dry Climates: west coast of South America, In middle latitudes, from 35° - 60° north and south of equator, the interior of continents surrounded by mountains.

Humid Subtropical Climate: North Indian plains and South China interior plains

Mediterranean Climate (Hot, dry summer and mild, rainy winter): Around Mediterranean sea, Central California, Central Chile, along the coast in south eastern and south western Australia

Marine West Coast Climate: Northwestern Europe, west coast of North America, north of California, southern Chile, southeastern Australia and New Zealand.

Tundra Climate: region of permafrost, the tundra regions

HYDROSPHERE

All forms of water (oceans, rivers, lakes, glaciers, underground water, water vapour, etc.) available on the Earth are collectively called hydrosphere. Of the total amount of the Earth's water, 97% is in the form of oceans and 3% is in the form of ice sheets, glaciers and underground water. Only a very small portion is available as fresh water for human use. Oceans make the major part of hydrosphere. They are all interconnected.

Some of the important facts about the hydrosphere are as follows:

- Its five major oceans are Pacific Ocean, Atlantic Ocean, Indian Ocean, Southern Ocean and Arctic Ocean.
- Atlantic Ocean is the second largest ocean in the world. It is S-shaped.
- Atlantic Ocean is also the busiest ocean in terms of trade.
- Indian Ocean is the only ocean named after a country.
- Southern Ocean encircles the continent of Antarctica.
- Arctic Ocean is located around the North Pole. It is frozen most of the time of the year.

OCEAN

There are five oceans in the world. These are Pacific, Atlantic, Indian, Arctic and Southern oceans. The largest ocean in the world is the Pacific. In spite of their vast size, all the oceans are connected to each other. Sea water is salty. The salt of sodium, chlorine, magnesium, etc. dissolves in sea water. The salinity of ocean is defined as the amount of salt in grams present in 1000 grams of water. The average salinity of the oceans is 35 parts per thousand. Dead Sea in Jordan has the highest salinity (340 g/1000 g of water).

Ocean Currents

Ocean currents are like river flow in oceans. The primary forces that influence the currents are heating by solar energy, wind, gravity and coriolis force. Ocean currents can be classified based on temperature as-

Cold currents: cold currents bring cold water into warm water areas. These currents are usually found on the west coast of the continents in the low and middle latitudes (in both hemispheres) and on the east coast in the higher latitudes in the Northern Hemisphere.

Warm currents: warm currents bring warm water into cold water areas and are usually observed on the east coast of continents in the low and middle latitudes

(in both hemispheres). In the northern hemisphere they are found on the west coasts of continents in high latitudes.

Tides

Tides are caused by several forces, the most important of which is the pull of the moon's gravity. This pull causes the ocean's water to pile up in a bulge on the side of the earth that faces the moon, and another on the opposite side. The moon's attraction power on earth is more than twice as strong as the sun's.

When the sun, the moon and the earth are in the same line, the highest tides occur. These tides are called spring tides. When the sun and moon are at right angles to each other, the lowest tides occur. These tides are called neap tides. In neap tide, gravitational forces of the sun and moon tend to counteract each other.

BIOSPHERE

Biosphere comprises the zone where all living organisms are found. It is the zone of life on the Earth. It includes humans, plants, animals, microbes, bacteria and all other forms of life. Generally, it can be divided into two parts: plant kingdom and animal kingdom. Natural vegetation and wild life exist in the biosphere.

NATURAL VEGETATION

Natural vegetation depends upon the topography and climatic conditions of a particular place. Temperature, humidity, slope and soil are various factors that influence the growth of natural vegetation in a place. Broadly, natural vegetation is of three types: forests, grasslands and shrubs.

Forests

Tropical Evergreen Forests

These forests grow in tropical areas of heavy rainfall and so they are also called tropical rainforests. They are

evergreen throughout the year. There is no dry season. Rosewood, ebony and mahogany are few examples of tropical evergreen forests.

Tropical Deciduous Forests

These forests are also called monsoon forests because they are mostly found in the monsoonal climates of India, northern Australia and Central America. In these forests, trees shed their leaves in the dry season and come into leaf in the following season of heavy rainfall. Sal, teak, neem and shisham are few examples of tropical deciduous forests. These trees are useful for making furniture, transport and constructional material.

Temperate Evergreen Forests

These forests are found in the temperate zones of USA, China and Brazil. Oak, pine and eucalyptus are few examples of temperate evergreen forests. In these types of forests, trees are both hard and soft.

Temperate Deciduous Forests

These forests are found in New Zealand, Chile and Western Europe. Their trees shed their leaves in the dry season. Oak, ash and beech are few examples of temperate deciduous forests.

Mediterranean Forests

These forests are found around the areas that are adjacent to the Mediterranean Sea, south-west USA, south-west Africa, south western South America and south-west Australia. The special characteristic of this region is that summers are hot and dry, and rain happens mostly in winter. Citrus fruits, such as oranges, figs, olives and grapes are the main vegetation of these types of forests.

Taiga Forests

These forests are found at the higher latitudes of the Northern Hemisphere. They are also called coniferous forests. They occupy a very large area in Canada and Russia. Trees are tall and evergreen in these forests. Chir, pine and cedar are few examples of taiga forests. These trees are very useful for making pulp, paper and boxes.

Grasslands

Tropical Grasslands

Tropical grasslands are found at 10° to 20° latitudes on both sides of the equator. This region receives moderate to low rainfall. These areas have tall grasses of 3 to 4 metres in height. The region is also called 'the big game country' because large animals like elephants, zebras, giraffes, deer and leopards are common here.

Temperate Grasslands

Temperate grasslands are found in 30° to 40° north and south latitudinal zones and in the interior parts of continents. In these areas, the grass is shorter than that in tropical grasslands. This region is called 'the bread basket of the world' because its soil is very fertile for crops like wheat and maize.

Different names of tropical grasslands in different places:

East Africa	Savanna
Brazil	Campos
Venezuela	Llanos

Different names of temperate grasslands in different places:

Argentina	Pampas
N. America	Prairie
S. Africa	Veld
C. Asia	Steppe
Australia	Down

Biodiversity

Biodiversity is the number and variety of organisms found within a specified geographic region. It refers to the varieties of plants, animals and micro-organisms, the genes they contain and the ecosystems they form.

Endangered Species

It includes those species which are in danger of extinction. Examples: Asian elephant, Asian lion, blue whale, Red Panda etc.

Vulnerable Species

This includes the species which are likely to be in danger of extinction in near future if the factors threatening to

their extinction continue. Examples: gaur, hippopotamus, Indian rhinoceros, polar bear, sloth bear etc.

RESOURCES

Anything that has a value and can be used to fulfil our needs is called a resource. Resources are evolved with time and technology.

Natural Resources

Resources that are directly extracted from the nature are called natural resources. For example, air, water, soil, mineral, etc. are natural resources.

On the basis of origin, natural resources can be classified as:

- **Abiotic resources** are those resources that are non-living. For example, land, soil, rocks and minerals.
- **Biotic resources** are those resources that are living, e.g. plants and animals.

On the basis of exhaustibility, natural resources are classified as:

- **Renewable resources** can be renewed or reproduced by physical, chemical or mechanical processes. They are unlimited in nature, like solar power, wind, water, forest, wildlife, etc.
- **Non-renewable resources** are limited in nature and can be exhausted. Resources, like coal, petroleum and natural gas take thousands of years to be renewed.

Minerals

Based on the composition, minerals are classified as metallic and non-metallic minerals. Metallic minerals contain metal in raw forms. For example, iron ore, bauxite, manganese ore, etc. Metallic minerals are divided into two categories – ferrous or non-ferrous. Ferrous minerals contain iron, e.g. iron ore, manganese and chromite. A non-ferrous mineral does not contain iron, such as gold, silver, copper and lead. Non-metallic minerals do not contain metals. Limestone, mica, gypsum, coal and petroleum are examples of non-metallic minerals.

Distribution of Minerals

Minerals are found in different types of rocks, such as igneous, metamorphic and sedimentary rocks. Metallic minerals are mostly found in igneous and metamorphic rock formations.

Asia

- Iron ore deposits are found in China and India.
- Tin is found in China, Malaysia and Indonesia.
- China is the leading producer of lead, antimony and tungsten in Asia.
- Manganese, bauxite, nickel, zinc and copper are also found in Asia.

Europe

- In Europe, iron ore are found in Russia, Ukraine, Sweden and France.
- Limestone deposits are found in France, Italy and Serbia.
- Manganese deposits are found in Ukraine.
- Copper, lead, zinc and nickel are mostly found in Russia and capital eastern Europe.

North America

- Iron ore is found in Canadian Shield Region and Pittsburgh region of USA.
- Copper and nickel deposits are mainly found in Ontario (Canada).
- Coal deposits are mostly found in the Appalachians region of USA.
- Gold and silver deposits are found in Canadian Shield and San Francisco (USA).

South America

- In South America, Brazil is the largest producer of high-grade iron ore.
- Copper is found mostly in Chile and Peru.
- Tin is found in Brazil and Bolivia.
- Gold, silver, zinc, chromium, manganese, bauxite, mica, platinum, asbestos and diamond are also found in South America.
- Petroleum products such as oil and gas are found in Venezuela, Argentina, Chile, Peru and Columbia.

Africa

- Africa is the world's largest producer of diamond, gold and platinum.
- Gold is mainly found in South Africa, Zimbabwe and Zaire.
- South Africa is the leading producer of iron, nickel and chromium.
- Copper, uranium, cobalt and bauxite are also found in Africa.
- Phosphate deposits are found in Algeria.
- Petroleum products like oil are mainly found in Nigeria, Libya and Angola.

Australia

- Australia is the largest producer of bauxite in the world.
- Iron ore, tin, nickel and diamond are found in large quantities.
- Copper, lead, zinc and manganese are also found in Australia.
- Gold deposits are found in Western Australia (Kalgoorlie and Coolgardie).

Power Resources

Power resources can be classified as conventional and non-conventional resources. Conventional power resources are those sources of energy which have been in common use for a long time such as firewood and fossil fuels. Some of the major conventional power resources are explained below.

Coal

- Coal is the most commonly used fossil fuel. It is used as a domestic fuel.
- Coal is used in industries such as iron and steel, steam engine and power generation.
- China, USA, India, Germany, Russia, South Africa and France are the leading producers of the coal in the world.
- In India, Raniganj, Jharia, Dhanbad and Bokaro are the main coal-producing places.

Oil

- Oil is a very valuable commodity in today's world. Hence, it is called Black Gold.
- Crude oil is found between the layers of rocks in off-shore and on-shore areas.
- Through drilling process, crude oil is dig dug out and sent to refineries, where it can be converted into diesel, petrol or kerosene.
- Wax, plastics and lubricants are other by-products of crude oil.
- Iran, Iraq, Saudi Arabia, Qatar, USA, Russia, Venezuela and Nigeria are the leading producers of crude oil in the world.
- In India, Digboi (Assam), Bombay High (Mumbai) and the deltas of Krishna and Godavari rivers are the main oil-producing places.

Natural Gas

- Natural gas is found along with the petroleum deposits of crude oil.
- Apart from domestic use, natural gas is used in many industries such as fertiliser, power generation, etc.
- Natural gas is cheaper than oil and easy to transport through pipelines. It is also less polluting than coal and oil.
- Natural gas can be converted into many forms such as CNG, LNG and PNG. Compressed Natural Gas (CNG) is a popular eco-friendly automobile fuel as it causes less pollution than petroleum and diesel.
- Russia, Qatar, Norway and Netherlands are the leading producers of natural gas in the world.
- In India, natural gas is found in Jaisalmer, Krishna-Godavari delta and some off-shore areas of Mumbai.

Hydropower

- Hydropower is generated through dams. River water is stored in dams and made to fall from heights. The falling water passes through turbine blades placed at the bottom of the dam. The moving blades then turn the generator to produce electricity. The electricity produced from this process is called

hydroelectricity. About 25% of the world's electricity is produced by hydropower.

- Hydroelectricity was first developed in Norway. Norway, Finland, Sweden, Brazil, Paraguay and China are the major producers of hydropower.
- In India, Bhakra Nangal, Hirakund dam, Sardar Sarovar, Gandhi Sagar, Nagarjunsagar and Damodar valley are the major hydropower projects.
- The main disadvantage associated with hydropower is that it promotes displacement of local community. Tehri dam in Uttarakhand displaced the whole ancient city of Tehri.

AGRICULTURE

Agriculture is a primary activity. Primary activities are related to extraction and production of natural resources. Apart from agriculture, mining, fishing, etc. are also primary activities. Secondary activities are related to processing and manufacturing of goods. Iron and steel industry, cloth-making industry, etc. are the examples of secondary industry. Tertiary activities are connected to transport, trade, banking, insurance and advertising.

About 50% of the world's population is in agriculture. In India, more than 60% of the people are engaged in agricultural activities. Agricultural system depends upon physical and socio-economic conditions of a particular country.

Some of the other major cultures are following:

- **Sericulture:** Related to rearing of silkworms
- **Pisciculture:** Related to breeding of fish in specially constructed tanks and ponds
- **Viticulture:** Cultivation of grapes
- **Horticulture:** Cultivation of vegetables, flowers and fruits for commercial use

Major Crops

Wheat, rice, maize and millets are the major food crops. Jute and cotton are fibre crops. Tea and coffee are plantation crops.

Rice

Rice is the main food of the countries of tropical zone. It needs high temperature (25°C), high humidity and rainfall (100–200 cm). Alluvial soil is best suited for rice cultivation. China, India, Thailand, Japan, Sri Lanka and Egypt are the major rice producing countries. China is the largest producer of rice. In India, major rice-producing states are West Bengal, Andhra Pradesh, Tamil Nadu and Bihar.

Wheat

Wheat is grown in moderate temperature. It is grown in both temperate and tropical zones. It requires rainfall during growing season and bright sunshine at the time of harvest. Well-drained loamy and alluvial soil is best suited for wheat. China, India, USA, Canada, Argentina, Russia, Ukraine, France and Australia are the major wheat producing countries. In India, major wheat-growing states are Uttar Pradesh, Punjab, Haryana and Madhya Pradesh.

Millets

Millets are grown on less fertile and sandy soils. Millets require less rainfall and moderate temperature. Jowar, bajra and ragi are the major millet crops in India. China, India, Nigeria and Niger are the leading millets-producing countries. In India, Rajasthan, Madhya Pradesh, Karnataka and Maharashtra are the major millets-producing states.

Maize

Maize grows in moderate temperature, rainfall (100 cm) and lots of sunshine. It requires well-drained fertile soils. USA, Mexico, Brazil, China, Russia, Canada and India are the major maize-producing countries. In India, Madhya Pradesh, Andhra Pradesh and Uttar Pradesh are the major maize-producing states.

Cotton

Cotton needs high temperature, moderate rainfall, two-hundred frost-free days and bright sunshine for its growth. Black soil is best suited for the growth of cotton. China, USA, India, Pakistan, Brazil and Egypt are the leading producers of cotton. It is one of the main raw materials for the cotton textile industry. In India, Gujarat,

Maharashtra, Madhya Pradesh and Tamil Nadu are the major cotton-producing states.

Jute

Jute is grown in the tropical zone of high temperature, heavy rainfall and humid climate. It is also known as the 'golden fibre'. Alluvial soil is best suited for jute crop. India and Bangladesh are the leading producers of jute. In India, West Bengal, Tripura and Bihar are the major jute-producing states.

Coffee

Coffee is also a tropical crop, which needs warm and wet climate and well-drained loamy soil. Hill slopes with tree shades are required for suitable growth of coffee. Brazil is the largest producer of coffee in the world. Columbia, India and Peru are the other main coffee producers in the world. In India, Karnataka is the largest coffee-producing state.

Tea

Tea plantation needs moderate temperature, well-distributed high rainfall, well-drained loamy soil and gentle slopes for good growth. Kenya, India, China and Sri Lanka are the leading producers of tea in the world. In India, Assam, West Bengal, Meghalaya and Sikkim are the main tea-producing states.

PHYSIOGRAPHY OF INDIA

The relief and physiography of India has been greatly influenced by the geological and geomorphological processes active in the Indian subcontinent. Physiography of India is the outcome of structure, process and the stage of development. On the basis of macro variations, India can be divided into the following physiographic divisions:

- (1) The Northern and North-eastern Mountains
- (2) The Northern Plain
- (3) The Peninsular Plateau
- (4) The Coastal Plains
- (5) The Islands.

The North and Northeastern Mountains

The North and Northeastern Mountains consist of the Himalayas and the Northeastern hills. Great Himalayas,

Trans-Himalayan, the Middle Himalayas and the Shiwalik are part of north-western Himalaya.

On the basis of relief, alignment of ranges and other geomorphological features, the Himalayas can be divided into the following sub-divisions:

1. Kashmir or Northwestern Himalayas
2. Himachal and Uttaranchal Himalayas
3. Darjiling and Sikkim Himalayas
4. Arunachal Himalayas
5. Eastern Hills and Mountains

Kashmir or Northwestern Himalayas

It consists of the Karakoram, Ladakh, Zaskar and Pir Panjal range. Kashmir valley lies between the Great Himalayas and the Pir Panjal range. Important glaciers are The Baltoro and Siachen. Important passes are Zoji La (Great Himalayas), Banihal (Pir Panjal), Photu La (Zaskar) and Khardung La on the Ladakh range. Important rivers are Indus and its tributaries such as the Jhelum and the Chenab.

The Himachal and Uttarakhand Himalayas

This region of Himalaya is situated between the Ravi in the west and the Kali (a tributary of Ghaghara) in the east. This region is drained the Indus and the Ganga and their tributaries including the river Ravi, the Beas and the Satluj, the Yamuna and the Ghaghara. The Great Himalayan range, the Lesser Himalayas (Dhaoladhar in Himachal Pradesh and Nagtibha in Uttarakhand) and the Shiwalik are part of this region. Important hill stations are Dharamshala, Mussoorie, Shimla, Kasauli, Almora, Lansdowne and Ranikhet.

The Darjiling and Sikkim Himalayas

It is situated between Nepal Himalayas in the west and Bhutan Himalayas in the east. River Tista flows in this region. It is a region of high mountain peaks like Kanchenjunga (Kanchengiri), and deep valleys. The higher reaches of this region are inhabited by Lepcha tribes while the southern part, particularly the Darjiling Himalayas, has a mixed population of Nepalis, Bengalis and tribals from Central India.

The Arunachal Himalayas

The extension of Arunachal Himalayas is from the east of the Bhutan Himalayas up to the Diphu pass in the east. The direction of the mountain range is from southwest to northeast. Important rivers are the Kameng, the Subansiri, the Dihang, the Dibang and the Lohit.

The Eastern Hills and Mountains

Patkai Bum, Naga hills, the Manipur hills, Mizo or Lushai hills are part of this region.

The Northern Plains

The northern plains are formed by the alluvial deposits brought by the rivers – the Indus, the Ganga and the Brahmaputra. From the north to the south, these can be divided into three major zones

Bhabar: Bhabar is a narrow belt ranging between 8-10 km parallel to the Shiwalik foothills at the break-up of the slope.

Tarai: South of the Bhabar is the Tarai belt, with an approximate width of 10-20 km where most of the streams and rivers re-emerge without having any properly demarcated channel, thereby, creating marshy and swampy conditions known as the Tarai.

Bhangar and Khadar: The south of Tarai is a belt consisting of old and new alluvial deposits known as the Bhangar and Khadar respectively.

The Peninsular Plateau

The peninsular plateau has the boundary of Delhi ridge in the northwest, (extension of Aravalis), the Rajmahal hills in the east, Gir range in the west and the Cardamom hills in the south. It also has the an extension in the northeast, in the form of Shillong and Karbi-Anglong plateau. Indian desert is also an extension of the peninsular plateau. On the basis of the prominent relief features, the peninsular plateau can be divided into three broad groups:

The Deccan Plateau

The Deccan plateau has the boundary of Western Ghats in the west, Eastern Ghats in the east and the Satpura,

Maikal range and Mahadeo hills in the north. Anaimudi, the highest peak of Peninsular plateau is located on the Anaimalai hills. Dodabetta is situated on the Nilgiri hills. Important ranges of eastern ghats are Javadi hills, the Palconda range, the Nallamala hills, the Mahendragiri hills, etc. The Eastern and the Western Ghats meet each other at the Nilgiri hills.

The Central Highlands

Vindhyan and Kaimur ranges and Satpura range are part of central Highland. Average heights of Central Highlands ranges between 700-1,000 m above the sea level. An eastern extension of the Central Highland is formed by the Rajmahal hills.

The Northeastern Plateau

It is an extension of the main peninsular plateau. The Garo, Khasi and Jaintia Hills are part of northeastern plateau. An extension of this is also seen in the Karbi Anglong hills of Assam.

The Coastal Plains

The coastal plains are divided into two parts the western coastal plains and eastern coastal plains. The west coast is extended from the Gujarat coast in the north to the Kerala coast in the south. The Kachchh and Kathiawar coast in Gujarat, Konkan coast in Maharashtra, Goan coast and Malabar coast in Karnataka and Kerala respectively are part of western coast.

The eastern coastal plain is wider in comparison to the western coast plain. There are well developed deltas here which include the deltas of the Mahanadi, the Godavari, the Krishna and the Kaveri. Eastern coastal plain has less number of ports and harbours.

The Islands

There are two major island groups in India – one in the Bay of Bengal and the other in the Arabian Sea. The Bay of Bengal island groups consist of about 572 islands. Andaman and Nicobar islands are separated by the Ten degree channel. Barren Island, the only active volcano in India is situated in the Nicobar Islands. Arabian Islands consists of 36 islands including Lakshadweep and Minicoy.

RIVERS OF INDIA

The Indus

Total length of Indus river is 2,880 km (in India 1,114 km). It is the westernmost of the Himalayan Rivers in India. It originates from a glacier near Bokhar Chu in the Tibetan region in the Kailash Mountain range. It flows between Ladakh and Zaskar. The main tributaries of Indus are Shyok, the Gilgit, the Zaskar, the Hunza, the Nubra, the Shigar, the Gasting and the Dras. The Indus flows in India only through the Leh district in Jammu and Kashmir. It finally discharges into the Arabian Sea, east of Karachi. The Panjnad is the name given to the five rivers of Punjab, namely the Satluj, the Beas, the Ravi, the Chenab and the Jhelum.

The Ganga

The Ganga originates in the Gangotri glacier near Gaumukh in the Uttarkashi district of Uttarakhand. Here, it is known as the Bhagirathi. At Devprayag, the Bhagirathi meets the Alaknanda; hereafter, it is known as the Ganga.

The Alaknanda has its source in the Satopanth glacier above Badrinath. Alaknanda meets with Pindar at Karna Prayag while Mandakini or Kali Ganga meets it at Rudra Prayag. The Ganga enters the plains at Haridwar and discharges itself into the Bay of Bengal near the Sagar Island. The Ganga river system has a length of 2,525 km.

The Yamuna

The Yamuna is the western most and the longest tributary of the Ganga. It originates in the Yamunotri glacier of Banderpunch range. It meets with Ganga at Praya. Its right bank tributaries are Chambal, the Sind, the Betwa and the Ken. While the Hindan, the Rind, the Sengar, the Varuna, etc. are its left bank tributaries.

The Son

The Son tributary originates in the Amarkantak plateau. It is the right bank of Ganga. After forming a series of waterfalls at the edge of the plateau, it reaches Arrah, west of Patna, to join the Ganga.

The Brahmaputra

The Brahmaputra originates from the Chemayungdung glacier of the Kailash range near the Mansarovar lake.

In Tibet it is known as the Tsangpo. It enters India with a name of Dihang to the west of Sadiya town in Arunachal Pradesh. Its left bank tributaries are Dibang and Lohit. The Brahmaputra enters into Bangladesh near Dhubri and flows southward. In Bangladesh, the Tista joins it on its right bank from where the river is known as the Yamuna. It finally merges with the river Padma, which falls in the Bay of Bengal.

The Mahanadi

The Mahanadi originates near Sihawa in Raipur district of Chhattisgarh and runs through Odisha to discharge its water into the Bay of Bengal. It is 851 km long. The drainage basin of this river lies in Madhya Pradesh, Chhattisgarh and Odisha.

The Godavari

The Godavari is the largest Peninsular river system. It is also called the Dakshin Ganga. It rises in the Nasik district of Maharashtra and discharges its water into the Bay of Bengal. Its tributaries run through the states of Maharashtra, Madhya Pradesh, Chhattisgarh, Odisha and Andhra Pradesh. It is 1,465 km long. The Penganga, the Indravati, the Pranhita, and the Manjra are its principal tributaries.

The Krishna

The Krishna rises near Mahabaleshwar in Sahyadri. Its total length is 1,401 km. The Koyna, the Tungbhadra and the Bhima are its major tributaries. It flows in Maharashtra, Karnataka and Andhra Pradesh.

The Kaveri

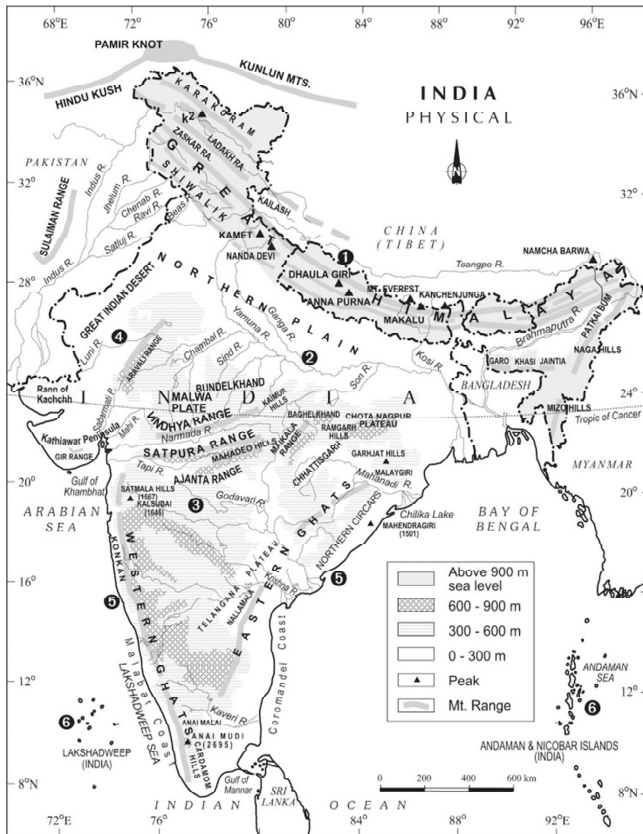
The Kaveri rises in Brahmagiri hills of Kogadu district in Karnataka. Its length is 800 km. Kaveri basin falls in Kerala, Karnataka and Tamil Nadu. Its important tributaries are the Kabini, the Bhavani and the Amravati.

The Narmada

The Narmada originates on the western flank of the Amarkantak plateau. Narmada river flows in a rift valley between the Satpura in the south and the Vindhyan range in the north. Total length of this river is 1312 km.

The Tapi

The Tapi originates from Multai in the Betul district of Madhya Pradesh. It is 724 km long. Its basin lies in Maharashtra, Madhya Pradesh and Gujarat.



SOIL AND NATURAL VEGETATION

Soil is the mixture of rock debris and organic materials which develop on the earth's surface. Mineral particles, humus, water and air are the main component of soil. The major factors that affect the formation of soil are relief, parent material, climate, vegetation, time and human activities.

On the basis of genesis, colour, composition and location, the soils of India have been classified into:

Alluvial Soils

Alluvial soils are found in the northern plains, river valleys, plains of Gujarat and deltas of the east coast. These soils cover about 40 per cent of the total area of the country. They are generally rich in potash but poor in phosphorous. Khadar is the new alluvial soil and Bhangar is old alluvial soil. Alluvial soils are the most useful soil type for agriculture.

Black Soil

Black soil or regur soil is found on the Deccan Plateau which includes parts of Maharashtra, Madhya Pradesh,

Gujarat, Andhra Pradesh and some parts of Tamil Nadu. It is most useful in cotton cultivation.

Red and Yellow Soil

Red soil is found in the eastern and southern part of the Deccan Plateau, parts of Odisha and Chattisgarh and in the southern parts of the middle Ganga plain. The soil develops a reddish colour due to iron. These soils are poor in nitrogen, phosphorous and humus.

Laterite Soil

The laterite soils are found in the areas of high temperature and high rainfall. The laterite soils are commonly found in Karnataka, Kerala, Tamil Nadu, Madhya Pradesh and the hilly areas of Odisha and Assam.

Laterite soils are rich in iron oxide, aluminium and potash. These soil are not very suitable for cultivation.

Arid Soils

Arid soils are developed in western Rajasthan. These soils are poor and contain little humus and organic matter. These soils are also poor in Nitrogen and phosphate. Arid soils are red to brown in colour.

Saline Soils

Saline soil are founds in area of arid and semi-arid regions like western Gujarat, deltas of the eastern coast and some areas of Punjab and Haryana.

SOIL EROSION

Soil erosion is defined as the destruction of the soil cover. Sheet erosion takes place on level lands after a heavy shower. It removes the finer and more fertile top soil. Gully erosion is common on steep slopes. Gullies deepen with rainfall, cut the agricultural lands into small fragments and make them unfit for cultivation. Contour bunding, Contour terracing, regulated forestry, controlled grazing, cover cropping, mixed farming and crop rotation are the some of the method of soil conservation

FOREST COVER IN INDIA

Forest area covers 23.28 per cent of the total land area of the country. Madhya Pradesh has the largest forest cover in terms of area in the country followed by

Arunachal Pradesh. In terms of percentage of forest cover with respect to total geographical area, Mizoram had the highest forest cover followed by Lakshadweep.

Biosphere Reserves

There are 18 Biosphere Reserves in India .Ten Biosphere Reserves, namely Nilgiri, Nanda Devi, Sunderbans, Gulf of Mannar, Norkek, Pachmarhi, Simlipal, Achanakmar-Amarkantak, Nicobar Island and Agasthyamala Biosphere Reserve have been recognised by the UNESCO on World Network of Biosphere Reserves.

MINERAL AND ENERGY RESOURCES

Important minerals and their leading producing states are following-

Iron Ore

Orissa: Gurumahisani, Sulaipet, Badampahar (Mayurbhuj), Kiruburu (Kendujhar) and Bonai (Sundergarh).

Jharkhand: Noamundi and Pashchimi Singhbhum

Chhattisgarh: Durg (Dalli and Rajhara), Dantewara and Bailadila

Karnataka: Sandur-Hospet (Bellary), Kudremukh (Chikmagalur), Shimoga, Chitradurg and Tumkur

Maharashtra: Chandrapur, Bhandara and Ratnagiri

Andhra Pradesh: Karimnagar, Warangal, Kurnool, Cuddapah and Anantapur

Tamil Nadu: Salem and Nilgiris

Manganese

Orissa: Bonai, Kendujhar, Sundergarh, Gangpur, Koraput, Kalahandi and Bolangir.

Karnataka: Dharwar, Bellary, Belgaum, North Canara, Chikmagalur, Shimoga, Chitradurg and Tumkur.

Maharashtra: Nagpur, Bhandara and Ratnagiri districts.

Madhya Pradesh: Balaghat-Chhindwara-Nimar-Mandla and Jhabua districts.

Bauxite

Orissa: Kalahandi, Sambalpur, Bolangir and Koraput

Jharkhand: Lohardaga

Gujarat: Bhavanagar, Jamnagar

Chhattisgarh: Amarkantak plateau

M.P.: Katni-Jabalpur and Balaghat

Maharashtra: Kolaba, Thane, Ratnagiri, Satara, Pune and Kolhapur

Copper

Jharkhand: Singhbhum

Madhya Pradesh: Balaghat

Rajasthan: Jhunjhunu and Alwar

Mica

Jharkhand: Hazaribagh plateau

Andhra Pradesh: Nellore

Rajasthan: Bhilwara and Udaipur

Karnataka: Mysore and Hasan

Tamil Nadu: Coimbatore, Tiruchirapalli, Madurai and Kanniyakumari

Coal

Jharkhand-Bengal belt: Raniganj, Jharia, Bokaro, Giridih, Karanpura.

Madhya Pradesh: Singrauli

Orissa: Talcher and Rampur

Chhattisgarh: Korba

Maharashtra: Chanda-Wardha, Kamptee and Bander

Andhra Pradesh: Singareni and Pandur

Petroleum

Assam: Digboi, Naharkatiya and Moran

Gujarat: Ankaleshwar, Kalol, Mehsana, Nawagam, Kosamba and Lunej.

Maharashtra: Mumbai High

Andhra Pradesh: Krishna-Godavari and Kaveri basin

Nuclear Energy Resources

Uranium deposits occur in the Dharwar rocks. Geographically, uranium ores are known to occur in several locations along the Singhbhum Copper belt. It is also found in Udaipur, Alwar and Jhunjhunu districts of

Rajasthan, Durg district of Chhattisgarh, Bhandara district of Maharashtra and Kullu district of Himachal Pradesh. Thorium is mainly obtained from monazite and ilmenite in the beach sands along the coast of Kerala and Tamil Nadu.

The important nuclear power projects are at Tarapur (Maharashtra), Rawatbhata near Kota (Rajasthan), Kalpakkam (Tamil Nadu), Narora (Uttar Pradesh), Kaiga (Karnataka) and Kakrapar (Gujarat).

MAJOR INDUSTRIES

The Iron and Steel Industry

Tata Iron and Steel plant (TISCO) – Jamshedpur (Jharkhand)

Rourkela Steel Plant – Sundargarh (Orissa)

Bhilai Steel Plant – Durg (Chhattisgarh)

Durgapur Steel Plant – West Bengal,

Bokaro Steel Plant – Bokaro (Jharkhand)

The Cotton Textile Industry

Tamil Nadu: Coimbatore, Chennai, Madurai, Tirunelveli, Tuticorin, Thanjavur, Ramanathapuram and Salem

Karnataka: Davangere, Hubli, Bellary, Mysore and Bangalore

Telangana: Hyderabad, Secunderabad, Warangal and Guntur.

Uttar Pradesh: Kanpur, Modinagar, Hathras, Saharanpur, Agra and Lucknow

West Bengal: Hugli, Howrah, Serampur, Kolkata and Shyamnagar

Sugar Industry

Uttar Pradesh: Saharanpur, Muzaffarnagar, Meerut, Bulandshahr, Basti, Gorakhpur, Bahraich

Maharashtra: Sangli, Solapur, Satara, Ahmednagar, Pune, Nasik

Tamil Nadu: Coimbatore, Vellore, Tiruvanamalai, Villupuram and Tiruchchirappalli

Karnataka: Belgaum, Bellary, Mandya, Shimoga, Bijapur, and Chitradurg

Andhra Pradesh: East Godavari, West Godavari and Vishakhapatnam

Telangana: Nizamabad, and Medak

Haryana: Yamuna Nagar, Rohtak, Hissar and Faridabad

Gujarat: Surat, Junagarh, Rajkot, Amreli, Valsad and Bhavnagar

Petrochemical Industries

Maharashtra: Mumbai, Thane, Ratnagiri

Gujarat: Jamnagar, Gandhinagar and Hajira

Uttar Pradesh: Auraiya

West Bengal: Haldia

Andhra Pradesh: Vishakhapatnam

TRANSPORT

Transport is the means by which people and goods move. Means of transport have evolved rapidly in the course of time, especially during the last century. Today is the era of jet aircrafts and bullet trains, but in many parts of rural India, people still use animals for transportation.

Road Transport

Road is the most preferred mode of transport, especially for the shorter distance. India has one of the largest road networks in the world. Road networks are divided into National Highways (NH), State Highways (SH) and rural roads.

Some of the features of road transport in India are as follows:

- In India about 3/4th of passenger and 2/3rd of freight traffic are carried by roads every year.
- The density of road is high in the plains of northern states and major southern states. It is low in the Himalayan region, north-eastern region, Madhya Pradesh and Rajasthan.
- Grand Trunk (GT) road built by Sher Shah Suri connect Amritsar to Kolkata.
- National Highway-7 is the longest national highway, which connects Varanasi to Kanyakumari via Jabalpur, Nagpur, Hyderabad, Bangalore and Madurai.

- National Highway-8 connects Delhi to Mumbai.
- Golden Quadrilateral connects four big metro cities of Delhi-Mumbai-Chennai-Kolkata.
- North-South Corridor connects Srinagar to Kanyakumari.
- East-West Corridor connects Silchar (Assam) to Porbandar (Gujarat).
- The length of the National Highways has increased from 19,700 km in 1951 to 92851.07 in 2014.

Rail Transport

After industrial revolution, rail transport increased rapidly. Transportation of heavy goods with faster speed became possible through rail transport. India has one of the largest railways networks in the world. In the country, the first train ran between Bombay and Thane in 1853. In India there are total seventeen Railway zones. The railway network is dense in the plane states of Uttar Pradesh, Bihar, West Bengal and Punjab but less dense in the hill states and north eastern states. The Metro

Railway of Kolkata became the 17th independent zone of the Indian Railways.

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

PRACTICE QUESTIONS

Answer the following questions by selecting the most appropriate option.

1. **The point in the crust where earthquake waves start is called**
 - (1) centre
 - (2) focus
 - (3) epicentre
 - (4) crater
2. **Which of the following represents the inner planets?**
 - (1) Planets between the Sun and the Earth
 - (2) Planets between the Sun and the main belt of asteroids
 - (3) Planets in gaseous state
 - (4) Planets without satellite(s)
3. **Earth is surrounded by a layer of gases called**
 - (1) ozone
 - (2) nitrogen
 - (3) environment
 - (4) atmosphere
4. **Which of the following gases has the highest concentration in the atmosphere?**
 - (1) Oxygen
 - (2) Nitrogen
 - (3) Argon
 - (4) Carbon dioxide
5. **Which of the following types of economic activities dominate in rural settlements?**
 - (1) Primary
 - (2) Secondary
 - (3) Tertiary
 - (4) Quaternary
6. **Which of the following is an after-effect of burning of fossil fuels?**
 - (1) Climate change
 - (2) Depletion of ozone layer
 - (3) Acid rain
 - (4) Smog
7. **Natural resources include**
 - (1) minerals
 - (2) air
 - (3) soil
 - (4) all of the above
8. **Steel is an alloy of**
 - (1) tin
 - (2) copper
 - (3) iron
 - (4) zinc
9. **Which of the following is not an area of sparse population?**
 - (1) Atacama
 - (2) Equatorial region
 - (3) South-east Asia
 - (4) Polar Regions
10. **Which of the following describes the lithosphere?**
 - (1) Upper and lower mantle
 - (2) Crust and core
 - (3) Crust and upper mantle
 - (4) Mantle and core
11. **Which of the following major diseases is caused by ultraviolet radiations?**
 - (1) Liver cancer
 - (2) Skin cancer
 - (3) Neurological disorder
 - (4) Blood cancer
12. **Which of the following is a major consequence of depletion of the ozone layer?**
 - (1) The average concentration of oxygen is diminishing.
 - (2) The amount of ultraviolet radiation is increasing on the Earth's surface.
 - (3) The water level of seas is gradually rising due to the melting of polar ice.
 - (4) The temperature of the Earth's surface is increasing gradually.
13. **Which of the following is not a major consequence of global warming?**
 - (1) The agricultural productivity is increasing simultaneously.
 - (2) The average concentration of carbon dioxide in the atmosphere is rising.
 - (3) The water level of seas is gradually rising due to the melting of polar ice.
 - (4) The temperature of the Earth's surface is increasing gradually.
14. **How do humans largely impact the environment?**
 - (1) By hunting and gathering
 - (2) By industrialisation
 - (3) By agricultural activities
 - (4) All of the above
15. **What were the gases that initially formed the Earth's atmosphere?**
 - (1) Oxygen
 - (2) Nitrogen, carbon dioxide and methane
 - (3) Hydrogen and helium
 - (4) Argon and neon
16. **Which of the following is the most important mode of transport in India?**
 - (1) Pipeline
 - (2) Roadways
 - (3) Railways
 - (4) Airways
17. **Which of the following is/are correctly matched?**
 - (I) Vishakhapatnam: Tidal port
 - (II) Kolkata: Riverine port
 - (III) Kandla: Landlocked port

Choose the correct answer.

 - (1) Only II
 - (2) Only III
 - (3) II and III
 - (4) I, II and III

- 18. Which of the following produces wealth and provides work for generations by not altering the environment?**
- (1) Green revolution
 - (2) Self-sufficiency
 - (3) Sustainable economy
 - (4) Sustainability
- 19. The Golden Quadrilateral of India connects which of the following places?**
- (1) Srinagar—Porbandar—Kanyakumari—Silchar
 - (2) Delhi—Mumbai—Chennai—Kolkata
 - (3) Delhi—Mumbai—Kanyakumari—Kolkata
 - (4) Jammu—Ahmedabad—Chennai—Kolkata
- 20. Which of the following is the most abundant element in the Earth's crust?**
- (1) Oxygen
 - (2) Silica
 - (3) Iron
 - (4) Aluminum
- 21. Which of the following Indian states has the largest resources of copper ore?**
- (1) Bihar
 - (2) Jharkhand
 - (3) Rajasthan
 - (4) Odisha
- 22. Quality of population depends upon _____**
- (1) literacy rate
 - (2) health of people
 - (3) skill formation
 - (4) all of the above
- 23. Which of the following gases has the highest concentration in the atmosphere after nitrogen?**
- (1) Oxygen
 - (2) Nitrogen
 - (3) Argon
 - (4) Carbon dioxide
- 24. Manipur has common boundaries with the group of states of**
- (1) Nagaland, Assam and Mizoram
 - (2) Nagaland, Meghalaya and Tripura
 - (3) Meghalaya, Mizoram and Tripura
 - (4) Nagaland, Mizoram and Meghalaya
- 25. Which of the following is not a layer of atmosphere?**
- (1) Troposphere
 - (2) Stratosphere
 - (3) Lithosphere
 - (4) Thermosphere
- 26. The temperature falls towards the poles due to _____.**
- (1) heavy snowfalls in polar regions
 - (2) polar regions being largely nearby the sea coast
 - (3) polar regions being lower than the equatorial region
 - (4) the intensity of insolation varying from the equator towards polar regions
- 27. Which of the following statements is correct about the ecosystem?**
- (1) It supports only biotic elements.
 - (2) It supports only abiotic elements.
 - (3) It is the relation between plant and animal kingdoms.
 - (4) It is the interaction between organisms and their relations with the surroundings.
- 28. Which of the following statements about the Earth's crust is correct?**
- (1) Its thickness is about 500 km on continents.
 - (2) On oceanic floors, its thickness is about 5 km.
 - (3) Its continental mass is known as Sial.
 - (4) The oceanic crust is known as Sima.
- 29. Which of the following statements about extrusive igneous rocks is not correct?**
- (1) They are also known as volcanic igneous rocks.
 - (2) Their crystals are big.
 - (3) The Deccan Plateau of south India is made of volcanic rocks.
 - (4) Basalt is a common extrusive igneous rock.
- 30. Which of the following statements about sedimentary rocks is not correct?**
- (1) They are made due to the effect of pressure.
 - (2) They are crystalline in nature.
 - (3) They contain fossils of animals and plants.
 - (4) Sandstone is an example of sedimentary rocks.
- 31. Which of the following statements about metamorphic rocks is not correct?**
- (1) They are made from igneous and sedimentary rocks.
 - (2) Heat and pressure play a key role in their formation.
 - (3) Minerals are not found in them.
 - (4) Coal is an example of metamorphic rocks.
- 32. Which of the following trees is not found in tropical rainforests?**
- (1) Mahogany
 - (2) Ebony
 - (3) Rosewood
 - (4) Sal
- 33. Which of the following statements about the hydrosphere is not incorrect?**
- (1) It consists of all water bodies of the Earth.
 - (2) Of the total amount of water found on the Earth, 70% is in the form of oceans.
 - (3) 20% water is available in the form of ice sheets, glaciers and underground water.
 - (4) Only 10% of water is available as fresh water for human use.
- 34. Which of the following statements about oceans is correct?**
- (1) Atlantic Ocean is the third largest ocean in the world.
 - (2) In terms of commerce, Pacific Ocean is the busiest ocean.
 - (3) Indian Ocean is the only ocean named after a country.
 - (4) Southern Ocean encircles the Arctic Ocean.

- 35. Which of the following is not correct about tropical evergreen forests?**
(1) Presence of tall, closely grown trees with crowns forming a continuous canopy
(2) Coexistence of a large number of species
(3) Presence of numerous varieties of epiphytes
(4) Trees shedding their leaves in dry seasons
- 36. Which of the following statements about the atmosphere is incorrect?**
(1) It protects us from the harmful effects of ultraviolet rays.
(2) 99% of it is made up of nitrogen and oxygen.
(3) Troposphere is its lowest layer.
(4) Its density increases when we go up from the sea level.
- 37. Which of the following is an important variety of taiga forests?**
(1) Rosewood (2) Pine
(3) Teak (4) Fig
- 38. Steppe grasslands are found in _____.**
(1) Canada (2) Australia
(3) Ukraine (4) Brazil
- 39. Which was the first hydroelectric power project in India?**
(1) Shivanasamudra in Karnataka
(2) Palli Vasal in Kerala
(3) Paikara in Tamil Nadu
(4) Nizamnagar in Andhra Pradesh
- 40. Which of the following statements about the Earth's crust is not correct?**
(1) It is the outermost solid part of the Earth.
(2) It is made up of heavier rocks.
(3) It is mostly made up of iron and nickel.
(4) Its thickness varies.
- 41. Which of the following statements about the Earth's core is not correct?**
(1) It is made up of very heavy material, mostly consisting of nickel and iron.
(2) The outer core is in solid state, while the inner core is in liquid state.
(3) The core-mantle boundary is located at a depth of 2,900 km.
(4) The density at the centre of the Earth is around 13g/cm³.
- 42. Which of the following statements about earthquakes is not correct?**
(1) The point in the crust where the movement starts is called the hypocentre.
(2) The place on the surface above the hypocentre is called the focus.
(3) The maximum damage occurs at closest to the epicentre.
(4) The magnitude of earthquakes is measured on the Richter scale.
- 43. Which of the following is not correctly matched?**
(1) Basalt : Schist (2) Shale : Slate
(3) Granite : Quartzite (4) Peat : Coal
- 44. Which of the following is not a Union Territory?**
(1) Nagaland
(2) Puducherry
(3) Lakshadweep
(4) Dadra and Nagar Haveli
- 45. Which of the following is not correctly matched?**
(1) Argentina : Pampas
(2) North America : Prairie
(3) Australia : Veld
(4) Central Asia : Steppe
- 46. Oak, ash and beech trees grow in which of the following forests?**
(1) Coniferous forests
(2) Tropical rain forests
(3) Temperate deciduous forests
(4) Tropical deciduous forests
- 47. In which of the following states are Garo and Khasi tribes found?**
(1) Arunachal Pradesh (2) Nagaland
(3) Meghalaya (4) Mizoram
- 48. Which of the following is the renewable source of energy?**
(1) Coal (2) Solar energy
(3) Petroleum (4) Uranium
- 49. Generally, atmosphere can be classified in _____ layers.**
(1) three (2) fourth
(3) five (4) Six
- 50. In which of the following radio waves are found?**
(1) Stratosphere (2) Ionosphere
(3) Exosphere (4) Troposphere
- 51. The equatorial low pressure belts represent**
(1) the zone of convergence of northeast and southeast trade winds
(2) the zone of convergence of northwest and southwest trade winds
(3) the zone of divergence of northeast and southeast trade winds
(4) the zone of divergence of northwest and southwest trade winds
- 52. The earth is heated by**
(1) radiation from the nuclear reactor
(2) incoming solar radiation
(3) energy from the core of earth
(4) atmospheric pressure
- 53. The process of condensation**
(1) conducts heat from the cooler to warmer regions
(2) conducts heat from the warmer to colder regions

- (3) changes the gaseous state of matter to the physical state
(4) None of the above
- 54. Which of the following winds blows in almost same direction throughout the year?**
(1) Planetary winds (2) sea wind
(3) Seasonal wind (4) Local winds
- 55. In which belt does the Inter-Tropical Convergence Zone (ITCZ) lie?**
(1) Doldrums
(2) Northeast Trade Wind Belt
(3) Southeast Trade Wind Belt
(4) Polar Easterlies
- 56. Which of the following is true for the prevailing westerlies?**
(1) It blows from equatorial high pressure belt to polar low pressure belt.
(2) It blows from east to west
(3) It is a seasonal wind.
(4) It blows from sub-tropical high pressure to sub-polar low pressure belt.
- 57. Which of the following factor does not affect the flow of wind?**
(1) pressure belts
(2) rotation of earth
(3) atmospheric heating
(4) ocean currents
- 58. Which of the following process settles down the heavier soil particles at the bottom of a beaker contained with soil-water mixture?**
(1) Sedimentation (2) Decantation
(3) Filtration (4) Chlorination
- 59. The depletion of oxygen from the water bodies is due to**
(1) the suspended particles in air
(2) inorganic waste
(3) organic waste
(4) viruses and parasitic worms
- 60. Which river originates from the Angsi glacier?**
(1) Brahmaputra (2) Indus
(3) Ganges (4) Mahanadi
- 61. Which of the following is correct in context of sea breeze?**
(1) The air flowing towards the land from the sea
(2) The air flowing towards the sea from the land
(3) The air flowing towards the sea from the mountains
(4) The air flowing towards the sea from the rivers
- 62. Which of the following countries in the world is ranked first in wheat production?**
(1) India (2) China
(3) USA (4) Japan
- 63. Which of the following countries is the largest producer of tobacco in the world?**
(1) Brazil (2) India
(3) China (4) USA
- 64. Rabi crops are grown during _____ in India.**
(1) January-March (2) March-June
(3) October-December (4) During whole year
- 65. Which of the following rivers of India flows through rift-valley?**
(1) Kaveri (2) Tapti
(3) Son (4) Ken
- 66. Which of the following is not a Rabi crop?**
(1) Rice (2) Wheat
(3) Mustard (4) Barley
- 67. Solar eclipse occurs when:**
(1) the Moon comes between the Sun and the Earth.
(2) the Sun comes between the Moon and the Earth.
(3) the Earth comes between the Moon and the Sun.
(4) the Moon does not lie on the line joining the Sun and the Earth.
- 68. In which of the following months Kharif crops are sown?**
(1) March (2) May
(3) June (4) July
- 69. The largest producer of rice in India is**
(1) Uttar Pradesh (2) Andhra Pradesh
(3) West Bengal (4) Bihar
- 70. Which one of the following is not true about energy resources?**
(1) Non-renewable resources are unlimited in nature.
(2) Non-renewable resources can be exhausted.
(3) Abiotic resources are non-living resources.
(4) Biotic resources are living resources.
- 71. Which of the following statements about the resources is incorrect?**
(1) Thorium deposits in Kerala is a potential resource.
(2) Coal is a ubiquitous resource.
(3) Black soils of the Deccan Plateau are actual resources.
(4) Deposits of petroleum are actual resource.
- 72. Which of the following is not a principle of sustainable development?**
(1) Respect and care for only human life
(2) Focus on human development
(3) Protection and conservation of natural resources
(4) Increase environmental awareness

- 73. Which of the following countries has the highest percentage of area under forest cover?**
(1) Brazil (2) China
(3) Russia (4) USA
- 74. Which of the following soils is the most infertile one?**
(1) Alluvial Soil (2) Laterite Soil
(3) Peaty Soil (4) Black Cotton Soil
- 75. Spot the odd item of the following:**
(1) Marble (2) Limestone
(3) Sandstone (4) Shale
- 76. Which one of the following statements about petroleum is incorrect?**
(1) Petroleum products are found both off-shore and on-shore.
(2) Wax, plastics and lubricants are other by-products of crude oil.
(3) Oil is also called 'Black Gold'.
(4) In India, oil is produced only from off-shore areas.
- 77. Which one of the following is a non-metallic mineral?**
(1) Iron (2) Bauxite
(3) Manganese (4) Mica
- 78. The National Park 'Valley of Flowers' lies in the state of**
(1) Kerala (2) Himachal Pradesh
(3) Uttarakhand (4) Jammu & Kashmir
- 79. Which one of the following is a ferrous mineral?**
(1) Gold (2) Silver
(3) Chromite (4) Copper
- 80. Light year is a unit of:**
(1) Current (2) Distance
(3) Time (4) Light
- 81. Which one of the following statements is incorrect about wheat cultivation?**
(1) Wheat is grown only in temperate zones.
(2) It requires rainfall during growing season and bright sunshine at the time of harvest.
(3) Well-drained loamy and alluvial soil is best suited for wheat.
(4) China is the largest producer of wheat in the world.
- 82. The Suez Canal connects**
(1) Red Sea and Arabia Sea
(2) Red Sea and Black Sea
(3) Mediterranean Sea and Red Sea
(4) Mediterranean Sea and Black Sea
- 83. Which is the largest producer of the copper in the world?**
(1) Chile (2) Peru
(3) USA (4) China
- 84. Golden Temple is situated in**
(1) Amritsar (2) Mumbai
(3) New Delhi (4) Agra
- 85. Which of the following regions is called the 'granary of the world'?**
(1) Temperate grasslands
(2) British type vegetation
(3) Laurentian type vegetation
(4) Tropical grasslands
- 86. Which is the largest producer of bauxite in the world?**
(1) Brazil (2) Australia
(3) South Africa (4) China
- 87. Which of the following minerals is mostly used in electronics industry?**
(1) Aluminium (2) Copper
(3) Tin (4) Silicon
- 88. Which of the following states of India has the maximum thorium deposits?**
(1) Karnataka (2) Kerala
(3) Maharashtra (4) Tamil Nadu
- 89. Which of the following places of India does not have a nuclear power station?**
(1) Tarapur (2) Kota
(3) Kochi (4) Kalpakkam
- 90. Which one of the following is incorrectly matched?**
(1) Sericulture: Rearing of silkworms
(2) Pisciculture: Breeding of earthworms
(3) Viticulture: Cultivation of grapes
(4) Horticulture: Cultivation of vegetables, flowers and fruits
- 91. Which of the following is the largest producer of maize in the world?**
(1) China (2) USA
(3) India (4) Brazil
- 92. The longest river of Europe is**
(1) Rhone (2) Rhine
(3) Volga (4) Danube
- 93. Which of the following state does not share its border with Pakistan?**
(1) Gujarat (2) Madhya Pradesh
(3) Jammu and Kashmir (4) Rajasthan
- 94. The large coffee plantation in Brazil is called**
(1) Fazenda (2) Ranch
(3) Pampas (4) Estancia
- 95. Which of the following statements is incorrect about rice cultivation?**
(1) It is mainly grown in countries of tropical zone.
(2) Rice needs high temperature and high humidity.
(3) Alluvial soil is best suited for rice cultivation.
(4) India is the largest producer of rice.

- 96. Spring tides occur on**
(1) full moon day as well as on new moon day
(2) new moon day only
(3) the day when the moon's position is in its first quarter
(4) full moon day only
- 97. Which of the following statements is incorrect about cotton cultivation?**
(1) Cotton needs high temperature and moderate rainfall.
(2) Two-hundred frost-free days are required for good growth.
(3) Red soil is best suited for the growth of cotton.
(4) India is the largest producer of the cotton in the world.
- 98. Which of the following is not a characteristic feature of dairy farming?**
(1) It is highly labour intensive.
(2) It is very capital intensive.
(3) The locations of dairy farms should be far from the cities.
(4) The facilities of storage, transportation and refrigeration are necessary.
- 99. What are the main characteristics of mixed farming?**
(1) Commercial crop and food crop are grown together.
(2) Crops are grown with trees.
(3) It comprises the growing of crops and the raising of livestock.
(4) Many crops are grown in a single farmland.
- 100. Intensive subsistence agriculture is practiced in**
(1) France (2) Australia
(3) India (4) Israel
- 101. Kaziranga National Park is in the state of**
(1) Bihar (2) Tamil Nadu
(3) Assam (4) Kerala
- 102. Which of the following statements about tides is incorrect?**
(1) Tides are caused by the pull of the moon's gravity.
(2) The moon's attraction power on earth is half as strong as the sun's.
(3) Spring tides occur when the sun, the moon and the earth are in the same line.
(4) When the sun and moon are at right angles to each other, lowest tides occur.
- 103. The study of earthquakes and their bearings on the internal structure of the Earth is called**
(1) seismology
(2) hydrology
(3) oceanography
(4) glaciology
- 104. Which of the following planets is closest to the Sun?**
(1) Mercury (2) Mars
(3) Earth (4) Venus
- 105. Which of the following causes seasons and years on the Earth?**
(1) Earth's rotation about its axis
(2) Earth's revolution around the Sun
(3) Earth's inclination at an angle of 66.5°
(4) Earth's movement from west to east
- 106. Tropic of Cancer is located on the globe at**
(1) 66.5° north (2) 66.5° south
(3) 23.5° north (4) 23.5° south
- 107. Which among the following is not a terrestrial planet?**
(1) Mercury (2) Venus
(3) Uranus (4) Earth
- 108. Which among the following is/are a/the gaseous planet(s)?**
(1) Jupiter (2) Saturn
(3) Neptune (4) All of the above
- 109. Latitudes are**
(1) the imaginary horizontal lines that give the location of a place as north or south of the equator
(2) the imaginary vertical lines that give the location of a place as east or west of the meridian
(3) the imaginary horizontal lines that give the location of different continents
(4) the imaginary vertical lines that give the location of different continents
- 110. Earth looks slightly flattened at**
(1) North Pole
(2) South Pole
(3) Both North and South Poles
(4) In the middle
- 111. How many parallels of latitude are there in the globe?**
(1) 360 (2) 180
(3) 90 (4) 45
- 112. Digboi Oil refinery is located in the state of**
(1) Punjab (2) Assam
(3) Gujarat (4) Bihar
- 113. The world famous 'Khajuraho' Temple is in**
(1) Orissa (2) Madhya Pradesh
(3) Gujarat (4) Karnataka
- 114. Choose the option which represents the correct arrangement of atmospheric layers.**
(1) Mesosphere, Ionosphere, Ecosphere, Troposphere, Stratosphere
(2) Troposphere, Stratosphere, Mesosphere, Ionosphere, Ecosphere

- (3) Ecosphere, Troposphere, Ionosphere, Mesosphere, Stratosphere
 (4) Ionosphere, Ecosphere, Mesosphere, Stratosphere, Troposphere

115. The neighbouring country of India which has the smallest area is

- (1) Sri Lanka (2) Bangladesh
 (3) Bhutan (4) Nepal

116. The study of soil is called

- (1) pedology (2) climatology
 (3) hydrology (4) oceanography

117. The largest coral reef in the world is found near the Eastern coast of

- (1) Japan (2) China
 (3) Cuba (4) Australia

118. Kollur mine, famous for its diamonds, is situated in:

- (1) Madhya Pradesh (2) Andhra Pradesh
 (3) Telangana (4) Tamil Nadu

119. In which of the following orbits do all the planets revolve around the Sun?

- (1) Galactocentric orbit
 (2) Elliptical orbit
 (3) Geocentric orbit
 (4) Lunar orbit

120. Time taken by a ray of sun to reach the Earth is

- (1) 8 seconds (2) 8 minutes
 (3) 8 hours (4) a year

121. Which of the following is correct?

- (1) Tropic of Capricorn passes through India.
 (2) Equator passes through India.
 (3) Equator passes through Britain.
 (4) Tropic of Cancer passes through China.

122. Summer solstice happens on

- (1) 22 June (2) 21 June
 (3) 21 March (4) 23 September

123. Winter solstice happens on

- (1) 22 December (2) 23 December
 (3) 25 December (4) 1 January

124. Variation in the length of days and nights is due to

- (1) rotation of the Earth on its axis
 (2) revolution of the Earth around the Sun
 (3) inclination of the Earth at an angle of 66.5° towards its axis
 (4) none of the above

125. Mount Kilimanjaro, the highest mountain in Africa, is situated in:

- (1) Kenya (2) Tanzania
 (3) Uganda (4) Ethiopia

126. Asteroids are found between

- (1) Mercury and Venus (2) Venus and Earth
 (3) Earth and Mars (4) Mars and Jupiter

127. Which of the following is not a subtropical desert?

- (1) Gobi Desert (2) Sahara
 (3) Arabian Desert (4) Thar Desert

128. Which of the following planets has the maximum density?

- (1) Venus (2) Earth
 (3) Jupiter (4) Saturn

129. Stars occurring in clusters can be described as

- (1) galaxies (2) satellite
 (3) moon (4) geoid

130. Which of the following is called the blue planet?

- (1) Earth (2) Mercury
 (3) Venus (4) Uranus

131. Which of the following planets is called the 'veiled planet'?

- (1) Earth (2) Mercury
 (3) Venus (4) Uranus

132. Evergreen type forests are found in:

- (1) Mediterranean region
 (2) Monsoon climatic area
 (3) Desert region
 (4) Equatorial region

133. Which of the following planets is the hottest planet of the solar system?

- (1) Mercury (2) Venus
 (3) Uranus (4) Earth

134. The satellite of which of the following planets is the largest satellite in the solar system?

- (1) Jupiter (2) Saturn
 (3) Neptune (4) Earth

135. Which of the following planets has concentric rings made up of ice?

- (1) Jupiter (2) Saturn
 (3) Neptune (4) Earth

136. When it is 2 pm in India, what would be the time in England?

- (1) 7:30 am (2) 8:30 am
 (3) 7:30 pm (4) 6:30 pm

137. Longitudes are

- (1) imaginary vertical lines that give the location of a place as east or west of prime meridian
 (2) imaginary horizontal lines that give the location of different continents
 (3) imaginary horizontal lines that give the location of a place as north or south of the equator
 (4) imaginary vertical lines that give the location of different continents

- 138. For every 1 degree of longitude towards east,**
(1) a time of four minutes has to be added
(2) a time of four minutes has to be subtracted
(3) there will no change in the time
(4) a time of ten minutes has to be added
- 139. The standard time for a country is**
(1) the international time of a central place in the world, taken as the standard time for the other countries of the world
(2) the local time of the central place of a country
(3) the time that is decided by the country itself
(4) decided by a special group of countries
- 140. A longitude is**
(1) the angular distance in degrees on the Earth's surface measured north and south of the equator
(2) the angular distance in degrees on the Earth's surface measured east and west of the equator
(3) the angular distance in degrees on the Earth's surface measured in degrees from a certain point of equator
(4) the angular distance in degrees on the Earth's surface measured in degrees from a certain meridian
- 141. Day and Night are equal at the:**
(1) Prime Meridian (2) Poles
(3) Equator (4) Antarctic
- 142. The meridian that passes through Greenwich is called**
(1) prime longitude (2) prime meridian
(3) prime equator (4) prime latitude
- 143. At the core of the Earth, the temperature is about**
(1) 6,000° C (2) 60,000° C
(3) 6,00,000° C (4) 66,00,000° C
- 144. Which of the following soils is made from volcanic rocks?**
(1) Alluvial soil (2) Black soil
(3) Laterite soil (4) Red soil
- 145. The Mediterranean region is characterised by heavy rain in**
(1) Summer (2) Autumn
(3) Spring (4) Winter
- 146. How many meridians of longitudes are there on the globe?**
(1) 360 (2) 180
(3) 90 (4) 45
- 147. Which of the following planets does not have any ring around it?**
(1) Jupiter (2) Saturn
(3) Uranus (4) Neptune
- 148. Which of the following planets has no satellite?**
(1) Venus (2) Mars
(3) Neptune (4) Jupiter
- 149. The position of the Earth when the whole of it experiences equal days and equal nights is known as**
(1) equinox (2) summer solstice
(3) perihelion (4) winter solstice
- 150. Which 'Water Body' separates the Andaman and Nicobar Islands?**
(1) Andaman Sea
(2) Bay of Bengal
(3) Ten Degree Channel
(4) Eleventh Degree Channel
- 151. Which of the following rivers does not originate in the Indian Territory?**
(1) Mahanadi (2) Brahmaputra
(3) Ganga (4) Satluj
- 152. The shipbuilding yard Mazagon Dock is located in**
(1) Mumbai (2) Kolkata
(3) Vishakhapatnam (4) Kochi
- 153. The South-East trade winds are attracted towards the Indian sub-continent in the rainy season due to**
(1) the effect of easterlies
(2) the presence of low atmospheric pressure over North-West India
(3) the effect of Northern-East trade winds
(4) the development of cyclone over the equator
- 154. Which place is called the Lighthouse of the Mediterranean?**
(1) Stromboli of Sicily
(2) Mount Pelée of West Indies
(3) Paricutin of Mexico
(4) Vesuvius of Italy
- 155. The layer of atmosphere closest to the earth's surface is called:**
(1) Ionosphere
(2) Troposphere
(3) Exosphere
(4) Stratosphere

ANSWERS AND EXPLANATIONS

1. (2) An earthquake wave starts from the focus, which is called the hypocentre. The point on the surface, directly above the focus, first experiences the earthquake and is called the epicentre.
2. (2) Those planets that lie between the Sun and belt of asteroids are called inner planets, such as Mercury, Venus, Earth and Mars. The other four planets—Jupiter, Saturn, Uranus and Neptune—are called the outer planets.
3. (4) Earth is surrounded by a layer of gases called the atmosphere, which provides us with the air we take in and protects us from the harmful effects of the Sun's ultraviolet rays.
4. (2) Nitrogen has a concentration of 78.08 percent, the highest among all the gases present in the atmosphere.
5. (1) Rural settlements are dominated by primary activities such as agriculture, fishing, mining, etc. In rural areas, the majority of people engage in these activities. Urban settlements, on the other hand, are dominated by secondary (industrial), tertiary (service) and quaternary activities.
6. (2) The burning of fossil fuels depletes the ozone layer due to the emission of chlorofluorocarbons (CFCs). A CFC is an organic compound that contains carbon, chlorine and fluorine. Common applications of CFCs are in refrigeration, air conditioners and propellers used to launch satellites and spaceships.
7. (4) Air, water, soil and minerals (such as iron, bauxite, coal, chromite, etc.) all are natural resources. These resources can be defined as things or materials that have some utility for human beings.
8. (3) Steel is an alloy of iron and other elements, primarily carbon and manganese.
9. (3) Equatorial regions, desert regions and Polar Regions have very sparse population. South-east Asia (Malaysia, Indonesia, Singapore, Thailand, etc.) have very dense population.
10. (3) The solid outer part of the Earth is called lithosphere, which consists of the crust and upper part of the mantle. The crust is the uppermost part and in solid state, whereas the mantle is in thick liquid state lying below the crust.
11. (2) Due to ultraviolet radiations, the possibility of developing skin cancer is the maximum, which makes the skin inflamed and painful.
12. (2) The depletion of ozone layer will allow more UV radiations to reach the surface of the Earth, and further depletion means the larger amount of such radiations on the Earth.
13. (1) Due to global warming, the temperature of the Earth is rising significantly. It will put an adverse impact on the Earth's climatic conditions, which are directly related to agricultural production. Hence, global warming will decrease agricultural productivity.
14. (4) Humans impact the natural environment by doing hunting-gathering, which imbalances the ecosystem; by industrialisation, which affects the aquatic life due to release of industrial wastes; and over-use of fertilisation in agricultural processes, which will hamper the productivity of soil in the long run.
15. (3) Initially, the Earth was a barren, rocky and hot object with a thin atmosphere of hydrogen and helium.
16. (2) Roadways are the most important system of transportation in India. They are divided under national highways, state highways, district roads and rural roads. Every year, about 85% of passenger traffic and 70% of freight traffic are carried by roadways.
17. (1) Kandla (Gujarat) is a tidal port. Kolkata is an inland riverine port. Vishakhapatnam is the deepest landlocked and well-protected port.
18. (3) The major objective of sustainable economy is to establish an economy that is viable, environmentally sound and socially responsible.
19. (2) The Golden Quadrilateral is a 5846 km long national highway (ongoing project), which connects four metro cities of Delhi, Mumbai, Chennai and Kolkata. This project is being managed by the National Highway Authority of India (NHAI).
20. (1) Oxygen (46%) is the most abundant element in the Earth's crust, followed by silicon (28%).
21. (3) The Indian state Rajasthan has the largest resources of copper ore, followed by Madhya Pradesh.
22. (4) Literacy rate; health of citizens, indicated by the country's life expectancy; and

skill formation of the working class determine the quality of the country's population.

- 23.** (1) After nitrogen, oxygen has the highest concentration of 20.95 percent in the Earth's atmosphere.
- 24.** (1) Manipur is a northeast Indian state sharing a common boundary with Nagaland, Mizoram and Assam. Its capital is Imphal.
- 25.** (3) The atmosphere can be divided into five layers. Starting from the Earth's surface, they are troposphere, stratosphere, mesosphere, thermosphere and exosphere.
- 26.** (4) The intensity of insolation varies from the Equator towards the Polar Regions, which itself is controlled by the angle of incidence of solar rays and duration of sunshine.
- 27.** (4) Ecosystem is defined as the interaction between organisms and their relations with the physical and chemical factors of the environment.
- 28.** (2) The thickness of the crust is about 35 km on continents and 5 km in the regions of oceanic floors. The continental mass of the crust consists of silica and aluminum in greater proportions. Therefore, it is called sial. The oceanic crust mainly consists of silica and magnesium. Therefore, it is called sima.
- 29.** (2) Volcanic or extrusive igneous rocks are molten rocks poured out of volcanoes as lava. They solidify rapidly on the Earth's surface. Their crystals are small. Basalt is a common volcanic rock. The Deccan Plateau of south India is made of volcanic rocks.
- 30.** (2) Sedimentary rocks are formed because of the tremendous pressure exerted by the layers above. They are non-crystalline and often contain fossils of animals, plants and other microorganisms. Sandstone, limestone and shale are few examples of sedimentary rocks.
- 31.** (3) Valuable minerals such as diamond, coal, marble and quartz are found in the form of metamorphic rocks.
- 32.** (4) Rosewood, ebony and mahogany are examples of tropical rainforests. Sal is a tropical deciduous forest.
- 33.** (1) All forms of water (oceans, rivers, lakes, glaciers, underground water, water vapour, etc.) available on the Earth are collectively called hydrosphere. Of the total amount of the Earth's water, 97% is in the form of oceans and 3% is in the form of ice sheets, glaciers and underground water. Less than 1% portion is available as fresh water for human use.
- 34.** (3) Atlantic Ocean is the second largest ocean in the world. In terms of commerce, it is also the busiest ocean. Indian Ocean is the only ocean named after a country (i.e., India). Southern Ocean encircles the continent of Antarctica.
- 35.** (4) In the region of tropical evergreen forests, there is no dry season. These forests are evergreen throughout the year.
- 36.** (4) The density of the atmosphere decreases when we go up from the sea level. Heavier gases like oxygen and nitrogen are found in the lower parts of the atmosphere.
- 37.** (2) Chir pine and cedar are examples of taiga forests.
- These types of forests are found at the higher latitudes of the Northern Hemisphere.
- 38.** (3) In central Asia and Europe, temperate grasslands are known as steppe. Steppe grasslands are found in Ukraine, Kazakhstan and Uzbekistan.
- 39.** (1) The first hydroelectric power project in India was established in Shivanasamudra in Karnataka in 1902. It was commissioned by the Diwan of Mysore.
- 40.** (3) The crust is made up of heavier rocks, mainly including the elements of silica, aluminum, iron, magnesium and calcium.
- 41.** (2) The core is located at a depth of 2,900 km. The outer core is in liquid state, while the inner core is in solid state. The core is made up of nickel and iron. It is also referred to as the nife layer.
- 42.** (2) Earthquake waves start from the focus, which is called the hypocentre. The point on the surface, directly above the focus, first experiencing the earthquake is called the epicentre.
- 43.** (3) Due to the effects of heat and pressure, igneous and sedimentary rocks change into metamorphic rocks. Granite converts into gneiss.
- 44.** (1) Nagaland is a north-eastern Indian state which borders Assam, Manipur, Arunachal Pradesh and Myanmar. Its capital is Kohima.
- 45.** (3) Temperate grasslands have different names in different regions. They are called pampas in Argentina, prairies in North America, velds in South Africa, downs in Australia and steppes in central Asia.

46. (3) Oak, ash and beech are temperate deciduous forest trees. They are found in the temperate zones of New Zealand, Chile and Western Europe. They shed their leaves in the dry season.
47. (3) The Garo and Khasi tribes belong to Meghalaya and are also found in certain parts of Bangladesh. These tribes are matrilineal tribes.
48. (2) Coal, petroleum and uranium are the non-renewable sources of energy, while solar energy is a renewable source of energy.
49. (3) There are five layers in the atmosphere. They are troposphere, stratosphere, mesosphere, thermosphere and exosphere.
50. (2) Radio waves are found in the ionosphere. This layer reflects the radio waves back to earth.
51. (1) The equatorial low pressure belts represent the convergence of trade winds coming from the northeast and southeast directions.
52. (2) The earth receive all its energy from the Sun and it is heated by the solar insolation. Solar insolation is also called incoming solar radiation.
53. (2) The process of condensation conducts heat from the warmer to colder regions. In other words, we can say that it changes the physical state of matter from the gaseous state to the liquid state.
54. (1) Planetary wind or permanent wind such as trade winds, westerlies and easterlies regularly blow throughout the year in a particular direction.
55. (1) The Northeast Trade wind and the Southeast Trade wind meets with each other in Inter-Tropical Convergence Zone (ITCZ). Which is also known as Doldrums.
56. (4) Prevailing westerlies are permanent winds which blows from west to east direction throughout the year. It blows from sub-tropical high pressure belt to sub-polar low pressure belt.
57. (4) Pressure belts, migration of belts, rotation of earth, atmospheric heating, distribution of continents and oceans are the factors which affect the flow of the wind.
58. (1) Sedimentation is the process of settling down of sedimentary particles at the bottom of a beaker contained with soil-water mixture. This process is used for water treatment.
59. (3) The household wastes contain high content of organic wastes. It causes the depletion of oxygen from the water bodies.
60. (1) The Brahmaputra originates from the Angsi glacier in the Burang County of Tibet. It flows through China, India and Bangladesh and is one of the major rivers of Asia.
61. (2) The flowing of air towards the sea from the land is called sea breeze, whereas its reverse is called the land breeze.
62. (2) China is the largest producer of wheat in the world. India, USA, Canada, Argentina, Russia, Ukraine, France and Australia are the other major wheat-producing countries.
63. (3) China is the largest producer of tobacco in the world. Brazil is the second largest producer.
64. (2) Rabi crops are grown during March-June in India. Their harvesting begins during the months of April and May.
65. (2) The Tapti River flows through a rift valley in Madhya Pradesh. It originates in the Betul district, near Multai.
66. (1) Wheat, mustard and barley are Rabi crops. Rice and millets are the Kharif crops.
67. (1) A solar eclipse occurs when the moon comes between the Sun and the Earth. There are four types of solar eclipses namely; total eclipse, annular eclipse, hybrid eclipse and partial eclipse.
68. (4) The Kharif crops are sown in the month of July and harvested in October every year.
69. (3) West Bengal is the largest producer of rice in India followed by Uttar Pradesh and Andhra Pradesh.
70. (1) Abiotic resources are non-living resources, e.g. land, soil, rocks and minerals. Biotic resources are living resources such as plants and animals. Non-renewable resources are limited in nature and can be exhausted. Resources like coal, petroleum and natural gas take thousands of years to be renewed.
71. (2) Ubiquitous resources are present everywhere like the air. Coal is not found everywhere. It is a localised resource.
72. (1) Sustainable development focuses on careful use of present resources so that environment could not get polluted and future generation can also use these resources. Respect and care for all forms of life is one of the basic principles of sustainable development.

- 73.** (1) Brazil is located in the equatorial zone of tropical evergreen forest. It has about 66% of its area under forest, whereas the percentage of areas under forest for China, USA and Russia are 14, 32 and 44 respectively.
- 74.** (2) Laterite soil is the most infertile soil among all as it is rich in iron and aluminium and is rusty red in colour due to the presence of iron oxide in the soil.
- 75.** (1) Marble is the odd one out as it is a metamorphic rock while limestone, sandstone and shale are sedimentary rocks.
- 76.** (4) In India, crude oil is produced from both on-shore (Digboi) and off-shore (Bombay High). Oil is a very valuable commodity in today's world. Hence, it is called 'Black Gold'.
- 77.** (4) Iron, bauxite and manganese are metallic minerals. Non-metallic minerals do not have metals in them, e.g. limestone, mica, gypsum, etc.
- 78.** (3) The Valley of Flowers National Park is situated in the state of Uttarakhand. It is famous for alpine flowers and several species of endangered animals such as snow leopards, musk deer, Asiatic black bear and blue sheep.
- 79.** (3) Metallic minerals are of two types: ferrous and non-ferrous. Ferrous minerals contain iron, e.g. iron ore, manganese and chromite. A non-ferrous mineral does not contain iron, e.g. gold, silver and copper.
- 80.** (2) A light year is a unit of distance that measures the distance travelled by light in one year.
- 81.** (1) Wheat is grown in moderate temperature. It is grown in both temperate and tropical zones. It requires rainfall during growing season and bright sunshine at the time of harvest. Well-drained loamy and alluvial soil is best suited for wheat. China, India, USA, Canada, Argentina, Russia, Ukraine, France and Australia are the major wheat-producing countries.
- 82.** (3) The Suez Canal connects the Mediterranean Sea with the Red Sea. It was built by the Suez Canal Company and took 10 years to complete. The Suez Canal was officially opened in November 1869.
- 83.** (1) Chile is the largest producer of the copper in the world. China, Peru and USA are the second, third and fourth largest producers of the copper in the world.
- 84.** (1) The Golden Temple or Harmandir Sahib is situated in Amritsar, Punjab. It is considered to be the holiest Gurudwara. It was founded by Guru Ram Das who was the fourth Sikh Guru.
- 85.** (1) The temperate grasslands are known as the 'granary of the world' due to widespread cultivation of wheat in these areas. The temperate grassland regions comprise the Pampas of Argentina, Brazil and Uruguay, the Prairies of North America and the Steppes of Eurasia.
- 86.** (2) Australia is the largest producer of bauxite in the world. It produces one third of world's total production of bauxite, which was mostly exported to China and India.
- 87.** (4) Silicon is used in the electronics industry. It is obtained from quartz. Copper is used in electric wire, coins, pipes, etc. Aluminium is used in automobiles, airplanes, bottling industry, buildings, etc.
- 88.** (2) Thorium is found in large quantities in the Monazite sands of Kerala.
- 89.** (3) In India, nuclear power stations are located in Kalpakkam (Tamil Nadu), Tarapur (Maharashtra), Kota (Rajasthan), Narora (Uttar Pradesh), Kakrapar (Gujarat) and Kaiga (Karnataka).
- 90.** (2) Pisciculture is related to the breeding of fish in specially constructed tanks and ponds. Sericulture is related to the rearing of silkworms. Viticulture is the cultivation of grapes. Horticulture is the cultivation of vegetables, flowers and fruits for commercial use.
- 91.** (2) USA is the largest producer of maize in the world. Mexico, Brazil, China, Russia, Canada and India are the other major maize-producing countries.
- 92.** (3) Volga is the longest river of Europe which flows through Russia into the Caspian Sea. It is considered to be the national river of Russia.
- 93.** (2) Madhya Pradesh does not share its border with Pakistan. The Indian states which share a border with Pakistan are Jammu & Kashmir, Gujarat, Rajasthan and Punjab.
- 94.** (1) The large coffee plantation in Brazil is called fazenda. These fazendas are the largest coffee producing ground of the world.
- 95.** (4) Rice is mainly grown in the countries of tropical zone. It needs high temperature (25°C), high humidity and rainfall (100-200 cm). Alluvial soil is best suited for rice cultivation. China is the largest producer of rice.

- 96.** (1) A spring tide, also known as king tide, occurs where there is a highest difference between high and low tide and when the moon is either new or full, and the sun, the moon and the earth are aligned. In such a case, their collective gravitational pull on the earth's water is strengthened, which results in spring tides.
- 97.** (4) Cotton needs high temperature, moderate rainfall, two-hundred frost-free days and bright sunshine for its growth. Black soil is best suited for the growth of cotton. China, USA, India, Pakistan, Brazil and Egypt are the leading producers of cotton.
- 98.** (3) Dairy farming is highly labour and capital intensive. The locations of dairy farms should be near cities. The facilities of storage, transportation and refrigeration are the prerequisite for the development of dairy farming.
- 99.** (3) Mixed farming comprises the growing of crops and the raising of livestock. It is practiced mainly in developed countries such as Britain, France, Italy and Eastern North America.
- 100.** (3) Intensive subsistence agriculture is mainly practiced in densely populated regions of Asia, e.g. India, Bangladesh, Pakistan and China.
- 101.** (3) Kaziranga National Park is situated in the Golaghat and Nagaon districts of Assam. It was established in 1908 and given the status of World Heritage Place by UNESCO in 1985.
- 102.** (2) Tides are caused by several forces, the most important of which is the pull of the moon's gravity. The moon's attraction power on earth is more than twice as strong as the sun's. When the sun, the moon and the earth are in the same line, highest tides occur. These tides are called spring tides. When the sun and moon are at right angles to each other, lowest tides occur. These tides are called neap tides.
- 103.** (1) Seismology is the study of earthquakes and their bearings on the internal structure of the Earth.
- 104.** (1) Mercury is the smallest and closest planet to the sun which 36 million miles away from the sun.
- 105.** (2) season changes due to the revolution of earth around the sun.
- 106.** (3) The Tropic of Cancer is located on 23.5 degree north latitude and tropic of Capricorn is located on 23.5 degree south latitude.
- 107.** (3) Mercury, Venus, Earth and Mars are Terrestrial planets. They are made up of solid rocks.
- 108.** (4) Jupiter, Saturn, Uranus and Neptune are gaseous planets. They are also called outer planets.
- 109.** (1) Latitude is the imaginary horizontal lines which gives the location of a place north or south of the equator which is expressed by angular measurements ranging from 0° at the equator to 90° at the poles and there are 180 parallels of latitude.
- 110.** (3) Shape of the earth is not spherical it has large diameter at the equator than at the poles in other words we can say that the earth is flattened at both poles.
- 111.** (2) There are 180 parallels of latitude in the globe and each parallel of latitude is a circle.
- 112.** (2) The Digboi Oil Refinery is located in Digboi, Assam. It was established by the Assam Oil Company in 1901. However, the Indian Oil Corporation gained control over it in 1981.
- 113.** (2) The Khajuraho Temple, a UNESCO World Heritage site, is situated in Madhya Pradesh. The temple was built during the reign of the Rajput Chandela dynasty.
- 114.** (2) Troposphere is the lowest layer of earth's atmosphere. Stratosphere lies over troposphere, followed by mesosphere, ionosphere and exosphere, which is the outermost atmospheric layer of earth.
- 115.** (3) Bhutan has the smallest area among all neighbouring countries of India having a total area of 38,394 km². Its capital is Thimphu.
- 116.** (1) The scientific study of soils is called pedology or soil science. It deals with all aspects of soils including their physical and chemical properties.
- 117.** (4) The Great Barrier Reef, located off the coast of Queensland, Australia, is the largest coral reef in the world. It is composed of 2900 coral reefs and 900 islands.
- 118.** (2) Kollur mine is situated in the Guntur district of Andhra Pradesh. It was one of the most productive diamond mines of the world; the Koh-I-Noor, the Hope Diamond and Dresden Green Diamond having been mined at the Kollur mine.
- 119.** (2) In the solar system, all the planets revolve around the Sun in elliptical orbits. This is because the Sun is not quite at the center of a planet's elliptical orbit, because of

which, the planet has to move closer to and yet farther away from the Sun, creating an elliptical or oval every orbit.

- 120.** (2) A solar ray of light takes about eight minutes to reach the Earth, while a lunar ray of light takes a second to reach the same.
- 121.** (4) The Tropic of Cancer passes through the Yunnan province of China. It also passes through India.
- 122.** (2) On 21 June, in the Northern Hemisphere, solar rays fall vertically on the Tropic of Cancer. It is the longest day in this hemisphere. The position of the Earth on this day is known as summer solstice.
- 123.** (1) Solar rays fall vertically on the Tropic of Capricorn on 22 December. It is the longest day in the Southern Hemisphere. When this happens, the position of the Earth is known as winter solstice.
- 124.** (3) The axis of earth makes an angle of $66\frac{1}{2}^\circ$ with its orbital plane due to this the amount of sun light received at a place varies.
- 125.** (2) Mount Kilimanjaro is situated in Tanzania. It is a dormant volcano which lies 5,895 metres above sea level.
- 126.** (4) Asteroids are found between Mars and Jupiter. They are small bodies that also move around the Sun.
- 127.** (1) Gobi Desert is a rain shadow desert which was formed by the blockage of rain-carrying winds by the Himalayas from reaching the Gobi region. The Gobi desert lies in north and north-western China and southern Mongolia.
- 128.** (2) Inner planets (Mercury, Venus, Mars, Earth) have more density than outer planets (Jupiter, Saturn, Uranus, Neptune). Among inner planets, the Earth has the maximum density.
- 129.** (1) Stars are not scattered bodies, but they occur in clusters known as galaxies or nebulas. A galaxy may contain more than 100,000 million stars.
- 130.** (1) Earth is also known as the blue planet because of the presence great amount of water on it.
- 131.** (3) Venus has a thick cloud cover wrapping it, due to which this planet is also known as the veiled planet.
- 132.** (4) Evergreen forests are generally found in equatorial regions where there are only two distinct seasons i.e. rainy and dry. The evergreen trees maintain their green leafage all year round.
- 133.** (2) Venus is the hottest planet of the solar system, even hotter than the Mercury that is closest to the Sun. This is because it has a much thicker atmosphere than Mercury.
- 134.** (1) Jupiter's Ganymede is the largest satellite in the solar system.
- 135.** (2) Saturn has concentric rings made up of ice and dust particles revolving around it.
- 136.** (2) Indian Standard Time (IST) is 5 hours and 30 minutes ahead of the GMT (Greenwich Mean Time) which is passes through England. So, it will be 8:30 a.m. in England when it is 2 pm in India.
- 137.** (1) Longitude is also imaginary vertical line which gives the location of a place east or west of a north-south line called the prime meridian.
- 138.** (1) For every 1 degree of longitude towards east, a time of four minutes has to be added, whereas for every 1 degree of longitude towards west, a time of four minutes has to be subtracted.
- 139.** (2) When the local time of a central place is taken as the time for the whole country, it is called the standard time. India has 30 local times. So, to avoid any confusion, the local time of its central meridian is taken as the time for the whole country.
- 140.** (4) A meridian is an imaginary line that is extending from the North pole to the South pole making an angle of 90° with the equator.
- 141.** (3) Day and night are equal at the equator at the time of occurrence of the astronomical event known as the equinox. During this event, the plane of Earth's equator passes through the center of the sun. This event occurs twice in a year on 20th or 21st March and 22nd or 23rd September.
- 142.** (2) The prime meridian is used to determine the longitude of a place. It is a 0° longitude passing through Greenwich in Britain.
- 143.** (1) Earth's inner and outer cores are almost as hot as the surface of the Sun, which is about $6,000^\circ\text{C}$.
- 144.** (2) Black soil is made up of volcanic rocks and lava. It is rich in lime, magnesium and iron. Black soil is found in parts of Maharashtra, Chhattisgarh, Madhya Pradesh, Gujarat, Andhra Pradesh and Tamil Nadu.
- 145.** (4) The Mediterranean climate is characterised by heavy rain in winter due to ocean currents and sea temperature.

- 146.** (1) There are 360 meridians of longitudes on the globe in which 180 are in one hemisphere and other 180 in the other.
- 147.** (4) Jupiter, Saturn and Uranus all have rings around them. These rings are belts of small debris.
- 148.** (1) Mercury and Venus have no satellites. Mars has two, Neptune has eight and Jupiter has sixteen satellites.
- 149.** (1) The whole world experiences equal days and equal nights on 21 March and 23 September. This position of the Earth is known as equinox.
- 150.** (3) The Ten Degree Channel separates the Little Andaman of Andaman and Car Nicobar in the Bay of Bengal.
- 151.** (2) The Brahmaputra River originates from the Chemayungdung glacier located in the Burang County of Tibet. It is a transboundary river which flows through China, India and Bangladesh.
- 152.** (1) The Mazagon Dock manufactures warships and submarines for the Indian Navy. It is located in Mumbai, Maharashtra.
- 153.** (2) The South-East trade winds are attracted towards the Indian sub-continent in the rainy season due to the presence of low atmospheric pressure over North-West India. This occurs because of intense heat that envelops the Indian sub-continent, thus attracting the south-east trade winds originating from the southern hemisphere.
- 154.** (1) Stromboli is a small island off the north coast of Sicily, Italy. It is referred to as the Lighthouse of the Mediterranean due to the repeated volcanic eruptions occurring on the island.
- 155.** (2) Troposphere is the atmospheric layer closest to the earth's surface. Troposphere extends up to the height of 7-20 kilometres starting from the earth's surface and almost all weather phenomena transpires in this atmospheric layer.

3

ECONOMIC AWARENESS

BASIC CONCEPTS RELATED TO ECONOMICS

The basic concern of economics is allocation of resources to various uses. This also includes the process through which production can be increased.

Nobel Laureate Prof. Samuelson defined Economics as follows: 'Economics is the study of how men and society selected, with or without the use of money, to employ scarce productive resources which could have alternative uses, to produce various commodities over time, and distribute them for consumption now and in the future among various people and groups of society'.

Macro and Micro-Economics

Modern economics is divided into two parts, namely microeconomics and macroeconomics. Microeconomics is concerned with a particular unit or some part of the economy, whereas macroeconomics is concerned with the whole economy.

One can differentiate between microeconomics and macroeconomics on the basis of scale of study, field of study, methods of study and differences in analytical factors.

Microeconomics

Microeconomics is the economic activity of an economic unit or a part of the economy or a small group of more than one unit. It is the study of the economy that relates to the matters of production, consumption, prices in the market, wage rate and so on.

Microeconomics also deals with the behaviour patterns and role of firms and individuals in income distribution and study of conditions of efficiency in production and attainment of overall efficiency. The three main central problems of an economy are what to produce, how to produce and how to distribute them, which is the subject matter of microeconomics.

Macroeconomics

Macroeconomics is the study of economic activities as a whole for a country. It also deals with the income and employment issues of the country. In macroeconomics, the economy can be studied under four components—households, firms, government and external sector. It deals with the economic issues of effects of taxation, budgetary policies, money supply, rate of interest, unemployment, inflation, balance of payment deficits' and so on.

Demand, Supply, Cost and Revenue

Demand

In an economy, the concept of demand is defined as the quantity of the goods purchased at a given price at a given time. It has three components, namely price of the goods, quantity of the goods, and time period.

The law of demand is defined as the condition in which if the price of a good falls, its demand increases, and if the price of the good increases, its demand falls, all other things remain constant.

Individual demand is the quantity of goods that an individual buyer is willing to buy at the given price at a given time. Market demand is the total quantity of goods that all the individual buyers in the market are willing to buy at a given price at a given time.

The determinants of individual demand are price of the goods, price of related goods, income of the buyer, tastes, and preferences of the buyer. The determinants of market demand include number of individual buyers, distribution of income and wealth and climatic conditions in addition to the determinants of individual demand.

The law of demand states that if all other factors affecting demand remain constant, the buyers will buy more quantity of a commodity at a lower price and less of it at a higher price. Demand curve is a diagrammatic representation of the law of demand. The demand curve of a commodity slopes downwards from left to right.

Supply

There is a difference between the availability of a commodity in the market and supply of that commodity. Supply of a commodity is defined as the quantity of the commodity that a seller offers for sale at a given price at a given time. Supply has three components, namely quantity of goods offered for sale, price of the goods in the market and time period.

Stock is defined as the total quantity available with a seller/firm at a particular point of time. The part of stock which the seller or firm wants to sell in a given time period is supply.

Market supply is the total quantity of a commodity offered for sale by all the firms in the market at a given price and time. The individual supply depends on the price of the commodity, price of other related goods, change in technology of production, change in price of inputs, and objective of the firm and government policy. The market supply depends on the number of firms supplying the commodity and expected future price in addition to the determinants of individual supply.

If other factors determining supply remain constant, then the price of a commodity and the quantity supplied directly relate to each other. This is called the law of supply. Supply curve is a diagrammatic representation of the law of supply. According to the law of supply, the supply curve of a commodity goes upwards.

Cost

Cost is defined as the expenses of a producer for purchasing factors of production, such as raw materials to produce goods and services, payments and wages of workers, rent for the use of land etc.

TYPES OF COST

Fixed Cost

Fixed cost is the expense on fixed factors which are compulsory, such as rent of building, and has nothing to do with the cost of production of the good or service.

Variable Cost

Variable cost is the expense on variable factors/inputs such as raw materials which can be changed.

Explicit Cost

Explicit cost is defined as the expenditure incurred by the producer on both fixed and variable factors of production

and raw materials, etc. These are direct payments and are properly calculated and separately recorded.

Implicit Cost

Implicit cost is the cost of self-supplied factors (a farmer uses his own tractor to cultivate land) for producing goods and services. The value of such cost has to be calculated on the basis of market value.

Total Cost (TC) = Total Fixed Cost + Total Variable Cost

Average Cost (AC) = Total Cost/Total Output

Marginal Cost (MC)

Marginal cost is defined as the increase in the total cost due to increase in one extra unit of output.

Revenue

Revenue can be defined as receipts or returns from the sale of products of an organisation. In other words, revenue is the income that an organisation receives from normal business activities. According to Dooley, "The Revenue of a firm is its sales receipts or money receipts from the sale of a product." Total Revenue (TR) equals quantity of output multiplied by price per unit.

TR = Price (P) * Total output (Q)

Cost and Revenue Analysis

For instance, if an organisation sells 1000 units of a product at a price of ₹ 10 per unit, the total revenue of the organisation would be ₹ 10000. Total revenue is a function of output and is mathematically expressed as:

TR = f (Q)

From the aforementioned equation, it can be seen that the value of dependent variable (total revenue) is determined by the independent variable (output). In economic analysis, different types of revenue are taken into account, which are discussed later in the next sections.

Average Revenue

Average Revenue (AR) can be defined as revenue per unit of output. In the words of McConnell, "Average revenue is the per unit revenue received from the sale of a commodity." AR is calculated as:

AR = TR/Q

Therefore, from the aforementioned equation, it can be said that AR is the rate at which output is sold, where rate refers to the price of the product.

We know that TR equals P*Q, thus,

AR = (P*Q)/Q

AR = P

Hence, it can be said that AR is nothing, but price of the product.

National Income

Net National Product (NNP) at factor cost is called National Income.

National income received by households is called Personal Income (PI). To calculate PI, we have to deduct that part of income which is not received by the households from the national income, such as undistributed profits (UP), corporate tax, net interests paid by the households to the firms and government. On the other hand, we have to add the transfer payments received by the household from government and firms, such as pensions, scholarship and prizes, to national income to calculate the PI.

Personal income (PI) = National income - Undistributed profits - Net interest payments made by households - Corporate tax + Transfer payments to the households from the government and firms.

TYPES OF ECONOMIES

The main goal of every economy is to fulfill human needs by using the available resources. These needs can be satisfied by production and consumption of goods and services. Economy is a framework where all economic activities are carried out. Production, consumption and investment are the vital processes of an economy.

Economies can be classified on various types of criteria. On the basis of ownership and control over means of production or resources, economies are classified as follows:

1. Capitalist economy
2. Socialist economy
3. Mixed economy

Capitalist Economy

The capitalist or free enterprise economy is the oldest form of economy. Capitalist economies run on the policy of 'laissez-faire' which means 'leave free'. They advocate minimum government intervention in the economic activities. Some of the main features of a capitalist economy are private ownership of property, freedom of entrepreneurship, consumer first policy, priority of profit, competition, market-based demand and supply, and minimum government interference in market. True capitalism is not seen in today's world, but economies of USA, UK, France, Netherlands, Spain, Portugal, Australia, etc. are known as capitalistic economies.

Socialist Economy

Socialist economies are centrally planned economies where all the means of production are owned and controlled by the government in the overall interest of the society. Some of the main features of a socialist economy are collective ownership of means of production, a welfare state, plans are made from top to bottom, main focus is on reducing inequalities and competition is not promoted.

Countries, such as Russia, Cuba, China and many eastern European countries tried the socialist form of economy in the past, but failed and are now adopting privatisation and liberalisation in their countries for faster economic development.

Mixed Economy

A mixed economy combines the best features of capitalism and socialism. Thus, a mixed economy has some elements of both free enterprise or capitalist economy and a government-controlled socialist economy. The public and private sectors co-exist in mixed economies. The main characteristics of a mixed economy are co-existence of public and private sectors, freedom of enterprise, welfare state, economic planning and special emphasis on the interests of weaker sections of the society.

Indian economy is the perfect example of a mixed economy. Even countries such as USA and UK which were known as capitalistic countries, are also called mixed economies now because of the active role of their government in economic development.

Developed and Developing Economies

On the basis of the level of development, an economy can be classified as developed economy or developing economy. This classification can be done on the basis of GDP, per capita income and standard of living of a particular country. Developed countries have higher GDP, higher per-capita income and high rate of living in comparison to developing countries. Some of the common characteristics of developing countries are: 1) high poverty level, 2) low per capita income, 3) low standard of living, 4) high growth of population, 5) high income inequality, 6) low productivity, 7) low saving and investment, 8) low level of technological development, and 9) high unemployment.

INFLATION

Inflation is a situation of price rise. Purchasing power of money reduces with inflation.

Types of Inflation

1. Demand-Side Inflation: Demand-side inflation is defined as the situation where demands for goods and services are higher than their supply. Therefore, prices of goods rise. Some of the causes of demand-side inflation are as follows:

- Increased public expenditure
- Low saving rate
- Easily available loans
- Increased government spending
- Excess money supply in the market
- Increase in population

2. Supply-Side Inflation: Supply-side inflation arises when the price of goods increases due to supply constraint or rise in the cost of production. This type of inflation has a cascading effect and spreads from one industry to another. Some of the causes of supply side inflation are as follows:

- Increases in labour cost
- Increases in indirect taxes
- Monopoly of some company

3. **Deflation:** It is a situation where prices decline over time. This situation occurs with the supply of goods rising faster than the supply of money.
4. **Stagflation:** It is a situation where the economic growth of a country slows down and the rate of unemployment is very high, accompanied by high inflation rate.

Measures of Inflation

Wholesale Price Index (WPI)

WPI is calculated by the Office of the Economic Adviser under the Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce & Industry. WPI data is published weekly on every Thursday for primary articles and fuel group and monthly on the 14th of every month for all the commodities. Final WPI data is released after every two months. WPI has three components, namely manufactured products, primary articles and fuel & power. Manufactured products have 64.23% weightage, which include chemical, metal and food items in descending order of weight. Primary articles have 22.62% weightage, which include food, non-food and minerals in descending order of weight. Fuel & power have 13.15% weightage, which include mineral oil, electricity and coal in descending order of weight.

Consumer Price Index (CPI)

CPI is calculated by the Central Statistics Office (CSO) under the Ministry of Statistics and Programme Implementation (MOSPI). CPI data is published on monthly basis for urban India, rural India and all India. A state releases its own CPI data. CPI measures the price of goods that households consume. Government uses CPI for monitoring price stability. It is also used for calculating Dearness Allowance. RBI uses CPI to design monetary policy.

Index of Industrial Production (IIP)

IIP is also calculated by the CSO under MOSPI. IIP data is released on a monthly basis with a time lag of six weeks from the reference month. IIP has three components. According to their weight, they are manufacturing (77.633%), mining (14.373%) and electricity (7.994). IIP data is released in two formats, i.e. sector-wise (mining, manufacturing and electricity) and goods category-wise.

Human Development Index (HDI)

Human Development Index report is published every year by the UNDP. This index compares countries based on the educational levels of the people, their health status and per capita income.

There are three components of HDI, which are as follows:

1. **Life expectancy at birth:** It denotes average expected length of life of a person at the time of birth.
2. **Gross enrolment ratio:** It denotes enrolment ratio for primary school, secondary school and higher school.
3. **Per capita income:** It is calculated in dollars for all countries so that it can be compared. It is also done in a way so that every dollar would buy the same amount of goods and services in any country.

As per the latest available Human Development Report (HDR), 2016, the HDI for India was 0.624 with an overall global ranking of 131 (out of 188 countries). India's rank was 130 with 0.609 score in the 2015 report. India is ranked in the medium human development category. Norway, Australia and Switzerland are the top three nations in the 2016 HDI.

ECONOMIC REFORMS

Economic reforms in India were started in 1991 in response to a fiscal and Balance-of-Payment (BoP) crisis. These reforms were historic and changed the basic structure of the Indian economy. Some of the reforms are still going on. Economic reform in India was not voluntary; it was much in coherence with the guidelines of the International Monetary Fund (IMF).

The LPG Reforms

The process of economic reforms in India also includes the processes of liberalisation, privatisation and globalisation, popularly known as the LPG. Liberalisation is the direction of reform, privatisation is the link to the path of reform and globalisation is the final goal of reform.

Liberalisation

The process of liberalisation is related to the political ideology of 'liberalism', which was developed in the early

nineteenth century. Liberalism came into being to oppose the ideology of feudalism. It supported the growth of market economy and a capitalist society. It also supported the principle of laissez-faire. Thus, the process of decreasing the role of states and increasing the role of market in the economy is known as liberalisation.

Privatisation

Privatisation is the process of transferring state assets to the private sector. It includes selling the shares of the state-owned public sector enterprises to the private sector. Disinvestment is a form of privatisation where less than 100 per cent ownership transfers from the state to the private sector. If an asset has been sold out by the government to the tune of only 49 per cent, the ownership remains with the state, although it is considered privatisation. Policies of delicensing, dereservation, permission for foreign investment, etc. enable the process of privatisation.

Globalisation

Globalisation is the free movement of goods and services, capital and labour force across the world. It increases the economic integration amongst the countries of the world. The concept of globalisation was popularised by the Organisation of Economic Cooperation and Development (OECD) in 1985. World Trade Organisation (WTO) defined globalisation as the 'unrestricted cross border movements of goods and services, capital and labour force'.

NITI Aayog

The Government has replaced Planning Commission with a new institution named National Institution for Transforming India (NITI) Aayog. The institution will serve as 'Think Tank' of the Government. NITI Aayog will provide the governments at the central and state levels with relevant strategic and technical advice across the spectrum of key elements of policy. This includes matters of national and international import on the economic front, dissemination of best practices from within the country as well as from other nations, the infusion of new policy ideas and specific issue-based support.

The NITI Aayog comprises the Prime Minister of India as the Chairperson and Governing Council, comprising the Chief Ministers of all the States and Lt. Governors of Union Territories.

SECTORS IN THE INDIAN ECONOMY

Generally, an economy can be classified into three sectors, namely primary sector, secondary sector and tertiary sector.

Primary Sector

Primary sector includes agriculture and livestock activities, forestry, fishery and mining. These are complementary to each other.

Secondary Sector

Secondary sector includes the following production and manufacturing activities:

1. Manufacturing
2. Construction
3. Supply of gas, water and electricity

Manufacturing is the production of goods in factories and industries by using raw materials from the primary sector. In terms of size and expenditure, manufacturing industry can be classified as small-, medium- and large-scale industries. Shoes factory, glass-making and furniture factory are examples of small and medium industries, whereas production of iron and steel, automobiles and aluminium are examples of large-scale industries.

Construction of buildings, roads, parks, bridges, dams, airports, etc. also comes under the secondary sector. Supply of essential services, like gas, water and electricity is also a part of the secondary sector.

Tertiary Sector

Tertiary sector is also called the services sector. The following services are included in the tertiary sector:

1. Trade, hotels and restaurants
2. Transport, storage and communication
3. Financial services such as banking and insurance
4. Real estate and business services

5. Public administration
6. Other services

Classification of Crops

On the basis of monsoon, agricultural crop in India can be classified in three types, namely kharif, rabi and jayads crops. The kharif cropping season is from July to October during the South-West monsoon. Rice, maize, sorghum, millet, bajra, ragi, arhar, soyabean, groundnut, cotton, etc. are the main kharif crops. Rabi cropping season is from October to March during the North-East monsoon. Wheat, barley, oats, gram, mustard, etc. are the main rabi crops. The crops grown between March and June are summer crops known as the jayads.

Green Revolution

Initially, the productivity in the agricultural sector was very low. Many factors were responsible for that, such as the use of old technology, dismal state of the infrastructure, excessive dependence on monsoon and the colonial rule.

In the mid-1960s, India initiated the green revolution which increased the production of food grains manifold. This happened due the use of High Yielding Variety (HYV) seeds, especially for wheat and rice. The use of HYV seeds was complemented by the use of fertilisers and pesticides in the correct quantities as well as a regular supply of water. In the initial phase, farmers of Punjab, Haryana, western Uttar Pradesh, Andhra Pradesh and Tamil Nadu benefitted from Green Revolution. Further, the HYV technology spread to a larger number of states and benefitted more variety of crops. Green revolution made India self-sufficient in food grain production.

Agricultural practice which uses biofertilisers in place of chemical fertilisers, bio-pesticides in place of chemical pesticides and which emphasises on conserving water, balanced cropping pattern and proper crop combinations is known as the second green revolution. Second green revolution is also known as evergreen revolution or sustainable agriculture.

Second green revolution in India consisted of crop management, cost reduction, value addition, processing and marketing other than green farming. It wants to

increase agricultural production with the use of biotechnology. It puts greater emphasis on agro-processing, beverages and drinks industries. Second green revolution also lays emphasis on credit delivery for the agriculture sector, storage facilities for agricultural products, transport connectivity, irrigation preparedness and marketing network for agricultural products.

Providing food security to every citizen, price stability, cropping pattern, protection to small farmers, threat of globalisation and WTO commitments are some of the major challenges before the Indian agriculture.

RECENT GOVERNMENT SCHEMES

Pradhan Mantri Jan-Dhan Yojana (PMJDY)

PMJDY is a universal financial inclusion initiative of the Government of India, launched by Prime Minister, Narendra Modi on 28 August 2014. This initiative was launched with the objective of ensuring access to financial services, remittance, credit, insurance and pension to millions of unbanked Indians.

Make In India

This is an initiative of the Government of India to encourage investment by multinational companies as well as domestic companies to invest and manufacture their goods in India. 'Make in India' was launched by Prime Minister Narendra Modi on 25 September 2014.

Digital India

This is an initiative of the Government of India for ensuring access to government services by citizens with the help of better Internet connectivity and IT infrastructure. 'Digital India' programme was launched by Prime Minister Narendra Modi on 1 July 2015. The three components of 'Digital India' are as follows:

- Creation of digital infrastructure
- Deliver service digitally
- Promote digital literacy

Swachh Bharat Abhiyan

This is a national campaign by the Government of India to clean roads and other public places in 4,041 statutory

cities and towns in the country. 'Swachh Bharat Abhiyan' was launched on 2 October 2014. As a part of the programme, the Government of India plans to build 12 crore toilets in rural India by October 2019.

Atal Pension Yojana (APY)

This is a universal social security scheme launched by the Government of India, targeting specially the poor and the underprivileged. The proposal for 'APY' was made in the Union Budget of FY 2015-16. It has been announced that the Government will launch the APY, which will provide a defined pension, depending on the contribution, and its period. The APY targets all citizens in the unorganised sector who join the National Pension System (NPS) administered by the Pension Fund Regulatory and Development Authority (PFRDA). Under the APY, the subscribers would receive a fixed minimum pension of ₹ 1,000 per month, ₹ 2,000 per month, ₹ 3,000 per month, ₹ 4,000 per month, ₹ 5,000 per month, at the age of 60 years, depending on their contributions, which itself would be based on the age of joining the APY. The minimum age of joining APY is 18 years and the maximum age is 40 years. Therefore, minimum period of contribution by any subscriber under APY would be 20 years or more.

Smart City Mission

About 32% of India's population lives in cities and cities' contribution in India's GDP is about 63%. Extensive development of physical, institutional, social and economic infrastructure of cities is needed for rapid growth. To put Indian cities at par with global standard, the Central Government started the smart city mission. This scheme was launched on 29 April 2015. The features of this scheme are to select cities from all Indian states for their upgradation and development. A total of 100 cities will be developed under this scheme; these 100 cities will be chosen through a competition.

Stand Up India Scheme

The Government of India on 6 January 2016 launched the Stand-up India scheme with the aim of increasing employment opportunities, developing entrepreneurs and adding every section of the society to economic development. The main target of this scheme is to develop entrepreneurship in women and SC/ST, and

bring them to the mainstream of the economy and increase self-employment in them. In the present scenario, the ratio between women and SC/ST is very low in self-employment and entrepreneurship. This section of the population does not empower in the direction of self-employment due to the restricted access to financial institutions.

Through this scheme, the government will ensure confidence- building, entrepreneurship and economic cooperation for self-employment of backward class and women. Through this scheme, every branch of each bank has to sanction a minimum number of projects to women and SC/ST. This will enable financial inclusiveness to every section of the society. This scheme is different from the start-up India scheme. Start-up scheme is related to the development of entrepreneurs in every section of the society, but Stand-up scheme is targeted to ensure financial aid to women and SC/ST.

Start-Up India Movement

The Prime Minister, Shri Narendra Modi launched the Start-up India initiative on 16 January 2016 in New Delhi.

Salient features of the Start-up Action Plan are as follows:

- A dedicated Start-up fund worth ₹ 10,000 crore will be created for funding of start-ups.
- Start-ups will be exempted from paying income tax on their profit for the first three years.
- Government is working on a simple exit policy for start-ups.
- Government is working towards fast-tracking of start-up patent applications.
- An 80 per cent exemption in patent fee for start-up businesses and a self-certification-based compliance system for start-ups would be introduced for 9 labour and environment laws.

Uday Scheme

The UDAY (Ujwal Discom Assurance Yojana) Scheme has been launched to improve financial and operational efficiencies of power distribution companies (DISCOMs). It envisages reducing interest burden, cost of power and

AT & C losses. Consequently, DISCOMs would become sustainable to supply adequate and reliable power, enabling 24×7 power supply. The scheme provides that the states would take over 75% debt of DISCOMs, as on 30 September 2015, in two years.

Shyama Prasad Mukherji Rurban (Rural-Urban) Mission

Prime Minister Narendra Modi launched the Shyama Prasad Mukherji Rurban (Rural-Urban) Mission from Chhattisgarh's Dongargarh block, which aims to 'transform rural areas to economically, socially and physically sustainable spaces'.

The highlights of this scheme are:

- In order to reduce migration of people towards the cities, the mission will focus on developing 300 clusters by year 2020 to spur economic, social and infrastructural development in rural areas.
- The aims of the mission are to bridge the rural-urban divide by bringing civic and infrastructural facilities to clusters of villages across states, evolving a new mantra for urbanisation.
- Clusters will be identified geographically and adjusted Gram Panchayats with 25 to 50 thousand population in the plain areas and 5 to 15,000 in hilly or tribal areas.

Beti Bachao Beti Padhao Scheme

The Union Ministry of Women and Child Development has launched a new initiative scheme 'Beti Bachao Beti Padhao' with the aim to prevent gender-biased sex selective elimination, ensure survival & protection of the girl child' and ensure education of the girl child.

To fulfill the aims of the BBBP scheme, the initiative has been launched in partnership with Celltick Mobile Media India Pvt. Ltd. to spread awareness about the scheme to an estimated 100 million mobile users in India. Campaigning for the scheme aims at promoting gender equality and the importance of educating girls. The platform provides a means to reach users based on their location as well as their language of preference.

BUDGET

A budget means an assessment of the receipts and expenses over a definite future period of time which is collected and re-assessed on a periodic basis. Union Budget is a statement of the estimated receipts and expenditure of the Central Government for that particular financial year.

Types of Budgets

There are several different kinds of budgets that are explained as follows:

- **Balanced budget:** A balanced budget refers to a budget where revenues are equal to expenditure and neither budget deficit nor budget surplus exists.
- **Surplus budget:** A surplus budget refers to a budget where revenues are greater than expenditure.
- **Deficit budget:** A deficit budget refers to a budget where the expenditure is greater than the revenue.

Deficit and its Types

Deficit means a state of financial health of an economy whereby expenditures exceed the revenues. The different kinds of deficits are as follows:

- **Budgetary deficit:** It occurs when the government's expenses exceed its revenues. It is the difference between receipts and expenses pertaining to the capital and revenue accounts of the government.
- **Fiscal deficit:** It refers to the difference between total revenue and total expenditure of the government. It indicates the total borrowings needed by the government.
- **Revenue deficit:** It means that the revenue expenditure of the government is in excess of the total revenue receipts. In order to counteract the revenue deficit, the government should either reduce its expenditure or increase its tax and non-tax receipts.
- **Primary deficit:** It refers to the difference between present government expenditure on goods and services and the total current revenue.

BASICS OF TAXATION

The word “tax” has its origin in a Latin word “Taxo”. Taxes refer to a kind of finance charge that is imposed on an individual or a company by the Government of India or the state governments or any other recognised local body. The purpose of collecting taxes is to construct a pool of money that can be used to fund various public expenditures, such as providing subsidies and carrying out developmental activities.

Direct versus Indirect Tax

Direct taxes are the taxes that are to be paid by the assessee or the taxpayer (person or corporate) directly to the government. The tax has to be paid by the taxpayer only and cannot be transferred to any other person. Various types of direct taxes include income tax, gift tax, corporate tax, etc.

Indirect tax refers to a group of tax laws and regulations. In India, it is levied on all business activities including manufacturing, trading, imports and exports, stamp duty, registration fees, transfer tax, education cess, surcharge, gift tax, toll tax, etc. It is usually levied by state governments.

Basics of GST

Goods and Services Tax (GST) would be an exhaustive indirect tax that would be levied on the production, sales and consumption of goods and services throughout India. It would replace other taxes levied by the Central and State governments. Arun Jaitley introduced the GST Bill in Lok Sabha on 19 December, 2014. It has been passed by the Parliament in August, 2016.

WHAT IS GST?

GST is an integral indirect tax which was implemented throughout India from July 01, 2017. GST is the biggest tax reform in the history of Indian economy and it was

introduced as 101st Constitutional Amendment Act (122nd Amendment Bill) which was enforced from July 01, 2017. GST is a consumption based tax imposed on goods and services. It is a single uniform tax which eliminates and absorbs multiple taxes under Indian Taxation system, i.e. Value Added Tax (VAT), Service Tax, Excise Duty, Central Sales Tax (CST), Entry Tax, Local Body Tax (LBT), etc.

GST is applicable on all goods and services, manufactured or supplied inside India; however, there are three products which are exempted from GST, i.e. alcohol for human consumption, petroleum products and electricity.

GST Timeline

Table 1: GST Timeline

Year	Event
2000	Committee was set up to draft the GST Law
2005	Kelkar Committee recommends to roll out GST by 12th Finance Commission
2006	GST proposed in the Parliament by the then Finance Minister and set a deadline of April 01, 2010 to implement it
2009	The then finance minister presents a basic structure for GST and retains deadline
2010	Computerisation of commercial taxes in states
2011	Constitution Amendment bill for GST was presented in Lok Sabha
2012	New deadline (i.e. December 31, 2012) was set up by the then Finance Minister
2014	In the budget speech, the then Finance Minister announces a compensation of ₹9000 crore for states.
2014	The GST bill cleared by standing lapses as the Government changes
December 2014	The Finance Minister introduces bill in the Lok Sabha
February 2016	New deadline (i.e. April 01, 2016) was set up
January 2017	New deadline to roll out GST was set up (i.e. July 01, 2017)
March 2017	Four key bills (CGST, IGST, SGST and UTGST) are passed in both houses
May 2017	Four slab rates (i.e. 5%, 12%, 18% and 28%) are unveiled by the GST council
July 01, 2017	GST rolled out

Components of GST: Components of GST are as follows

- **Central goods and services tax (CGST):** As per the CGST Act 2016, CGST is the part of GST and it absorbs various taxes collected by the Central Government, such as CST, Central Excise Duty, Service Tax, Additional Customs Duty, Education Cess, Surcharge, etc. CGST is applicable when transaction is done within the state boundaries or at the intrastate level.
- **State goods and services tax (SGST):** SGST is collected by the state government and it absorbs various taxes collected by the State Government, such as VAT, State Sales Tax, Octroi and Entry Tax, Luxury Tax, Taxes on Lottery, Taxes on Betting and Gambling. Like CGST, SGST is applicable when transaction is done within the state boundaries or at the intrastate level.
- **Integrated goods and services tax (IGST):** IGST is collected by the Central Government and it is applicable when commodities or services move within two or more states. In other words, IGST is applicable on interstate transaction.
- **Union territory goods and services tax (UTGST):** UTGST is collected by both central and UT Administrative bodies in the ratio of 1:1. It is applicable when transaction is done within the UT. However, IGST is applicable in case of inter UT transfer and UT – State transfer.
- UTGST is applicable in Daman and Diu, Dadra and Nagar Haveli, Andaman and Nicobar, Lakshadweep and – Chandigarh. However, it is not applicable in Pondicherry and Delhi, as they have their own legislative assembly and Chief Minister.
- **GST Council:** GST is implemented and regulated by the GST Council. GST council consists of the Finance Minister of India as its Chairman, the Union Minister of state in charge for Finance, Taxation or Revenue as member and the minister in charge for Finance, Revenue, Taxation or any other Minister nominated by the State Governments as member. The Vice

Chairperson of GST council will be chosen among the members from various states.

Important decisions related to GST council

- Under the GST council, minimum 50% members are required to attend the meeting to make it valid. In other words, Quorum is 50% of the total members.
- 75% majority is required for decision making.
- Council is responsible to make recommendations related to laws, rules and rates under GST.
- Minimum limit (Threshold limit) for exemption is ₹ 20 lakh; however, it is ₹10 lakh in the special category state.
- There are four tax slabs (i.e. 5%, 12%, 18% and 28%) under GST.
- GST payers with turnover of less than ₹ 1.5 crore are divided among Union Tax Administration and State Tax Administration in the ratio of 1:9.
- GST payers with a turnover of more than ₹ 1.5 crore are divided among Union Tax Administration and State Tax Administration in the ratio of 1:1.
- Year 2015-16 is taken as GST revenue base year for states.

Important features of GST

- GST is imposed on (levied on) supply and movement of goods and services within the Indian Territory.
- Import of goods into India is considered as interstate supply and IGST is imposed along with Basic Customs Duty (BCD).
- All the transactions under GST are only made through the electronic mode and tax can be deposited by the mode of net banking, NEFT, RTGS, debit card, credit card or over the counter.
- Registration required only in case of turnover of more than ₹20 lakh and there is option for voluntary registration.
- Input tax credit available on taxes paid on procurement and it is provided only if the invoice is matched.

- Taxpayers need to file quarterly returns.
- GST Suidha Providers are appointed under GSTN (GST Network) to provide technology based assistance.
- Separate ledgers to be maintained for cash and credit in electronic form.
- Concept of Tax Collected at Source (TCS) in case of E-commerce companies and Tax Deducted at Source in case of Government department.
- Refund to be granted and directly credited to bank accounts within 60 days, and interest to be payable if not granted within this limit.

PAN Card

PAN stands for a Permanent Account Number that comprises a unique 10 character alpha-numeric code. It is issued by the Income Tax Department of India. The PAN card is mandatory for all transactions above ₹ 2,00,000. This decision was made applicable in January 2016 and was taken in order to curb black money. Its purpose is to prevent tax evasion and bring about a universal identification for all financial transactions. It is mandatory when filing income tax returns, TDS or any form of communication with the Income Tax Department.

PAN card is not considered to be a proof of Indian citizenship since it is also issued to foreign nationals who invest in the Indian economy subject to a valid visa.

FRBM Act

The Fiscal Responsibility and Budget Management (FRBM) Act is a fiscal sector legislation passed by the Government of India in 2003. The objective of the Act was to ensure fiscal discipline by setting targets such as reducing the fiscal deficit and eliminating revenue deficit. The FRBM Act focuses on ensuring fiscal discipline and fiscal strengthening in India.

The FRBM Act's main objective is to achieve inter-generational equity in fiscal management. The high borrowings today, will be repaid by the future generation. However, the benefits derived from high expenditure and debt in present times goes to the current generation. By ensuring that FRBM targets are achieved, inter-

generation equity can be attained since the burden of debt, to be borne by the future generation, would be decreased.

Finance Commission

The Finance Commission is a body established under Article 280 of the Constitution whose primary function is to propose measures and systems on revenue distribution between the Centre and the states. It also recommends and establishes the principles upon which aid is granted to states and other local administrative bodies. The proposals of 14th Finance Commission is applicable from 1 April 2015 onwards.

The 14th Finance Commission is headed by the former Governor of Reserve Bank of India, Mr. Y.V. Reddy who is the present Chairman of the Commission. The other members of the Commission are Abhijit Sen, Member, Planning Commission; Sushama Nath, Former Union Finance Secretary; M. Govinda Rao, former Director of National Institute of Public Finance and Policy; Sudipto Mundle, former Acting Chairman, National Statistical Commission; and AN Jha, Secretary to the Commission.

The key recommendation of the Commission was an increase in the revenue share of states in the Centre's tax revenue to 42 per cent from the present 32 per cent which has been implemented. This is the single largest increase ever recommended by the Finance Commission.

UNION BUDGET 2017-18

Union Budget 2017-18

The Union Budget 2017-18 was announced by the Finance Minister, Arun Jaitley on 1 Feb 2017. Budget 2017-18 contains 3 major reforms. First, the presentation of Budget was advanced to First February to enable the Ministries to operationalise all activities from the commencement of the financial year. Second, the Railways Budget was merged with General Budget to bring Railways to the centre stage of Government's Fiscal Policy. And third, removal of plan and non-plan classification of expenditure to facilitate a holistic view of allocations for sectors and ministries.

ROADMAP & PRIORITIES

Agenda for 2017-18: "Transform, Energise and Clean India" – TEC India.

Ten distinct themes to foster this broad agenda:

FARMERS

- Target for agricultural credit in 2017–18 has been fixed at a record level of ₹ 10 lakh crore.
- Farmers will also benefit from 60 days' interest waiver announced on 31 Dec 2016.
- Coverage under Fasal Bima Yojana scheme will be increased from 30% of the cropped area in 2016–17 to 40% in 2017–18 and 50% in 2018–19 for which a budget provision of ₹ 9000 crore has been made.
- Coverage of National Agricultural Market (e-NAM) to be expanded from 250 markets to 585 APMCs. Assistance of up to ₹ 75 lakhs will be provided to every e-NAM.
- Dairy Processing and Infrastructure Development Fund to be set up in NABARD with a corpus of ₹ 2000 crore and will be increased to ₹ 8000 crore over 3 years

RURAL POPULATION

- Aim to bring one crore households out of poverty and to make 50,000 Gram Panchayats poverty free by 2019, the 150th birth anniversary of Gandhiji.
- Against a target of 5 lakh farm ponds under MGNREGA, 10 lakh farm ponds to be completed by March 2017. During 2017-18, another 5 lakh farm ponds will be taken up.
- MGNREGA allocation to be the highest ever at ₹ 48,000 crore in 2017-18.
- Pace of construction of PMGSY roads accelerated to 133 km roads per day in 2016-17, against an average of 73 km during 2011-2014.
- Allocation for Pradhan Mantri Awaas Yojana (Gramin) increased from ₹ 15,000 crore in BE 2016–17 to ₹ 23,000 crore in 2017-18, with a target to complete 1 crore houses by 2019 for the houseless and those living in kutcha houses.
- 100% village electrification by 1 May 2018.

- Sanitation coverage in rural India has gone up from 42% in Oct 2014 to about 60%. Open Defecation Free villages are now being given priority for piped water supply.

YOUTH

- Innovation Fund for Secondary Education proposed encouraging local innovation for ensuring universal access, gender parity and quality improvement to be introduced in 3479 educationally backward districts.
- Good quality higher education institutions to have greater administrative and academic autonomy.
- SWAYAM platform, leveraging IT, to be launched with at least 350 online courses. This would enable students to virtually attend courses taught by the best faculty.
- National Testing Agency to be set-up as an autonomous and self-sustained premier testing organisation to conduct all entrance examinations for higher education institutions.
- Pradhan Mantri Kaushal Kendras to be extended to more than 600 districts across the country. 100 India International Skills Centres will be established across the country.
- Skill Acquisition and Knowledge Awareness for Livelihood Promotion programme (SANKALP) to be launched at a cost of ₹ 4000 crore. SANKALP will provide market relevant training to 3.5 crore youths.

THE POOR AND THE UNDERPRIVILEGED

- Mahila Shakti Kendra will be set up with an allocation of ₹ 500 crore in 14 lakh ICDS Anganwadi Centres. This will provide one stop convergent support services for empowering rural women with opportunities for skill development, employment, digital literacy, health and nutrition.
- Under Maternity Benefit Scheme ₹ 6,000 each will be transferred directly to the bank accounts of pregnant women who undergo institutional delivery and vaccinate their children.
- Affordable housing to be given infrastructure status.
- Government has prepared an action plan to eliminate Kala-Azar and Filariasis by 2017, Leprosy by 2018, Measles by 2020 and Tuberculosis by 2025.

- To create additional 5,000 Post Graduate seats per annum to ensure adequate availability of specialist doctors to strengthen Secondary and Tertiary levels of health care.
- Two new All India Institutes of Medical Sciences to be set up in Jharkhand and Gujarat.

INFRASTRUCTURE

- For the transportation sector as a whole, including rail, roads, shipping, provision of ₹ 2,41,387 crore has been made in 2017-18.
- For 2017-18, the total capital and development expenditure of Railways has been pegged at ₹ 1,31,000 crore. This includes ₹ 55,000 crore provided by the Government.
- For passenger safety, a Rashtriya Rail Sanraksha Kosh will be created with a corpus of ₹ 1 lakh crore over a period of 5 years.
- Unmanned level crossings on Broad Gauge lines will be eliminated by 2020.
- Railway lines of 3,500 km will be commissioned in 2017-18. During 2017-18, at least 25 stations are expected to be awarded for station redevelopment.
- 500 stations will be made differently abled friendly by providing lifts and escalators.
- It is proposed to feed about 7,000 stations with solar power in the medium term.
- 'Coach Mitra', a single window interface, to register all coach related complaints and requirements to be launched.
- By 2019, all coaches of Indian Railways will be fitted with bio toilets. Tariffs of Railways would be fixed, taking into consideration costs, quality of service and competition from other forms of transport.
- In the road sector, Budget allocation for highways increased from ₹ 57,976 crore in BE 2016-17 to ₹ 64,900 crore in 2017-18.
- Total length of roads, including those under PMGSY, built from 2014-15 till the current year is about 1,40,000 km which is significantly higher than that of the previous three years.
- Select airports in Tier 2 cities will be taken up for operation and maintenance in the PPP mode.
- By the end of 2017-18, high speed broadband connectivity on optical fibre will be available in more than 1,50,000 gram panchayats, under BharatNet. A DigiGaon initiative will be launched to provide tele-medicine, education and skills through digital technology.
- Proposed to set up strategic crude oil reserves at 2 more locations, namely Chandikhole in Odisha and Bikaner in Rajasthan. This will take our strategic reserve capacity to 15.33 MMT.
- Second phase of Solar Park development to be taken up for additional 20,000 MW capacity.
- For creating an eco-system to make India a global hub for electronics manufacturing, a provision of ₹ 745 crore in 2017-18 to be incorporated in incentive schemes like M-SIPS and EDF.
- A new and restructured Central scheme with a focus on export infrastructure, namely, Trade Infrastructure for Export Scheme (TIES) will be launched in 2017-18.

FINANCIAL SECTOR

- A mechanism to streamline institutional arrangements for resolution of disputes in infrastructure related construction contracts, PPP and public utility contracts will be introduced as an amendment to the Arbitration and Conciliation Act 1996.
- A Computer Emergency Response Team for our Financial Sector (CERT-Fin) will be established.
- Government will put in place a revised mechanism and procedure to ensure time bound listing of identified CPSEs on stock exchanges. The shares of Railway PSEs, like IRCTC, IRFC and IRCON will be listed in stock exchanges.
- A proposal to create an integrated public sector 'oil major' which will be able to match the performance of international and domestic private sector oil and gas companies.
- In line with the 'Indradhanush' roadmap, ₹ 10,000 crore for recapitalisation of Banks provided in 2017-18.

DIGITAL ECONOMY

- 125 lakh people have adopted the BHIM app so far. The Government will launch two new schemes to promote the usage of BHIM; these are, Referral Bonus Scheme for individuals and a Cashback Scheme for merchants.
- Aadhar Pay, a merchant version of Aadhar Enabled Payment System, will be launched shortly.
- A proposal to mandate all Government receipts through digital means, beyond a prescribed limit, is under consideration.
- Banks have targeted to introduce additional 10 lakh new POS terminals by March 2017. They will be encouraged to introduce 20 lakh Aadhar based POS by September 2017.
- A proposal to create a Payments Regulatory Board in the Reserve Bank of India by replacing the existing Board for Regulation and Supervision of Payment and Settlement Systems.

PRUDENT FISCAL MANAGEMENT

- Total resources being transferred to the States and the Union Territories with Legislatures is ₹ 4.11 lakh crore against ₹ 3.60 lakh crore in BE 2016-17.
- For the first time, a consolidated Outcome Budget covering all Ministries and Departments is being laid along with the other Budget documents.
- FRBM Committee has recommended 3% fiscal deficit for the next three years, keeping in mind the sustainable debt target and need for public investment, fiscal deficit for 2017-18 is targeted at 3.2% of GDP and Government remains committed to achieve 3% in the following year.
- Revenue Deficit of 2.3% in BE 2016-17 stands reduced to 2.1% in the Revised Estimates. The Revenue Deficit for next year is pegged at 1.9%, against 2% mandated by the FRBM Act.

PROMOTING DIGITAL ECONOMY

- Under the scheme of presumptive income for small and medium tax payers whose turnover is upto ₹ 2 crore, the present 8% of their turnover which is counted as presumptive income is reduced to 6% in respect of turnover which is by non-cash means.

- No transaction above ₹ 3 lakh would be permitted in cash subject to certain exceptions.

TRANSPARENCY IN ELECTORAL FUNDING

- Maximum amount of cash donation a political party can receive will be ₹ 2000/- from one person.
- Political parties will be entitled to receive donations by cheque or digital mode from their donors.
- Amendment to the Reserve Bank of India Act to enable the issuance of electoral bonds in accordance with a scheme that the Government of India would frame in this regard.
- Every political party would have to file its return within the time prescribed in accordance with the provision of the Income-tax Act.

EASE OF DOING BUSINESS

- Threshold limit for audit of business entities who opt for presumptive income scheme increased from ₹ 1 crore to ₹ 2 crore. Similarly, the threshold for maintenance of books for individuals and HUF increased from turnover of 10 lakhs to 25 lakhs or income from 1.2 lakhs to 2.5 lakhs.
- Foreign Portfolio Investor (FPI) Category I & II exempted from indirect transfer provision. Indirect transfer provision shall not apply in case of redemption of shares or interests outside India as a result of or arising out of redemption or sale of investment in India which is chargeable to tax in India.
- Commission payable to individual insurance agents exempt from the requirement of TDS subject to their filing a self-declaration that their income is below the taxable limit.
- Under the scheme for presumptive taxation for professionals with receipt upto ₹ 50 lakhs p.a. advance tax can be paid in one instalment instead of four.

PERSONAL INCOME-TAX

- Existing rate of taxation for individual assesses between income of ₹ 2.5 lakhs to ₹ 5 lakhs reduced to 5% from the present rate of 10%.
- Surcharge of 10% of tax payable on categories of individuals whose annual taxable income is between ₹ 50 lakhs and ₹ 1 crore.

- Simple one-page form to be filed as Income Tax Return for the category of individuals having taxable income upto ₹ 5 lakhs other than the business income.
- Appeal to all citizens of India to contribute to Nation Building by making a small payment of 5% tax if their income is falling in the lowest slab of 2.5 lakhs to 5 lakhs.

GOODS AND SERVICES TAX

- The GST Council has finalised its recommendations on almost all the issues based on the consensus on the basis of 9 meetings held.
- Preparation of IT system for GST is also on schedule.
- To maximise efforts for e-assessment in the coming fiscal year.
- To enforce greater accountability of officers of Tax Department for specific act of commission and omission.

BANKING

- **Public Sector Banks (PSBs):** Banks in which the government holds more than 50% shares are known as public sector banks. Currently, there are 27 PSBs in India including 19 nationalised banks, 6 banks belonging to the State Bank Group, IDBI and Bhartiya Mahila Bank (BMB).
- **Private Sector Banks:** Banks in which majority stake is held by private individuals or companies are known as private sector banks.
- **Nationalised banks:** Nationalisation refers to a process in which the country's government or state takes over a private industry and all its assets pass into public ownership. This is done by means of an Act or by implementing an ordinance. All 20 (now 19) banks that were taken over in 1969 and 1980 by means of the Banking Companies (Acquisition and Transfer of Undertaking) Act, 1969 are called nationalised banks. These are part of public sector banks.
- **Government banks:** It is an alternate term for public sector banks.

- **Foreign banks:** Foreign banks are those banks that are incorporated outside India. These banks are further divided into two types: first, foreign banks with branches in India; and second, foreign banks with representative offices in India.

History of Banking and Nationalisation

The history of banking in India is outlined in the following points:

First bank: General Bank of India (est. 1786)

Three banks established by the East India Company (Presidency Banks):

1. Bank of Bengal (1809)
2. Bank of Bombay (1840)
3. Bank of Madras (1843)

Allahabad Bank (1865) was the first bank that was completely run by Indians.

The Imperial Bank was formed in 1921 by the amalgamation of all Presidency Banks.

The Reserve Bank of India was established in April 1935 as the central banking authority of India.

The Imperial Bank of India was nationalised in 1955 under the State Bank of India Act, 1955. It was renamed as the State Bank of India. It was RBI's principal agent that was responsible for handling all banking transactions of the country.

In 1969, the **first round of the nationalisation** of banks took place and 14 commercial banks (with deposits ₹ 50 crore or more) were nationalised. The 14 banks were the following:

1. Allahabad Bank
2. Bank of Baroda
3. Bank of India
4. Bank of Maharashtra
5. Canara Bank

6. Central Bank of India
7. Dena Bank
8. Indian Bank
9. Indian Overseas Bank
10. Punjab National Bank
11. Syndicate Bank
12. UCO Bank
13. Union Bank of India
14. United Bank of India

In 1975, Regional Rural Banks (RRBs) were established under the provisions of an ordinance implemented on 26 September 1975. This was followed by the enactment of the Regional Rural Banks Act, 1976 in order to boost the rural economy and include more means of institutional credit for the rural and agriculture sector.

In 1980, six banks (with deposits > ₹ 200 crore) were **nationalised** including the following:

1. Andhra Bank
2. Corporation Bank
3. New Bank of India
4. Oriental Bank of Commerce
5. Punjab & Sind Bank
6. Vijaya Bank

In 1993, on the basis of the Narsimham Committee Report, the Banking Regulation Act was amended and private companies were allowed to enter the banking sector.

THE RESERVE BANK OF INDIA (RBI)

The Reserve Bank of India (RBI) is the central bank of India that is responsible for controlling and regulating the monetary policy and the banking system of a country.

RBI was set up on the basis of the recommendations of the Hilton Young Commission (Royal Commission on Indian Currency and Finance). This Commission

submitted its report in 1926. RBI came into existence on 14 January 1935; however, it started its operations w.e.f. 1 April 1935. RBI set up five offices in Delhi, Bombay, Calcutta, Madras and Rangoon. RBI was nationalised in 1949.

Powers and Functions

The following points outline the powers and functions of RBI in the Indian economy:

- Acts as the monetary authority of the country
- Controls money supply and credit
- Manages foreign reserves of the country
- Serves as banker and debt manager to the Government of India
- Acts as a banker of banks of India (Lender of last resort)
- Supervises banks
- Issues currency
- Manages public debt
- Regulates the banking system

National Housing Bank (NHB)

National Housing Bank (NHB) is a fully owned subsidiary of Reserve Bank of India (RBI). It was established under the National Housing Bank Act, 1987 on 9 July 1988. It is an apex financial institution for housing. NHB was established in order to function as a principal agency for promoting housing finance institutions both at local and regional levels. Moreover, NHB registers, regulates and supervises Housing Finance Company (HFC). It also observes through various on-site and off-site mechanisms and coordinates with other regulators.

Banking Ombudsman

The Banking Ombudsman is a senior official who is selected by the Reserve Bank of India to rectify customer complaints against failure or neglect in providing certain banking services.

NBFC's

According to the RBI, Non-Banking Financial Company (NBFC), a company registered under the Companies Act, 1956, is engaged in the business of loans and advances, acquisition of shares/stocks/bonds/

debentures/securities issued by Government or local authority or other marketable securities of alike nature, leasing, hire-purchase, insurance business, chit business but does not include any institution whose principal business is that of agriculture activity, industrial activity, purchase or sale of any goods (other than securities) or providing any services and sale/purchase/construction of immovable property.

Demonetisation

Demonetization means an economic approach where a specific currency denomination terminates to be perceived or utilized as a type of legal tender (i.e. lawful delicate). In other words, it is an act of the government under which, current currency denomination loses its status as legal tender and replaced by another new currency denomination that comes into motion.

History of Demonetisation in India

1st practice of demonetisation in India was carried out in 1946 by then British Government, when currency notes with denomination of INR 1000 and INR 10000 were banned or removed from flow.

Then after 1946, demonetisation takes place in 1978 which was first time in Independent India. That time currency notes of INR 1000, INR 5000 and INR 10000 were demonetised by then Morarji Desai Government of Janta party. At that time Mr. Indraprasad Gordhanbhai Patel, was RBI Governor and the main focus was to restrict the generation of black money within the economy.

On 08 November, 2016, on behalf of Government of India, Prime Minister Narendra Modi during his live address to the nation announced that currency denomination of INR 500 and INR 1000 will be terminated as legal tender from mid-night. He further announced that the Government will introduce new currency denomination of INR 500 and INR 1000 to replace old ones.

Results, Consequences and Outcomes

On 30 August, 2017, Reserve Bank of India releases annual report for the financial year ending 30 June,

2017 and data for demonetisation and following are the various outcomes:

- Total counterfeit currency cease by RBI was 762072 units of notes during RBI Financial Year 2016-17, which was 632926 units during FY 2015-16. RBI also states that fake currency ceased on high value notes was INR 41 crore.
- Reported suspicious transaction was found to be at 473003 during FY 2016-17, which was 106273 during FY 2015-16 (i.e. increased by approx. 345%).
- Total currency in circulation on November 04, 2016 was INR 17.97 lakh crore out of which INR 15.45 crore was in demonetised currency (i.e. INR 500 and INR 1000 notes) and total amount of INR 15.28 lakh crore was returned into banking sector, which was approx. 99% of total currency demonetised.
- RBI's balance sheet was declined by 2.4% (INR 80000 crore) between November 04, 2016 to March 31, 2017. In comparison RBI's balance sheet was increased by 16.1% (INR 4.7 lakh crore) during the same period of previous year.

MISCELLANEOUS TERMS RELATED TO BANKING

- **Aadhar:** It is a 12-digit individual identification number issued by the Government of India with the help of the Unique Identification Authority of India (UIDAI). It is considered to be a proof of identity and address throughout India.
- **ATM and its types:** ATM stands for Automated Teller Machine. It is an electronic machine installed at various places by banks and other operators in order to provide certain basic banking facilities, such as cash withdrawal, viewing balance, changing PIN number, etc.
- **White label ATM:** ATMs that are set up by NBFCs, such as Tata Communications, Muthoot Finance and Prism Payment Services.
- **Yellow label ATM:** ATMs that have been set-up for carrying out e-commerce transactions.

- **Bancassurance:** It refers to the Bank Insurance Model (BIM) or the partnership between banks and insurance companies, wherein banks sell insurance products through their established channels such as physical branches or through phone banking.
- **Bank draft:** A bank draft is a kind of cheque drawn by a bank on its own assets and the payment of which is guaranteed by the issuer bank. The issuer usually inspects the bank account of the person who requests the draft to verify whether sufficient funds are available in the account or not.
- **Bank rate:** It refers to the rate of interest that is charged by the RBI on loans granted by it to banks and financial institutions.
- **Banker's cheque:** This instrument enables banks to settle payments on behalf of their customers. The full value of this instrument is guaranteed by the bank and it is used for the payment within the local jurisdiction.
- **Base rate:** It was introduced in July 2010. It is the minimum interest rate below which a bank cannot lend (except in some special cases allowed by the RBI).
- **Cash Reserve Ratio (CRR):** It refers to the portion of the total deposits that a bank must maintain with the RBI.
- **Core banking:** It is a type of banking arrangement under which customers of a particular bank's branch can access their bank accounts and can perform basic banking transactions through any branch of the concerned bank.
- **Credit rating:** It refers to a practice wherein the ability of an individual/organisation to fulfill financial commitments is estimated. The estimation is usually based on the previous dealings of the individual/organisation.
- **Crossing of cheque:** It is a method of protecting the drawer and payee of a cheque against fraud. Crossing implies that two parallel lines are drawn across the face of a cheque.
- **Current Account Balance (In context of Balance of Payments):** It refers to the difference between the total value of exports and the total value of imports in India in a particular financial year.
- **Current Account Deficit (CAD):** When the total value of exports is less than the total value of imports, a country is known to face a CAD situation.
- **Debit card:** It is a (plastic) card issued by a bank or a financial institution. The holder of the card can electronically transfer the amount from his linked account to a particular merchant account. Debit card also functions as an ATM card.
- **Direct Benefit Transfer (DBT, also known as direct cash transfer of subsidies):** It is a programme of the Government of India under which all the subsidies received by the people would be transferred directly into their bank accounts.
- **Electronic Clearing Service (ECS):** It refers to a mode of making and receiving payments electronically.
- **Hawala:** It refers to an informal system for the transfer of money majorly across international borders whereby local agents disperse or collect money or goods on behalf of friends, relatives or other agents without legal protection or supervision.
- **Inflation:** It refers to a continuous increase in the aggregate or general price level of goods and services in an economy implying an increase in the cost of living.
- **Kisan Credit Card (KCC):** It refers to a scheme introduced by the NDA Government in 1998 so that ample and timely short-term credit could be provided to farmers during the cropping season.
- **Know Your Customer (KYC):** It refers to Customer Due Diligence (CDD) that financial institutions and other regulated companies need to perform to recognise their customers and assure important information pertinent to carrying out financial business with them.
- **Marginal Standing Facility (MSF):** It refers to the rate at which scheduled banks can obtain funds overnight from the Reserve Bank of India (RBI) against approved government securities.

- **Money laundering:** It refers to the act by which criminals disguise the original ownership and control of the incomes and profits generated through criminal conduct by making such proceeds appear to have been generated from a legitimate source.
- **Mortgage:** It refers to a legal agreement by which a financial institution lends money at interest in exchange for the title deed of the debtor's property as collateral for a loan.
- **Multicity cheque:** It refers to a cheque that can be written by the customer in favour of his client and can be paid at par at all branches of the bank.
- **NEFT:** It is an Indian system for facilitating the electronic transfer of money that takes place between one bank or bank branch and another.
- **Non-Performing Assets (NPA):** When a borrower fails to make interest or principal payment in respect of a loan for 90 days, it is considered as an NPA.
- **Overdraft:** It refers to a transfer of credit given by a lending institution to the account holder when his/her account balance reaches zero. It allows the individual to withdraw money even if there is no availability of funds.
- **Statutory Liquidity Ratio (SLR):** Commercial banks in India are required to maintain a certain portion of their net demand and time liabilities as liquid assets in the form of cash, gold and unencumbered securities. SLR is calculated as the ratio of liquid assets to demand and time liabilities.
- **SARFAESI Act:** SARFAESI refers to the Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act. It was enacted in 2002. This Act empowers banks to recover their bad debts or loans. This law is applicable to NPAs that are backed by banks by way of hypothecation or mortgage or assignment.

Aadhar-Enabled Payment System (AEPS)

AEPS was developed by NPCL. It enables financial inclusion by permitting transactions at a Point of Sale (PoS) using the Aadhar authentication number.

The four Aadhar-enabled basic types of banking transactions, which an individual can conduct, are

balance enquiry, cash withdrawal, cash deposit and Aadhar to Aadhar funds transfer. A customer can avail AEPS services if he/she has an individual identification number (identifying the bank with which the customer is associated), an Aadhar number and fingerprints taken during his/her enrollment.

The AEPS objective is to empower a bank customer to execute basic banking transactions by using Aadhar for accessing his/her Aadhar-enabled bank account, which are intra-bank or interbank in nature.

National Electronic Funds Transfer (NEFT)

NEFT was introduced by RBI in 2005 for the purpose of making payments from one individual/organisation to another on a one-to-one basis. In this system, an individual/organisation having an account in any branch of a NEFT-enabled bank can transfer money to another individual/organisation having an account in any branch of a NEFT-enabled bank. The network of NEFT is widespread and has presence all over India. NEFT transactions can be made from Monday to Saturday (except 2nd and 4th Saturday) from 8 am to 6.30 pm. All transactions of NEFT are settled in hourly batches, which means that money transfer takes place in a near real-time manner.

For completing a NEFT-transaction, the sender must fill in essential details related to the prospective receiver. The details include account number of the receiver, bank name of the receiver and IFSC code of the receiver's bank branch. The receiver is called beneficiary. The maximum amount that can be transferred in one NEFT transaction is INR 50,000.

Real-Time Gross Settlement (RTGS)

RTGS is an electronic payment method that was introduced in 2004. It is also used to transfer an amount from one bank account to another. RTGS stands for Real-Time Gross Settlement. As the term indicates, the settlement of an RTGS transaction is done on a real-time basis, that is, no waiting period is involved. RTGS transactions are also gross transactions because each RTGS transaction is carried out alone and not bundled along with other transactions unlike NEFT transactions. RTGS can be carried out only for those transactions that

are above 2 lakh value. The timing of RTGS is from 8.15 am to 4.15 pm.

Immediate Payment Service (IMPS)

IMPS was introduced in November 2010. It is a type of funds transfer service that is completed through a mobile phone. It was launched by the National Payments Corporation of India (NPCI). The account holders of the banks that are IMPS-enabled can transfer funds among themselves using mobile phones. The IMPS service is available 24/7, 365 days a year, and the transaction takes place on a real-time basis.

A customer who wishes to avail the IMPS service must first register for it with his /her bank. After that, the bank issues a Mobile Money Identifier (MMID) and MPIN to the customer. The customer can then use these details to transfer funds to another account.

INSURANCE

Insurance can be defined as an agreement or contract between an insurance company (insurer) and a client (insured). As per this contract, the insurance company agrees to pay or compensate a particular percentage of damage that may occur to the client or any of his/her properties in case any emergency arises. When a client enters into an insurance agreement, he/she has to pay a particular amount of money for a fixed period of time. The amount that has to be paid by the client is called the premium amount. The premium is to be paid annually or semi-annually or quarterly or monthly or as per the terms of the insurance agreement. Therefore, insurance serves as a risk management tool as it transfers a certain amount of risks from one entity to another.

Reinsurance

Reinsurance plays a crucial role in the financial system of a country as it is a means of transferring risks. When an insurer approaches a prospect for selling an insurance policy, it should be ensured that the insurer is able to pay for all the claims that are filed by the insured person. This protects the insured person against an emergency, on the other hand, it creates a burden for the insurance company as it needs to maintain a fixed

amount of capital. Thus, to reduce the amount of capital that is required to be maintained by the insurer, the insurer transfers part of its risk to another insurer. This is called the concept of reinsurance. In India, General Insurance Corporation (GIC) is the only company that provides reinsurance services.

General Insurance

General insurance can be any kind of insurance, except for life insurance. Thus, it is also called non-life insurance. Insurance that covers risks related to homes, offices, any building facilities, vehicles, disasters, theft, fires, terrorism, accidents, etc. come under the category of general insurance. Also, general insurance includes health insurance. Health insurance typically includes compensation for the cost of hospitalisation, cost of surgery and cost of medicines. These different general insurance policies may offer different percentage of risk cover. Moreover, the terms and conditions also vary for every type of insurance policy.

Life Insurance

Life insurance is an insurance agreement in which the insurer agrees to pay a certain amount to the insured (or his/her nominee) after the death of the insured or after a particular time period. It is used basically in two scenarios. In the first scenario, the insured may die young, leaving behind dependants, while in the second scenario; the insured may live long but has no financial support.

In 1956, the government took over 154 Indian insurers, 16 foreign insurers and 75 provident societies that were operating in India. All these were nationalised. As a result of this nationalisation drive, Life Insurance Corporation of India (LIC) came into existence on 1 September 1956. It was set up as a public body fully owned by the Government of India. During this time, most insurance companies were charging hefty premiums and were resorting to unethical practices. Thus, a need was felt to regulate these private insurance companies by nationalising them and bringing them under an umbrella of LIC. With the passage of time, LIC became a key player in the capital market.

IRDA

Established in 1999, the Insurance Regulatory and Development Authority (IRDA) ensures that various insurance companies are regulated and monitored efficiently and effectively. The basic objective of establishing IRDA was to ensure that various entities, which are holders of different policies, get their claim genuinely. Hence, in order to meet this objective, IRDA is required to maintain a stipulated deposit with the RBI, which is a certain percentage of the total premium collected from different entities. In addition, every insurer is required to maintain a minimum paid-up share capital of 100 crore with the promoters' quota not exceeding 26 per cent thereof. Some of the key functions of IRDA are as follows:

- Specifying a code of conduct for surveyors and loss assessors
- Protecting the interests of various policyholders
- Promoting awareness and education of various entities
- Controlling and regulating various companies in the insurance sector

MUTUAL FUNDS

A mutual fund can be defined from two perspectives. It may refer to a mutual fund trust or a particular scheme rolled out by a mutual fund company. A mutual fund trust is a professionally managed body that pools in the money (investment) of various investors and invests the entire money collected (corpus) into various securities such as stocks, bonds, money market securities, gilt securities, commodities and precious stones. In this way, it acts as a financial intermediary between financial markets and investors. On the other hand, in the context of a scheme, a mutual fund is a type of financial instrument in which investors and the general public can invest their savings in order to meet their investment objectives.

International Financial Institutions

There are several international financial institutions, which assist in the circulation of money and currency in

the world. Some of these institutions have been described in the next sections.

WTO

The World Trade Organisation (WTO) is an intergovernmental organisation which monitors and manages international trade. WTO officially began operations on 1 January 1995 under the Marrakesh Agreement which was signed by 123 nations on 15 April 1994. The Marrakesh Agreement replaced the General Agreement on Tariffs and Trade (GATT), which had begun in 1948.

World Bank

World Bank is an international financial institution that offers loans to developing nations for investment. It includes two institutions namely, the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA). The World Bank forms a part of the World Bank Group. Its official objective is to reduce poverty. The bank was formed in 1944 at the Bretton Woods Conference with its headquarters situated in Washington D.C.

IMF

The International Monetary Fund or IMF was formed at the 1944 Bretton Woods Conference in July 1944. Its headquarters are located at Washington D.C. The IMF's chief aim is to make the international monetary system secure which enables countries (and their residents) to transact with each other.

IFC

The International Finance Corporation (IFC) is an international financial institution that provides services pertaining to investment and asset management in order to stimulate growth in the private sector in developing nations. IFC is situated at Washington D.C., US and is a member of the World Bank Group. IFC was set up in 1956 with the purpose of improving economic development by investing in commercial projects in order to reduce poverty and promote development.

BRICS Bank

The New Development Bank (NDB) which was earlier known as the BRICS Development Bank was set up by

BRICS (Brazil, Russia, India, China and South Africa). The agreement for setting up NDB was signed at the 6th BRICS Summit, which was enforced in July 2015. NDB is headquartered in Shanghai, China and its first regional office would be opened in Johannesburg, South Africa. The present President of NDB is K.V. Kamath.

SEBI

This regulatory body was established in 1992 to ensure that the investors' interest is protected when dealing with securities of various companies. In addition, SEBI is also responsible for regulating, maintaining and developing various market opportunities of securities.

Powers and Functions

Some of the key functions of SEBI are as follows:

- Regulating transactions in the stock market exchange
- Admitting and registering various stock brokers
- Regulating the functioning of sub-brokers, agents, share transfer agents, etc.
- Registering and regulating the working of depositories and depository participants
- Promoting investor education and providing various training programmes to intermediaries for performing day-to-day operations
- Regulating various public issues of shares and debentures

PRACTICE QUESTIONS

Answer the following questions by selecting the most appropriate option.

1. Which of the following sectors employ the maximum number of people in India?
 - (1) Primary
 - (2) Manufacturing
 - (3) Industry
 - (4) Services
2. Which of the following is not a characteristic of developing countries?
 - (1) High poverty level
 - (2) Low per capita income
 - (3) High growth of population
 - (4) High rate of investment
3. Law of demand shows relation between
 - (1) price and supply of goods
 - (2) income and price of commodity
 - (3) price and quantity of goods
 - (4) income and quantity demand
4. Excise duty is a tax levied on which of the following?
 - (1) Production of goods
 - (2) Purchase of goods
 - (3) Export of goods
 - (4) Sale of goods
5. 'Zero Defect Zero Effect' is related to which of the following schemes of the Government of India?
 - (1) Digital India
 - (2) Make in India
 - (3) Start-up India
 - (4) Smart cities
6. By the year 2022, the 'Sardar Patel Urban Housing Mission' aims to build as many as
 - (1) 25 million houses
 - (2) 20 million houses
 - (3) 30 million houses
 - (4) 35 million houses
7. What is the cover amount for full disability in the Pradhan Mantri Suraksha Bima Yojana?
 - (1) 1 lakh
 - (2) 2 lakhs
 - (3) 3 lakhs
 - (4) 5 lakhs
8. Which of the following is not true regarding MUDRA Bank?
 - (1) It started with an initial corpus of ₹ 200 billion and a credit guarantee fund of ₹ 30 billion.
 - (2) The institution will function as a commercial bank.
 - (3) It is a subsidiary of SIDBI.
 - (4) It will refinance other micro-finance institutions.
9. The Millennium Development Goals (MDGs) are related to which of the following international agencies/ organisations?
 - (1) IMF
 - (2) WTO
 - (3) UN
 - (4) World Bank
10. Which of the following is incorrect about the Swachh Bharat Abhiyan?
 - (1) Clean India by 2 October 2022.
 - (2) Eliminate open defecation by constructing toilets for households and communities.
 - (3) Eradicate manual scavenging.
 - (4) Introduce modern and scientific municipal solid waste management practices.
11. Atal Pension Scheme has been started for
 - (1) unorganised sector's workers
 - (2) women
 - (3) agriculture worker
 - (4) service sector worker
12. Shyama Prasad Mukherji Rurban Mission was launched to develop
 - (1) cluster of smart villages
 - (2) export growth clusters
 - (3) manufacturing growth clusters
 - (4) tourism growth clusters
13. Indradanush Scheme is related to
 - (1) crop variation
 - (2) child vaccination
 - (3) export policy
 - (4) defence technology
14. The Stand-up India Scheme launched by the Central Government aims to promote entrepreneurship amongst people from
 - (1) SC/ST and women
 - (2) poor
 - (3) OBC
 - (4) differently abled
15. The Pradhan Mantri Ujjawala Yojana is related to
 - (1) providing free LPG connections to women from BPL households
 - (2) providing free LED bulbs to women from BPL households
 - (3) providing employment to women from BPL households
 - (4) providing free television sets to women from BPL households
16. Liberalisation of the Indian economy started in which year?
 - (1) 1989
 - (2) 1990
 - (3) 1991
 - (4) 1992
17. We come across the term 'PPP' in financial news nowadays. What does 'PPP' represent?
 - (1) Personal Per capita Power
 - (2) Public-Private Partnership
 - (3) Per capita Potential for Purchase
 - (4) Present Purchasing Power

- 18. Business in stock markets and other securities markets is regulated by**
(1) Sole Trade and Exchange Bank of India
(2) State and exchange Bank of India
(3) Securities and Exchange Board of India
(4) Stock and Exchange Bank of India
- 19. India is a mixed economy because of the presence of which of the following?**
(1) Public sector (2) Private sector
(3) Joint sector (4) Cooperative sector
- 20. GNP can be represented as**
(1) GDP + Net income from abroad
(2) NNP + Net income from abroad
(3) NNP – Net income from abroad
(4) GDP – Net income from abroad
- 21. Which one of the following developed the concept of Human Development Index?**
(1) Prof. Samuelson (2) Paul Krugman
(3) Dr. Mahbub-Ul-Haq (4) Amartya Sen
- 22. The Human Development Index (HDI) is based on**
A. education level
B. health status
C. per capita income
Choose the correct options:
(1) Only A (2) Only B
(3) A and B (4) A, B and C
- 23. Pradhan Mantri Ujjawala Yojana is implemented by the**
(1) Ministry of Petroleum and Natural Gas
(2) Ministry of Power
(3) Ministry of Women and Child Development
(4) Ministry of Health and Family Welfare
- 24. National income is defined as**
(1) Gross domestic product
(2) Gross national product
(3) Net National Product (NNP) at factor
(4) Net National Product (NNP) at market price
- 25. What is the full form of NITI?**
(1) National Institution for Technological Initiative
(2) National Institution for Transforming India
(3) National Initiative for Technological India
(4) New Initiative for Transforming India
- 26. The Gini Coefficient is a measure of**
(1) foreign exchange reserve
(2) export
(3) import
(4) income inequality
- 27. Yellow Revolution in India is related to**
(1) saffron cultivation
(2) oilseeds production
(3) advertising industry
(4) mango production
- 28. Each year, economic survey is published by**
(1) Ministry of Finance
(2) NITI Aayog
(3) RBI
(4) Indian Statistical Institute
- 29. Who is the Chairman of the NITI Aayog?**
(1) President (2) Vice President
(3) Prime Minister (4) Finance Minister
- 30. Which of the following is not a feature of the Indian economy?**
(1) High per capita income
(2) Heavy population pressure
(3) Dependence of population on agriculture
(4) Poverty and Inequality income distribution
- 31. Which of the following represents the sustainable method of development?**
(1) Optimum use of resource
(2) Reducing industrialisation
(3) Reducing consumption, increasing efficiency and using renewable energies
(4) Better transportation by building more roads
- 32. According to 14th Finance Commission, what is the share of states in union taxes?**
(1) 28% (2) 32%
(3) 35% (4) 42%
- 33. Which of the following institutions has replaced the Planning Commission?**
(1) Finance Commission
(2) National Development and Reform Commission
(3) National Institution for Transforming India Aayog
(4) Control Commission
- 34. Sustainable development indicates**
(1) continuous rise in GDP
(2) long-lasting development without affecting the needs of the future
(3) full exploitation of natural resources
(4) reduction in unemployment and poverty
- 35. Monetary policy in India is framed by the**
(1) Reserve Bank of India
(2) Security and Exchange Board of India
(3) SEBI
(4) Ministry of Finance
- 36. Which of the following about Human Development Index (HDI) is incorrect?**
(1) It is published every year.
(2) It is published by the United Nation Development Programme.
(3) HDI ranking is based on a score between 0 and 1.
(4) All member of United Nation are covered in this index.

- 37. In India, Consumer Price Index (CPI) data is calculated by**
(1) Ministry of Finance
(2) Reserve Bank of India
(3) Ministry of Commerce
(4) Central Statistics Office
- 38. In India, who issues the minimum support price?**
(1) Ministry of Finance
(2) Ministry of Agriculture
(3) NITI Aayog
(4) Commission for Agricultural Costs and Prices
- 39. In India, the National Income is calculated by**
(1) RBI (2) NSSO
(3) CSO (4) Finance Ministry
- 40. Which of the following was not a part of the green revolution strategy?**
(1) High-yielding variety seeds
(2) Chemical fertilisers
(3) Use of pesticides
(4) Organic farming
- 41. Who is called the father of Operation Flood in India?**
(1) S. Subramanyam
(2) Varghese Kurien
(3) C.R. Rao
(4) M.S. Swaminathan
- 42. New industrial policy that emphasised on LPG was started in**
(1) 1989 (2) 1990
(3) 1991 (4) 1993
- 43. Which of the following states is the leading producer of manganese?**
(1) Karnataka (2) Madhya Pradesh
(3) Rajasthan (4) Odisha
- 44. Which of the following states is the leading producer of bauxite in the country?**
(1) Maharashtra (2) Odisha
(3) Gujarat (4) Tamil Nadu
- 45. Which of the following is the leading producer of rice in the country?**
(1) Uttar Pradesh (2) West Bengal
(3) Bihar (4) Punjab
- 46. Net National Product at market price is equal to**
(1) GNP – Depreciation
(2) GDP – Depreciation
(3) GNP – Subsidies
(4) GNP + Depreciation
- 47. Which one of the following sectors contributes the most to the national income?**
(1) Primary sector (2) Public sector
(3) Services sector (4) Secondary sector
- 48. SIDBI stands for**
(1) Small Industries Developmental Banker Institute
(2) Small Industrial Designed Bank of India
(3) Small Innovations Development Banker's Institute
(4) Small Industries Development Bank of India
- 49. Reserve Bank of India (RBI) was nationalised in**
(1) 1951 (2) 1947
(3) 1935 (4) 1949
- 50. NABARD stands for**
(1) National Business for Accounting and Reviewing
(2) National Bank for Agricultural and Rural Development
(3) National Bank for Aeronautics and Radar Development
(4) National Bureau for Air and Road Transport
- 51. Budgetary deficit means**
(1) Excess of public expenditure over public revenue
(2) Excess of public revenue over public expenditure
(3) Deficit of public expenditure over public revenue
(4) Deficit of public revenue over public expenditure
- 52. How many characters are used in a PAN card unique identifier?**
(1) 8 (2) 7
(3) 10 (4) 12
- 53. What is meant by a balanced budget?**
(1) Revenues are more than expenditure
(2) Revenues are less than expenditure
(3) Revenues are equal to expenditure
(4) Income equals costs
- 54. What is the objective of taxation?**
(1) Raising revenue for the state
(2) To finance government expenditure
(3) Maintain economic stability
(4) All of these
- 55. In the Union Budget, the difference between revenue expenditure and revenue receipts is called**
(1) Fiscal deficit (2) Revenue deficit
(3) Budget deficit (4) Primary deficit
- 56. FRBM Act was first enacted in**
(1) 1999 (2) 2001
(3) 2003 (4) 2005
- 57. SEBI is a/an**
(1) constitutional body (2) advisory body
(3) non-statutory body (4) statutory body

- 58. The headquarters of the National Stock Exchange (NSE) are located in**
(1) New Delhi (2) Mumbai
(3) Kolkata (4) Chennai
- 59. Which of the following is not a public sector company?**
(1) HPCL (2) BPCL
(3) BHEL (4) Gillette
- 60. Micro credit concentrates on**
(1) small loans (2) women
(3) rural areas (4) all of these
- 61. Which among the following agencies/organisations acts as a regulator of micro-finance institutions in India?**
(1) RBI (2) NABARD
(3) SIDBI (4) SEBI
- 62. IRDA stands for**
(1) International Regulatory and Development Authority
(2) Indian Regulatory and Development Authority
(3) Indian Rural Development Authority
(4) Insurance Regulatory and Development Authority
- 63. India's capital market is regulated by**
(1) SEBI (2) RBI
(3) NSE (4) BSE
- 64. Mutual funds are regulated by**
(1) SEBI (2) AMFI
(3) RBI (4) IRDA
- 65. ULIP stands for**
(1) Unit Loan and Insurance Plan
(2) Unit Linked Insurance Plan
(3) Universal Loan and Investment Plan
(4) Uniformly Loaded Investment Plan
- 66. Who is the regulatory authority for the insurance business in India?**
(1) IRDP (2) SEBI
(3) NABARD (4) IRDA
- 67. Which of the following is not a component of the Indian securities market?**
(1) Government bonds (2) Corporate equity
(3) Currency derivatives (4) Term Deposits
- 68. Government securities with more than 1 year term are called**
(1) government bonds (2) treasury bills
(3) capital bills (4) bills of exchange
- 69. In India, _____ is the only company that provides reinsurance services.**
(1) General Insurance Corporation (GIC)
(2) Life Insurance Corporation (LIC)
(3) IRDA
(4) SEBI
- 70. The headquarters of the Forward Markets Commission (FMC) is located in**
(1) Mumbai (2) Kolkata
(3) Pune (4) Hyderabad
- 71. Which of the following is true with respect to Sensex?**
(1) It has 50 component stocks.
(2) Currently, it is calculated using the 'market capitalisation weighted' methodology.
(3) It is the second oldest stock index in India.
(4) It has 30 component stocks.
- 72. Prathama Bank, the first regional rural bank of India, was sponsored by**
(1) Oriental Bank of Commerce
(2) Punjab & Sind Bank
(3) Punjab National Bank
(4) Syndicate Bank
- 73. Which of these is the main source of a bank's income?**
(1) Interest on investments
(2) Commissions and brokerage
(3) Bill discounting
(4) Interest on loans
- 74. Regional rural banks were set up on the recommendations of the**
(1) Nariman Committee
(2) Narasimham Committee
(3) Gadgil Committee
(4) Bhave Committee
- 75. Which of the following is NOT a public sector bank?**
(1) Corporation Bank (2) United Bank of India
(3) Vijaya Bank (4) Federal Bank
- 76. Bandhan Bank is a**
(1) wholly owned subsidiary of RBI
(2) wholly owned subsidiary of Bandhan Financial Holdings
(3) Universal Bank
(4) Both (2) and (3)
- 77. Which of the following is the lender of last resort in India?**
(1) World Bank
(2) Reserve Bank of India
(3) Union Ministry of Finance
(4) Planning Commission
- 78. Which of the following is not a function of a commercial bank?**
(1) Providing project finance
(2) Settlement of payments on behalf of customers
(3) Deciding policy rates, such as CRR, SLR and repo rates
(4) Issuing credit/debit/ATM cards

- 79. One rupee note bears the signature of**
(1) President of India
(2) Vice-President of India
(3) Finance Secretary
(4) Finance Minister
- 80. In which of the following states is there no regional rural bank?**
(1) Karnataka (2) Goa
(3) Uttarakhand (4) Himachal Pradesh
- 81. The largest contribution in the New Development Bank has been made by**
(1) India (2) Russia
(3) Brazil (4) China
- 82. The headquarters of the Indian Overseas Bank are located in**
(1) Chennai (2) New Delhi
(3) Kolkata (4) Mumbai
- 83. NITI Aayog has proposed to replace the five-year plan with a**
(1) 10-year plan (2) 15-year plan
(3) 20-year plan (4) 25-year plan
- 84. The headquarters of 'Punjab National Bank' are based in**
(1) Mumbai (2) Chandigarh
(3) Kolkata (4) New Delhi
- 85. 'Retail Banking' is also known as _____**
(1) Wholesale Banking
(2) Co-operative Banking
(3) Corporate Banking
(4) Personal Banking
- 86. According to RBI guidelines, payment banks will not be allowed to issue**
(1) debit cards (2) credit cards
(3) prepaid cards (4) ATM cards
- 87. Banks are required to maintain a certain percentage of their deposits with the RBI in the form of**
(1) CRR (2) SLR
(3) bank rate (4) base rate
- 88. Liquidity is injected by the RBI in the economy through which of the following mechanisms**
(1) change in bank rate
(2) repo rate
(3) increase in SLR
(4) through Liquid Adjustment Facility
- 89. Which of the following is a measure taken by the RBI to control deflation in the country?**
(1) Increase in CRR
(2) Increase in SLR
(3) Contraction in money supply
(4) Decrease in SLR
- 90. The Reserve Bank of India was established in**
(1) 1932 (2) 1934
(3) 1935 (4) 1943
- 91. Which of the following is not a function of RBI?**
(1) Regulator and supervisor of the financial system
(2) Manager of Foreign Exchange
(3) Issuer of currency
(4) Prepare a fiscal policy
- 92. An increase in SLR means**
(1) Restriction on the expansion of bank's credit
(2) More lending money for bank
(3) Easy loan for bank customer
(4) More money in the market
- 93. How many regional offices does RBI have?**
(1) 14 (2) 19
(3) 21 (4) 17
- 94. Which of the following is not a main function of RBI?**
(1) Monetary authority
(2) Issuer of currency
(3) Regulator and supervisor of the financial system
(4) Development of Five Year Plans
- 95. Headquarters of the National Housing Bank are located in**
(1) New Delhi (2) Mumbai
(3) Ahmedabad (4) Pune
- 96. Nachiket Mor Committee was related to**
(1) Fiscal deficit (2) Revenue expenditure
(3) Financial inclusion (4) Monetary policy
- 97. Which of the following committee was constituted by RBI on New Bank Licenses?**
(1) Raghuram Rajan Committee
(2) Y V Reddy Committee
(3) S Damodaran Committee
(4) Bimal Jalan Committee
- 98. Who fixes the REPO rate in India?**
(1) WTO – World Trade Organisation
(2) SEBI – Securities and Exchange Board of India
(3) RBI – Reserve Bank of India
(4) IMF – International Monetary Fund
- 99. Which of the following is a private sector bank?**
(1) Yes Bank
(2) Punjab National Bank
(3) Vijaya Bank
(4) IDBI Bank Ltd
- 100. Which of the following institutions has the authority to issue participatory notes?**
(1) RBI (2) SEBI
(3) IRDA (4) TRAI

ANSWERS AND EXPLANATIONS

1. (1) In India, more than 50% of the total work force is employed in agriculture and allied services.
2. (4) In developing countries, the rate of saving and investment is very low because people tend to spend most of their earning on essential items, such as food, health and education.
3. (2) The law of demand states that if all other factors affecting demand remain constant, the buyers will buy more quantity of a commodity at a lower price and less of it at a higher price.
4. (1) Excise tax is an indirect tax, which is levied on goods manufactured within India to be consumed in India.
5. (2) 'Zero Defect Zero Effect' stands for the production of goods with zero defects and without any harmful effect on the environment.
6. (3) Sardar Patel Urban Housing Mission is a proposed scheme of the NDA government which would endeavour to construct 30 million houses by 2022 for the economically weaker sections and low income groups.
7. (2) Under the Pradhan Mantri Suraksha Bima Yojana, the coverage amount for accidental death and full disability is ₹2 lakhs and for partial disability is ₹1 lakh. Premium for this scheme is ₹12 per annum. The premium will be directly auto-debited by the bank from the subscribers' account. Any person having a bank account and Aadhaar number linked to the bank account can give a simple form to the bank every year before 1st of June in order to join the scheme.
8. (2) Mudra Bank will function as a non-banking financial company.
9. (3) MDGs aim at poverty eradication and economic development in the UN member states.
10. (1) The Swachh Bharat Abhiyan was launched on 2 October 2014. The aim of this Abhiyan is to clean India by 2 October 2019. It demands to change people's attitudes to sanitation and create awareness.
11. (1) Atal Pension Yojana was launched on 9 May 2015. It was launched for unorganised sector's workers.
12. (1) Shyama Prasad Mukherji Rurban Mission aims at the development of rural growth clusters, which have latent potential for growth and can trigger overall development in the region. The Mission will thus develop a cluster of smart villages.
13. (2) Mission Indradhanush is a scheme for child vaccination with the main objective of covering all those children by 2020, who are either unvaccinated or are partially vaccinated.
14. (1) The Stand-up India Scheme is being launched to promote entrepreneurship among people from schedule caste/schedule tribe and woman who will be provided loans starting from ₹ 10 lakhs to ₹ 100 lakhs.
15. (1) The Pradhan Mantri Ujjawala Yojana is a scheme for providing 5 crore LPG connections to women from BPL families.
16. (3) A balance of payment crisis necessitated the liberalisation of the Indian economy in 1991.
17. (2) PPP stands for Public-Private Partnership. In this, the government and its agencies collaborate with private sector enterprises to finance different projects (mainly infrastructure projects, such as metro rail, highways and airport).
18. (3) Business in stock markets and other securities markets is regulated by the Securities and Exchange Board of India (SEBI). It was established with the passing of the Securities and Exchange Board of India Act, 1992 on 12 April 1992.
19. (3) A mixed economy is characterised by the presence of both public and private sectors.
20. (1) $GNP = GDP + \text{Factor income earned by domestic entities abroad} - \text{Factor income earned by foreign entities in domestic economy}$. Thus, $GNP = GDP + \text{Net factor income from abroad}$.
21. (3) Dr. Mahubub-UI-Haq developed the concept of Human Development Index in 1990. He was an economist of Pakistani origin. The United Nations Development Programme (UNDP) has adopted his concept of Human Development for the comparative study of the development of different nations.
22. (4) HDI stands for Human Development Index. HDI report is published every year by UNDP. This index compares countries based on the educational levels of people, their health status and per capita income.

- 23.** (1) The Ministry of Petroleum and Natural Gas will implement a welfare scheme benefitting women belonging to the poorest households. The scheme provides financial support of ₹ 1600 for each LPG connection to BPL households. This scheme will be implemented over three years, namely the FY 2016-17, 2017-18 and 2018-19.
- 24.** (3) Net National Product (NNP) at factor cost is called national income. $NNP \text{ at factor cost} = NNP \text{ at market prices} - (\text{Indirect taxes} - \text{Subsidies})$.
- 25.** (2) NITI stands for National Institution for Transforming India.
- 26.** (4) Gini coefficient is used for measuring income inequality.
- 27.** (2) Yellow revolution in India is related to oilseeds production.
- 28.** (1) Each year, economic survey is published by the Ministry of Finance. Economic survey is a report card on the performance of economy in the current financial year.
- 29.** (3) The Prime Minister is the Chairman of the NITI Aayog.
- 30.** (1) Low per capita income, population pressure, dependence on agriculture, high poverty, income inequality, higher level of capital formation and mixed economy are the main features of the Indian economy.
- 31.** (3) The goal of sustainable development can be achieved by reducing consumption, increasing efficiency and using renewable energy.
- 32.** (4) According to the 14th Finance Commission report, states will get 42% share in the taxes of the union government.
- 33.** (3) The National Institution for Transforming India Aayog (NITI Aayog) is a think tank of Government of India that replaced Planning Commission. The Prime Minister is the Chairman of NITI Aayog.
- 34.** (2) According to the definition adopted by the United Nation, 'Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.
- 35.** (1) The Reserve Bank of India is responsible for implementing the monetary policy in India. RBI controls inflation through monetary policy.
- 36.** (4) HDI ranking is based on a score between 0 and 1. It has three components, and each component is given a weightage of 1/3. The three components of HDI are life expectancy at birth, gross enrolment ratio and per capita income.
- 37.** (4) CPI is calculated by the Central Statistics Office (CSO) under the Ministry of Statistics and Pro-gramme Implementation (MOSPI).
- 38.** (4) In India, every year, minimum support price is recommended by the Commission for Agricultural Costs and Prices (CACP). CACP was set up in 1985, and it recommends for MSP, issue prices and pro-curement prices.
- 39.** (3) In India, the National Income is calculated by the Central Statistical Organisation (CSO).
- 40.** (4) Use of HYV seeds, chemical fertilisers and pesticide in the correct quantities as well as regular supply of water were the main features of the green revolution.
- 41.** (2) Varghese Kurien is the father of Operation Flood in India. Operation Flood is related to the programme of increase in the milk production in India.
- 42.** (3) New industrial policy based on liberalisation, privatisation and globalisation (LPG) was started in 1991.
- 43.** (2) Madhya Pradesh produces maximum (37.68%) of the total production of manganese ore in 2014-15 followed by Maharashtra (28.56%), Odisha (13.90%), and Andhra Pradesh (10.82%).
- 44.** (2) In 2014-15, Odisha was the leading producer of bauxite (42%) followed by Gujarat (25%), Maharashtra (12%) and Jharkhand (9%).
- 45.** (2) West Bengal (14%) is the highest producer of rice in the country followed by Uttar Pradesh (11.7%) and Andhra Pradesh (11%).
- 46.** (1) During the process of production, some part of capital loss happens due to wear and tear of machinery; this is called depreciation. Depreciation cannot be included in the income. So, we deduct depreciation from GNP and get the Net National Product (NNP) at market price.
- 47.** (3) The service sector contributes the most to the national income of India. In 2015-16, the services sector accounted for 53.3 per cent of India's GVA at basic prices.
- 48.** (4) SIDBI stands for Small Industries Development Bank of India. It is a financial institution that aids the growth and development of micro, small and medium-scale business enterprises.

49. (4) The Reserve Bank of India (RBI) was nationalised on 1 January 1949. The present Governor of RBI is Urjit Patel.
50. (2) The National Bank for Agriculture and Rural Development (NABARD) is a development bank established to uplift agricultural and economical aspects of life in rural India. It was founded on 12 July, 1982 in Mumbai, Maharashtra.
51. (1) Budgetary deficit occurs when the government's expenses exceed its revenues. It is the difference between the receipts and expenses pertaining to the capital and revenue accounts of the government.
52. (3) PAN card refers to a Permanent Account Number which comprises a unique 10 character alpha-numeric code. It is issued by the Income Tax Department of India.
53. (3) A balanced budget refers to a budget where revenues are equal to expenditure and neither budget deficit nor budget surplus exists.
54. (4) The main objective of the taxation system in a welfare state like India is to raise revenue to meet public expenditure. Other objectives are to maintain economic stability and remove disparities in the distribution of income.
55. (2) Revenue deficit is the revenue expenditure minus revenue receipts. On the other hand, fiscal deficit is the total expenditure minus total receipts excluding borrowings.
56. (3) Fiscal Responsibility and Budget Management Act was first enacted in 2003. This Act requires the elimination of revenue deficit by 2008-09.
- The Act mandates a 3% limit on the fiscal deficit after 2008-09.
57. (4) On 12 April 1988, the Government of India established a new agency named SEBI (Securities and Exchange Board of India). SEBI was given statutory powers in 1992 with the passing of the SEBI Act, 1992, by the Indian Parliament.
58. (2) NSE is a leading stock exchange of India; it was established in Mumbai in 1992.
59. (4) Gillette is a brand of the multi-national company Procter & Gamble (P&G). It sells safety razors and various other personal care products under its Gillette brand.
60. (4) By definition, micro credit refers to the extension of small loans to the poor and needy sections of the society, who do not have any collateral, and a steady employment and verifiable credit history. Typically, women are given special focus in micro credit.
61. (2) National Bank for Agriculture and Rural Development (NABARD) is the largest development bank in India and is headquartered in Mumbai. The main aim of the bank is to provide funding to the economically weak segments to remove regional disparities.
62. (4) Insurance Regulatory and Development Authority (IRDA) of India was established in 1999 on the recommendations of the Malhotra Committee. The mission of IRDA is to protect the interests of policyholders and regulate the insurance industry.
63. (1) The prime objective of SEBI is to protect the investors' interest so that they can invest in the capital market. Its headquarter is located in Mumbai. It also has regional offices in New Delhi, Kolkata, Chennai and Ahmedabad.
64. (1) The mutual fund market is regulated by SEBI. It is an apex regulatory body that aims to boost the investor's trust in the capital market. In case mutual funds are promoted by a bank, RBI also regulates mutual funds.
65. (2) ULIP is the risk cover provided to the policyholder along with investment options to invest in qualified investments, such as stocks, bonds or mutual funds. The first ULIP was launched in India in 1971 by the Unit Trust of India (UTI).
66. (4) The establishment of Insurance Regulatory and Development Authority of India (IRDAI) was done by the Parliament of India. It is responsible for regulating and developing the insurance sector in India.
67. (4) Term deposits include the recurring and fixed deposits, and these are not tradable.
68. (1) As per RBI, a government bond is a tradable instrument issued by the Central Government or State Governments. It acknowledges the government's debt obligation. Such securities are short term (usually called treasury bills with original maturities of less than one year) or long term (usually called government bonds or dated securities with an original maturity of one year or more).
69. (1) Reinsurance means transferring risks. In India, it is provided by GIC only. GIC was

established in 1972, and its headquarter is in Mumbai.

- 70.** (1) The Forward Markets Commission (FMC) was established in 1953 and its headquarters are located in Mumbai, Maharashtra.
- 71.** (4) Sensex, first compiled in 1986, is the oldest stock index in India. Earlier, the 'market capitalisation weighted' methodology was used to calculate Sensex. However, since 2003, 'free-float market capitalisation' methodology is used to calculate it.
- 72.** (4) Prathama Bank was the first regional rural bank of India. It was sponsored by Syndicate Bank and was established on 26 September 1975.
- 73.** (4) The main source of a bank's income is the interest income. A bank earns interest from its advances and pays interest to the customers for their deposits. The difference between interest earned and interest paid by a bank contributes to its profits.
- 74.** (2) Regional rural banks were set up on the recommendations of Narasimham Committee in 1990.
- 75.** (4) Federal Bank is one of the major private commercial banks in India. The bank is headquartered in Kochi, Kerala.
- 76.** (4) Bandhan Bank is a wholly owned subsidiary of Bandhan Financial Holdings as well as a universal bank. A universal bank is the one that is both a commercial bank and an investment bank.
- 77.** (2) The RBI is considered to be the lender of last resort. Banks can approach the RBI to meet their shortfalls if they remain unable to meet the demand of funds by other sources.
- 78.** (3) The RBI has the sole authority to set policy rates.
- 79.** (3) All currency notes bear the signature of the Governor of the Reserve Bank of India (RBI), except the one-rupee note as it has the signature of the Finance Secretary.
- 80.** (2) A regional rural bank is a local-level banking organisation that operates in different Indian states. The bank serves the banking and financial requirements of people in rural areas. Many of the Indian states have rural regional banks, except Goa and Sikkim.
- 81.** (4) The largest contribution in the New Development Bank, promoted by BRICS, has been done by China. This bank is headquartered in Shanghai, China.
- 82.** (1) The Indian Overseas Bank is a public sector bank that is head-quartered in Chennai. It was the first public sector bank to intro-duce anywhere banking. The bank implemented anywhere banking in all its 129 branches located in four metro cities.
- 83.** (2) NITI (National Institution for Transforming India) Aayog has decided to come up with a 15-year vision document. NITI Aayog had already replaced Planning Commission in 2015. With its 15-year vision document, it will now abandon the concept of five-year plans.
- 84.** (4) Punjab National Bank was established in 1894 with its headquarters situated in New Delhi, India.
- 85.** (4) Retail banking is also known as personal banking wherein the bank directly interacts with its retail customers.
- 86.** (2) Payment banks mean 'Digital Wallet or Mobile Currency' that can be used by individuals to book movie tickets, pay utility bills, do shopping, etc.
- 87.** (1) Cash Reserve Ratio (CRR) refers to that part of a bank's total deposits that it needs to maintain as statutory reserves.
- 88.** (2) Repo rate refers to the rate at which the central bank of a country (in India, RBI) lends money to commercial banks in the case of any deficit of funds.
- 89.** (4) Statutory liquidity ratio (SLR) is one of the most important tools of monetary policy that requires commercial banks to maintain a proportion of their deposits in the form of gold and government approved securities before providing credit to customers. By decreasing the SLR, the money supply in the banking and financial system would increase, which leads to control of deflation.
- 90.** (3) The Reserve Bank of India was set up on 1 April 1935 as a shareholder bank during the British Rule. The bank started its operations in accordance with the provisions of the Reserve Bank of India Act, 1934.
- 91.** (4) A fiscal policy is prepared by the Ministry of Finance. RBI formulates, implements and monitors the monetary policy.
- 92.** (1) An increase in Statutory liquidity ratio (SLR) means a commercial bank has to keep more deposits with itself in the form of liquid assets, which restricts the expansion of the bank's credit.
- 93.** (2) Regional offices of RBI are located in Ahmedabad, Bangalore, Bhopal,

Bhubaneswar, Chandigarh, Chennai, Delhi, Guwahati, Hyderabad, Jaipur, Jammu, Kanpur, Kochi, Kolkata, Lucknow, Mumbai, Nagpur, Patna and Thiruvananthapuram.

- 94.** (4) Five year plans are developed by NITI Aayog since 2014. Earlier these plans were formulated by the Planning Commission.
- 95.** (1) Headquarters of the National Housing Bank are located in New Delhi. NHB is a wholly owned subsidiary of the Reserve Bank of India, which was set up in 1988. NHB is an apex financial institution for housing.
- 96.** (3) The Committee on Comprehensive Financial Services for Small Businesses and Low Income Households was set up by the RBI in 2013 under the chairmanship of Nachiket Mor. Nachiket Mor committee gives recommendation on various aspect of financial inclusion.
- 97.** (4) The Bimal Jalan Committee was constituted by RBI on issue related to New Bank Licenses. The committee submitted its report to the Reserve Bank of India (RBI) on 25 February 2014. The report contains the names of entities eligible for bank licences.
- 98.** (3) The Reserve Bank of India (RBI) fixes the repo rate in India. Repo rate refers to the rate at which the central bank of a country lends funds to the commercial banks. It is a tool used for controlling inflation in a country.
- 99.** (1) Yes Bank is the fifth biggest private sector bank of India which was established in 2004 by Rana Kapoor. It is headquartered in Mumbai, Maharashtra.
- 100.** (2) SEBI has the authority to issue participatory notes. These are instruments issued by registered foreign institutional investors to overseas investors.

4

POLITY AND CONSTITUTION OF INDIA

THE CONSTITUTION

India is the largest functioning democratic country in the world. Although the Constitution of India came into force on 26 January 1950, its roots go back a long way when millions of Indians—in *mohallas*, villages, towns and cities—would take the pledge of freeing their country from the centuries-old British Rule, committing themselves to making India a republic. The philosophy of the Indian Constitution evolved through the revolts, sacrifices, and mergers and partitions under this Great National Movement for India's independence. Very few constitutions have the kind of experience as the making of the Constitution of India had. Our Constitution is the world's largest written constitution comprising 444 Articles, 22 Parts, 12 Schedules and 118 Amendments, as well as 117,369 words in its English translation.

The Indian Constitution has been playing a crucial role "to empower the nation" in the last 64 years since its operation. For the formation of a powerful but fair government, the state powers were separated such that each would be neither superior nor inferior to the other but would be of primary importance. Therefore, the Government of India is divided into three branches: the legislative branch, the executive branch and the judicial branch. Each branch has been given a similar expanse of authority with clearly defined roles. No branch can wield unwarranted influence over the other. The executive branch has sprouted from the legislative branch. The judiciary is independent of these two branches. The legislature is the law-making forum, the onus of implementation of whose policies lies with the executive. In the executive branch, there are permanent executives, including civil servants, and other officers and staff working for the Indian Government, and temporary executives, including the Prime Minister of India together with his/her Council of Ministers. No bill proposed by the executive can be passed unless ratified by the legislature. The third pillar of Indian democracy, the judiciary, has the power to review the laws passed by the Parliament and strike them down if any law is found to be violating the principles or obstructing the goals of the Constitution. Thus, the functions of these three pillars—executive, legislature and judiciary—are vital for the successful operation of constitutional democracy in a nation such as India.

Schedules in the Indian Constitution

The following table depicts the various schedules in the Indian Constitution:

First Schedule	List of States & Union Territories
Second Schedule	Salary of President, Governors, Chief Justices, Justices of High Court and Supreme Court, Comptroller and Auditor General
Third Schedule	Forms of Oaths and Affirmations
Fourth Schedule	Allocates seats for each state of India in Rajya Sabha
Fifth Schedule	Administration and control of scheduled areas and tribes
Sixth Schedule	Provisions for administration of Tribal Areas in Assam, Meghalaya, Tripura, Mizoram & Arunachal Pradesh
Seventh Schedule	Gives allocation of powers and functions between Union & States. It contains 3 lists: 1. Union List (For central Govt)–97 Subjects. 2. States List (Powers of State Govt)–66 subjects 3. Concurrent List (Both Union & States)–47 subjects.
Eighth Schedule	List of 22 languages of India recognised by the Constitution 1. Assamese 2. Bengali 3. Gujarati 4. Hindi 5. Kannada 6. Kashmiri 7. Manipuri 8. Malayalam 9. Konkani 10. Marathi 11. Nepali 12. Oriya 13. Punjabi 14. Sanskrit 15. Sindhi 16. Tamil 17. Telugu 18. Urdu 19. Santhali 20. Bodo 21. Maithili 22. Dogri Sindhi was added in 1967 by the 21st Amendment; Konkani, Manipuri and Nepali were added in 1992 by 71st Amendment; Santhali, Maithili, Bodo and Dogri were added in 2003 by 92nd Amendment
Ninth Schedule	Added by 1st Amendment in 1951, Contains acts & orders related to land tenure, land tax, railways, industries (Right of property not a fundamental right now)
Tenth Schedule	Added by 52nd Amendment in 1985, contains provisions of disqualification on grounds of defection
Eleventh Schedule	By 73 rd Amendment in 1992, contains provisions of Panchayati Raj.
Twelfth Schedule	By 74th Amendment in 1992, contains provisions of Municipal Corporation.

Articles in the Indian Constitution

The Indian Constitution was adopted by the Constituent Assembly in 1949. It consisted of 395 articles and 22 parts. Further amendments have been made to it by subsequent constitutional amendments. Presently, the Indian constitution consists more than 444 articles in 25 parts. The list of Articles of the Constitution of India is as follows:

Articles 1-4	Deals with the territory of India, formation of new states, alterations, names of existing states
Articles 5-11	Deals with various rights of citizenship
Articles 12-35	Deals with fundamental rights of Indian Citizens, Abolition of untouchability and titles
Articles 36-51	Deals with Directive Principles of State Policy
Articles 51A	This part was added by the 42nd Amendment in 1976, which contains the fundamental duties of the citizens.
Articles 52-151	Deals with government at the central level
Articles 152-237	Deals with government at the state level
Article 238	Deals with states
Articles 239-241	Deals with the Union Territories
Articles 242-243	It consists of two parts: (i) added by 73 rd amendment in 1992, which contains a new schedule. It contains 29 subjects related to Panchayati Raj, which has been given administrative powers (ii) It was added by the 74 th amendment in 1992, which contains a new schedule. It contains 18 subjects related to municipalities, which have been given administrative powers
Articles 244-244A	Deals with the scheduled and tribal areas.
Articles 245-263	Deals with the relationship between the Union and states

Articles 264-300A	Deals with the distribution of revenue between the Union and states, appointment of Finance Commission, etc.
Articles 301-307	Deals with the trade and commerce within the territory of India
Articles 308-323	Deals with UPSC and Public Services Commissions
Articles 323A, 323B	Added by the 42 nd Amendment in 1976. Deals with administrative tribunals set up by parliament to hear disputes and complaints regarding Union, States or Local Government Employees
Articles 324-329	Deals with election
Articles 330-342	Deals with special provision for SCs, STs and Anglo-Indian Representatives
Articles 343-351	Deals with the official languages of the Union and states
Articles 352-360	Deals with emergency provisions, President's Rule
Articles 361-367	Deals with exemption of criminal proceedings for their official acts of president and governors
Articles 368	Deals with Amendments to the constitution
Articles 369-392	Article 370 deals with special status to J&K
Articles 371A	Gives special provisions with respect to the State of Nagaland
Articles 393-395	Deals with the short title, commencement and repeal of the constitution.

Constituent Assembly

The total number of members of the Constituent Assembly was 389—296 from British India and 93 members from the princely states. Initially, however, the Assembly included only the members of British India. The members of the Constituent Assembly were indirectly elected by only 20 to 24 per cent of the total population. Apart from them, there were many nominated members representing the native states. Constituent Assembly was responsible for formulating a new constitution for free India. After working on it for nearly three years, the Assembly adopted the Constitution on 26 November

1949. It held 11 sessions, covering 1965 days. The last sitting was held on 24 January 1950. In total, the Assembly had 15 committees with 80 members. A Drafting Committee was constituted in 1947 under the chairmanship of Dr. Ambedkar, which consisted of six other members to prepare the draft constitution. The draft was completed in February 1948.

Features of Indian Constitution

Cultural, geographical and historical diversity renders a variety of features to the Constitution of India. The features that are salient have been discussed in the following subsections.

Written Constitution

Like the constitutions of America, Canada and France, the Constitution of India is also a written constitution but the longest among such, comprising 395 Articles and 12 Schedules and consequently fulfilling the basic requirements of a federal government.

Preamble of the Constitution

The Preamble is the main part of the Constitution. It may be referred to as the mirror of the Constitution. It declares India 'a sovereign, secular, socialist, democratic, republic and welfare state'. The terms 'secular' and 'socialist' were added by the 42nd Amendment Act of 1976.

Single Citizenship

Citizenship is single, that is, everybody who is born in India is entitled to the citizenship of the whole country, rather than a particular state.

Rigid Constitution

The Constitution of India is rigid in nature. Most of the provisions dealing with the union and state relations can only be amended by joint actions. Such amendments are enforced only by a two-third majority of the members present and voting in the Parliament and approved by at least one-half of the total states.

Federal System with Unitary Bias

India has a federal system with a unitary bias. The desire and commitment to preserve the unity without compromising on the issues of development of different regions made this choice inevitable.

Central Government has More Powers

The Central Government has full authority to legislate on the subjects included in the Union List. State governments can make and enforce laws, under normal circumstances, on the subjects as given in the State List. The governor of a state may refer to the President for an opinion on a bill passed by the Legislative Assembly. Further, about the Concurrent List, if a debate arises between the Central Government and any state government over any matter or matters enumerated in the Concurrent List, the decision of the Centre shall be final, as the residuary powers are vested in it.

Independent Judiciary

The Supreme Court of India is at the helm of the judiciary. It has the power to declare a law unconstitutional or 'ultra vires' if it goes against the provisions of the Constitution in any way. In order to ensure the independence of the judiciary, judges are not removable by the executive and their salaries cannot be reduced by the Parliament.

India as a Secular State

The Indian Constitution gives a special status to no religion. There is no such entity as a state religion of India. This distinguishes it from theocratic states like most Islamic countries. Moreover, secularism in India guarantees equal freedom to all religions. The Constitution grants the Right to Religious Freedom to every citizen.

India as a Republic

The Preamble of the Constitution declares that India is a republic. Our country is not governed by a king or a nominated head. The President of India is an elected head for a limited period of five years.

Fundamental Rights

Part III of the Indian Constitution deals with the fundamental rights of every Indian. Articles 12–35 grant and guarantee fundamental rights such as Right to Equality, Right to Food, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Right to Life and Right to education. It may be referred to as the Indian Bill of Rights.

Dual Government Polity

In a federal state, there are two governments: the central or federal government and the state government (of each component unit) whereas in a unitary state, there is only one form of government, namely the central government. Thus, India, as a federal system, has central and state governments.

GOVERNMENT

Government can be referred to as a group who exercises sovereign authority over a nation. It is generally responsible for making and enforcing the laws. It is also responsible to formulate foreign policy and look after external affairs. A government has the authority of administering the public policies and exercising the executive, political, and sovereign powers through customs, institutions, and laws.

Forms of Government**Monarchy**

It is the form of the government, in which rulers enjoy their powers through traditional authority and rule through generations. In a monarchy, the state or a country is ruled by a king/emperor or queen/empress and the ruler usually holds the position for a lifetime. The complete power and sovereignty remain with a single individual and this is known as the rule by Royalty. It can be classified into two types based on the level of power held by the individual or family currently in power as the Absolute Monarchy and Constitutional Monarchy, respectively.

Democracy

Democracy is defined as the government, in which the powers belong to the people. Direct democracy is one form of government, in which people directly participate in law making and other activities of the government. In the representative form of democratic government, citizens vote for leaders to represent them in the political process and functioning of the government.

There are two types of democracy: direct democracy and indirect democracy, which are discussed as follows:

Direct Democracy

The features of direct democracy are as follows:

It is a form of democracy in which all the citizens have direct participation, without any intermediaries, in the decision making or political processes of the government.

All have the right to participate in discussions on national issues, and their opinions are also welcomed.

Every citizen's vote is considered truly important to the country as a whole, which strengthens the spirit of patriotism.

Switzerland is a rare example of direct democracy (instrumentalised at all levels of government such as municipalities, cantons and federal state).

Indirect Democracy

The features of the indirect democracy are follows:

- It is also known as representative democracy. In this type of democracy, citizens vote for leaders to represent them in the political processes and functioning of the government. As opposed to a direct democracy under which people directly vote on policy initiatives, representative democracy is a form government in which representatives elected by people vote on policy initiatives.
- It is one of the most common forms of government and can be found in countries like USA, Britain, Canada, etc.
- In it, the ultimate power to decide significant electoral system reforms lies with the people.
- India best exemplifies this form of government where the voting rights of every citizen is one of the important mechanisms in the country's progressive development as a powerful democracy.
- The representatives are elected by people through the election process, and the elected person is regarded as 'the representative of people', who will serve for a specified time period in office.

Principles of Democracy

The fundamental principles of a democratic system can be discussed as follows:

Majority Rule

The first and foremost principle of democracy, which guides and guards it, is the majority rule. According to this principle, a government takes a decision in favour of the option that draws the maximum votes. Under the democratic system, a political party or alliance with a clear majority in the parliament forms the government.

Multi-Party System

The voters have the right as well as the option to choose from among many parties and representatives at will, such as in India.

Freedom of Speech

Freedom of speech and expression is the first condition of liberty in a country that calls itself a democracy. Apart from leading citizens to self-development and self-fulfillment, this power strengthens their capacity to participate in decision making on the behalf of the nation.

Freedom of Assembly

No restriction is placed on the right to hold meetings or organise demonstrations, provided these do not violate the rights of others.

Respect for Every Individual's Rights

The sovereignty of citizens is protected by the state in case their rights are threatened by the actions of others.

Respect for Minority Rights

In the governmental system of a democracy, it is equally heeded that the majority rule is coupled with the guarantee of protecting the fundamental rights of minorities, i.e. their rights should neither depend upon the majority's goodwill nor be eliminated by majority votes.

Respect for the Law

The citizens must have respect for the laws by which they have been allowed their freedom and fundamental rights.

Merits of Democracy

The merits of democracy can be pointed out as follows:

- It is better than any other form of government because it represents the needs of people. It is accountable to public.

- It believes in finding a peaceful solution of a national problem by inviting the opinions of people. Thus, it keeps a country united. For dealing with differences and conflicts in countries with diversity of languages, castes, creeds and religions, such as India, democracy looks for methods that cater to the needs not of groups but of individuals.
- It practises political equality, which ensures equal rights both for the rich and for the poor, and the literate and the illiterate. In this way, democracy protects the dignity of every citizen.

Demerits of Democracy

The demerits of democracy can be pointed out as follows:

- It is based on quantity (majority of a political party or alliance), and quality (no real eligibility criteria exist for public officials) is not given importance.
- It might turn into domination of the majority over the minority, and the interests of the minority might be completely ignored.
- Sustaining political bodies like parliament, cabinets, ministries, etc., is a much expensive affair, as elections have to be conducted periodically to various offices, each of which involves huge expenditures.
- In a parliamentary democracy, there is no guarantee of completion of term by the government: It may be dissolved before its term and elections may be conducted before the period, its burden then being applied on tax payers.
- Political democracy without economic democracy is meaningless. In a democratic system, political rights are actually used by the capital class.

Oligarchy

It is defined as the form of government in which all the powers are enjoyed by a few people or by a dominant class or group within the society who may be distinguished by royalty, wealth, education or military command. The best example of such form of government is former Union of Soviet Socialist Republics (USSR). Other countries having oligarchy form of governments are China, North Korea, and Venezuela.

Authoritarianism

Authoritarianism is defined as the government where the powers are imposed forcefully by different government authorities. The people have no participation and absolute obedience towards the authority. Cuba has such form of government where citizens do not have their fundamental rights like right to liberty, freedom of speech, etc.

PARLIAMENTARY GOVERNMENT

In the Parliamentary form of government, the legislative and the executive organs are closely associated and interdependent on each other when it comes to the matters of the state. In such form of government, the head of the state is normally a different person from the head of the government, unlike in the Presidential form of government where the head of the state is the same person as the head of the government.

INDIAN PARLIAMENT

India has a federal system of the government and central legislature is bicameral in nature. The Indian Parliament consists of the President, the Rajya Sabha and the Lok Sabha. It is the supreme legislative body in the country. The Hindi names 'Rajya Sabha' and 'Lok Sabha' were adopted from the Council of the state and house of the people, respectively. The president is an integral part of the Parliamentary system, however, he is not a member of either House of the Parliament and does not sit in the parliament to attend sessions.

Rajya Sabha

Its membership is limited by the Constitution to a maximum of 250 members, and current provisions limit it to 245 members. 233 members of Rajya Sabha are indirectly elected by states and union territorial legislatures using single transferable votes. 12 members of the Rajya Sabha are appointed by the President of India on the recommendation of the Union Cabinet, for their expertise and contributions to art, literature, science, and social services.

The Articles from 79 to 122 of the Indian Constitution deal with the organisation, composition, duration,

officers, procedures, privileges, powers, etc. of the Parliament of India.

The Article 80 of the Indian Constitution deals with the strength and the qualification of the members of the Rajya Sabha.

Rajya Sabha is never subjected to dissolve and is of permanent nature. Around one third of its members retires every second year.

The Vice-President is the ex-officio chairman of the Rajya Sabha.

Lok Sabha

The maximum strength of the House envisaged by the Constitution of India is 552, which is made up by election of up to 530 members to represent the states, up to 20 members to represent the union territories and maximum two members to be from the Anglo-Indian community nominated by President.

The members are elected through direct elections held in the different Lok Sabha constituencies which are divided in a specific manner in every state so that the ratio between the population of each constituency and the number of seats allotted is the same throughout in a state.

The Constitution of India guarantees the uniformities of representation among the different states and different constituencies in the same state.

According to the 42nd Amendment of 1977 of the Indian Constitution, the allocation of seats in Lok Sabha to the states and the division of each state into territorial constituencies had been suspended till 2000 at 1971 census level, later that was extended to 2026 in the 84th Amendment of 2001.

POWERS AND FUNCTIONS OF THE PARLIAMENT

In India, the Parliament holds a central position and has a multi-functional role. In order to perform the constitutionally expected roles, the Constitution of India has provided various powers which are classified as the following.

Legislative Powers and Functions

The Parliament can legislate on the items enumerated in the Union List. In special circumstances, it can legislate even items on State List such as during the proclamation of National Emergency or when Rajya Sabha passes a resolution to the same effect.

In case of the concurrent list, the union laws have supremacy over state laws.

Article 123 of the Constitution grants the President certain law making powers to promulgate Ordinances when either of the two Houses of Parliament is not in session. Ordinances must be approved by Parliament within six weeks of reassembling or they shall cease to operate.

Executive Powers and Functions

The Indian Constitution established a parliamentary form of government in which the responsibilities of policies and acts remained with the Executive.

Through the various lawmaking procedures in both houses, the Parliament controls the Executive and supervises the activities of the Executive with the help of various committees.

The council of ministers can be removed from office by the Lok Sabha by passing a no-confidence motion in the house.

Financial Powers and Functions

The Parliament enacts the financial budget and approves the proposals of the Union Government to impose taxes and regulations.

With the help of various financial committees, Parliament scrutinises government's spendings and financial performances.

The parliament controls the Executive in matters of financial operations.

Other Functions of the Parliament

The Parliament functions as the highest deliberative body in the country which discusses the numerous issues of national and international importance.

The parliament has the right to approve the three types of emergencies, i.e. national, state and financial prescribed in the Constitution.

The parliament has the right to suspend the state legislative councils on the recommendation of the concerned state legislative assemblies.

The parliament has the right to expand as well as to decrease the territory of the country and it also has the right to rename any state of the Indian Union.

The organisation and jurisdiction of the Supreme Court and high court could also be regulated by the parliament.

STATE GOVERNMENT

The Indian Constitution describes the powers that are divided in the central government and the state governments. India comprises of twenty-nine states and seven union territories. India is a sovereign, secular, and democratic republic country with a parliamentary form of the government system at the centre as well as in the states. Chief Minister is the head of the council of ministers in every state, and governor of the state is the representative of the Centre. The Governor is the constitutional head of the state. According to Article 153 of the Indian Constitution, the executive power of state governments will rest with the Governor and there would be a council of ministers headed by the Chief Minister.

Legislature of the State

Similar to the Parliament, the states also consist of their assemblies. The legislature of the state comprises of the Governor and the Legislative Assemblies. In India, a few states possess bicameral legislature, such as Bihar, Maharashtra, Uttar Pradesh, Andhra Pradesh, Jammu and Kashmir, Telangana, and Karnataka, that consists of two houses namely the Legislative Assembly and the Legislative Council. In the remaining states, also known as unicameral states, there is only one house known as the Legislative Assembly.

Legislative Assembly (Vidhan Sabha)

The Legislative Assembly of a state or a union territory may constitutionally contain a maximum of 500 and a minimum of 60 members through direct election from territorial constituencies in the state. However, its size is less than 60 through an act of Parliament, viz. Goa, Sikkim and Mizoram. The ratio between the population of each constituency and number of seats allotted to it should be the same throughout the state. Term of an assembly is five years unless it is dissolved earlier. It is the lower house in bicameral states and only house in unicameral states.

Legislative Council (Vidhan Parishad)

The Legislative Council of a state contains maximum one third members of the legislative assembly and not less than 40 members of the assembly. Around one-third of the members of the council are elected by the members of legislative assembly; one-third by electorates comprising of members of municipalities, local authorities and district boards in the state; one-twelfth by electorate comprising of persons who have a minimum of three years' service experience in teaching in educational institutions in the state; one-twelfth by registered graduates of more than three years standing; and remaining one sixth members are nominated by Governor from among those who are distinguished personalities in literature, science, art, cooperative movement and social service.

Powers and Functions of the Chief Minister in India

The Leader of the Legislative Assembly

As leader of the Legislative Assembly in unicameral states (in bicameral states, the chief minister may be the leader of either Legislative Assembly or Legislative Council), the chief minister of a state possesses the following rights to perform state related tasks:

- The governor of the state acts upon his suggestions related to prorogue, summon, and dissolve the legislative assembly, etc.
- He clarifies the government policies as the chief spokesperson of the State Government and that is deemed to be final.

- The Chief Minister has the responsibility to get a bill passed by the Legislative Assembly and plays a role of rescue, if any minister faces difficulties during debates in the assembly.
- He remains answerable to the legislative assembly for any question related to any ministries of the government.

The Leader of the Council of Ministers

- The chief minister is the head of the Council of Ministers.
- The governor appoints or sacks other ministers of the council on his recommendation.
- The chief minister is responsible to maintain integrity and unity between the members of its Council of Ministers.
- The chief minister coordinates and monitors various activities and functions in different ministries of the state. He summons and chairs the meetings of the Council of Ministers.
- If the chief minister resigns, it implies the whole Council of Ministers is resigned. Since they work as a team, it is often said 'they swim or sink together'.

The chief advisor to the Governor

According to the Constitution of India, the chief minister is the chief advisor to the governor and executes it as following:

- The governor of the state exercises all functions on his advice.
- He is responsible to communicate with the governor to inform about all decisions taken by the Council of Ministers.
- He has to provide any information relating to the dealings of the State as the Governor may call for.

The Leader of the majority party or alliance

As leader of the majority party or alliance, the chief minister is in the centre of its party or alliance and possesses their related tasks as the following:

- It is the leader of the majority party or alliance in the Legislative Assembly whom the governor appoints the Chief Minister. He is also responsible to lead the

party in the assembly, and maintain the popularity, discipline, image and integrity of the party.

- He is always active to reconcile the strategy of the party or the alliance with that of the Government.

LOCAL GOVERNMENT

Local self-government in India

The concept of local self-government in India is not new. Ever since the Vedic period, local people were closely connected with the local affairs through several popular platforms like Sabhas (gatherings). Villages of India were always more or less self-independent unit. They used to generate their own resources and had own control over their local functions. After independence, Constitution of India did not have distinct and defined provisions of the municipalities or nagar panchayats in local urban areas. Entry 5 of the State list proclaims that local self-government shall be established by the State government and shall also transfer the power to fulfill its responsibilities.

However, in the rural areas, a provision of the village panchayats was placed under the Directive Principles of state policy. To make these provisions effective in practical form, two amendment bills were passed by parliament namely 73rd Constitutional Amendment Act, 1992 and the 74th Constitutional Amendment Act, 1992. These amendment acts were implemented in 1993, to the local self-governments in both rural and urban areas.

Local Government in Urban Areas

The Indian Constitution at the time of its adoption did not constitute self-government in urban areas or at the grass roots level. In order to provide local self-government in urban areas a collective framework was prepared to strengthen the democratic units in urban areas. The Parliament passed the 74th Constitutional Amendment Act, 1992, concerning local self-government in urban areas. The Act received the acceptance of the President on 20 April 1993 and it came into effect on 1 June 1993.

Local Government in Rural Areas

The Constitution of India discusses local governments in the chapter on Directive Principles of State Policy, which

specifies that the states should ratify appropriate laws for constituting Panchayats empowering them to function as local governments. In 1957 a committee was set up headed by Balawant Rai Mehta to evaluate the success of the National Extension Services and Community Development Programmes. The committee recommended a 3-tier system of panchayati raj. In 1977, Ashok Mehta Committee recommended that the 3-tier system of Panchayati Raj should be replaced by the 2-tier system. Most of the states ratified the recommendation of the Ashok Mehta Committee and provided political participation through Panchayat elections. In 1985, L.M. Singhvi Committee recommended that institutions like panchayats should be declared as components of local governments and made mandatory for all state governments.

73rd Constitutional Amendment Act was passed by the Indian Parliament that affirmed Panchayats as institutions of self-government in rural areas. This amendment came into force on 24 April 1993. The major features of the amendment are as the following:

- There should be three tiers of Panchayats (District Panchayats at the district level, Panchayat Committees at block level i.e. intermediary panchayats and Gram Panchayats at the village level.
- The States are mandated to transfer functions relating to 29 subjects.
- Panchayats are mandated to formulate plan(s) for economic development and social justice, and their implementation.
- The States are asked to constitute a State Finance Commission in every five years to regulate the Panchayats' share of state's financial assets as a matter of entitlement.
- Panchayat bodies must have proportional representation of the Scheduled Caste (SCs), the Scheduled Tribes (STs) and the Women. Such reservation should also put on in the cases of Chairpersons and Deputy Chairpersons of these bodies.

- There shall be a State Election Commission in every state which shall conduct elections to the panchayats in every five years.

THE JUDICIARY

The judicial system provides a mechanism for resolving disputes among citizens, between citizens and the government, between two state governments, and between the central and state governments. The Indian judicial system is the oldest judicial system in the world. After independence from the British colonial rule of over 200 years, India adopted a legal system with lots of similarities with the British legal system. Our judicial system is independent from the other two pillars, i.e. legislature and executive. If either of two acts against the Constitutional values or rights of citizens, the judiciary can take actions against them by way of Judicial Review. The hierarchy of the Indian judicial system goes as follows: the Supreme Court comes at the highest level, followed by high courts at the state level, then district or session courts at the district level and, lastly, lok adalats at grass roots level.

Features of the Indian Judicial System

As discussed above, the Indian judicial system is independent and strictly hierarchical in nature. The judiciary of India administers a common law system of legal jurisdiction. The salient features of this system have been discussed in the following subsections.

Independent Judiciary

The Constitution of India provides procedures of appointment and removal, and conditions of office for a court judge: (1) Every judge shall be appointed by the President, (2) The candidate should be highly qualified for appointment as a judge, (3) A judge can be removed from his/her office on grounds of proven misconduct or incapacity and by the order of the President of India after a recommendation is passed by a two-third majority in each House of Parliament, (4) The salary, pension and other benefits provided to a judge cannot be deducted by the government and (5) The judiciary is independent to perform its functions and has the power to review its own judgements.

Judiciary as the Interpreter of the Constitution

The right to interpret and define the Constitution has been given to the Supreme Court if any question arises on its any part, such as meaning or explanation of an article. The Supreme Court is the final interpreter of the Constitution, and its decisions are finally applied to all branches of the government, as well as all the citizens.

Supreme Court as the Arbitrator of Legal Disputes between Union and States

The Constitution of India gives the right to the Supreme Court to hear all cases of disputes as: (1) between the Government of India and one or more states, (2) between the Government of India and any state or states on one side and one or more states on the other and (3) between two or more states.

Supreme Court as the Guardian of Fundamental Rights

The Supreme Court of India occupies the highest place in the country's judicial and political system. Its primary role is to protect and guard the fundamental rights of the citizens. The Supreme Court ensures that people's rights are not violated, nor are they denied justice in any law court. The Supreme Court is generally appealed to when any high court's verdict is challenged or any Constitutional law is questioned. The Supreme Court is the final authority to decide over disputes between the government and one or more states (of India) or between a state or states and another state or other states. It has the power to issue writs, such as Certiorari, Habeas Corpus, Mandamus, Prohibition, and Quo Warranto, under Article 32 in Part III of the Constitution of India.

Judicial Review

As just discussed, the Supreme Court has the right to interpret the Constitution of India. Since it is also the protector of the Constitution and the fundamental rights of the citizens, to perform its role in this regard, it exercises the power of Judicial Review. If any law passed by the legislative branch is found conflicting with the Constitution or any of its provisions, the Supreme Court has the right to invalidate that law due to unconstitutional reasons.

High Court for Each State

The Constitution of India provides a high court to each state. However, two or more states can, by mutual consent, have a joint high court. There are presently 21 high courts in India. These courts have an advantage over the Supreme Court in that their right to issue writs is conferred upon them under Article 226 of the Indian Constitution, which can be invoked for any other purpose than only enforcement of fundamental rights, unlike Article 32.

Advisory Functions

The Supreme Court of India also has advisory functions, i.e. it sometimes gives advice to (sought by) the government relating to the matters of the Constitution. If the government faces problems regarding the clarification of any Constitutional affair, it may approach the Supreme Court for guidance and directions.

SOCIAL JUSTICE UNDER THE INDIAN CONSTITUTION

The Constitution of India mainly focuses on socio-economic justice for all vulnerable groups in the society. After independence, the Government of India launched various schemes and programmes like community development programmes and national extension services to uphold social justice at the national level. In 1976, 'secular' and 'socialist' words were added to the 42nd Amendment Act. The Preamble of the Constitution discusses about freedom, equality and justice to all the citizens of India. In Part III of the Constitution, individual freedom and fundamental rights have been mentioned, and in Part IV, guidelines for the states to endorse the welfare of the citizens have been provided under the directive principle of state policy. Enablement of exercising fundamental rights assures individual freedom to citizens. Provisions under Part III and Part IV of the Constitution can be described as follows:

- Article 15 (1) prohibits discrimination on the basis of race, religion, class, sex, caste, place of birth, etc.
- Article 15 (4) provides that the state may be enabled to make special provisions for the upliftment of educationally and socially backward classes of

citizens, and for children and women, and for the scheduled castes/scheduled tribes. Further, in the same way, Article 16(1) provides the opportunity of equality and Article 16(4) makes provisions for the appointment in government services of the backward classes that are not sufficiently represented.

- Article 17 forbids untouchability and abolishes its practice in any form. The Article further states that the implementation of untouchability shall be an offence punishable in accordance with law.
- Article 19 discusses six fundamental freedoms, which are provided to the entire society without any discrimination, such as Freedom of speech, Assembly, Association, Movement, Residence and Profession.
- Articles 23 and 24 protect against exploitation, human trafficking and forced employment of children in factories.
- Articles 25 to 28 deal with the Right to Freedom of Religion for all communities in the society without any discrimination.
- Articles 29 and 30 protect the rights and interests of minorities.
- Article 42 describes that the state shall make provisions for just and humane conditions of work and for maternity relief.
- Article 46 gives states that the state shall promote, with special care, the educational and economic interests of the weaker sections in the society and that, in particular, scheduled castes and tribes shall be protected from social injustice and all practices of exploitation.

Constitutional provisions to ensure gender equality in India

The Indian Constitution has provisions towards gender equality in its Preamble, Fundamental Rights, and Directive Principles. It also enables the states to implement measures of positive discrimination in order

to elimination of gender inequality through ways of legislation and policies. India has also ratified many international conventions and human rights forums to protect equal rights for women, such as ratification of convention on abolition of all forms of discrimination against women in 1993. Constitutional provisions to ensure gender equality in India can be discussed as the following:

- Article 14 of the Constitution provides equality before law for all persons
- Article 15(i) refers to the prohibition of discrimination on grounds of religion, race, caste, sex or place of birth. However, special provisions may be made by the state in favour of women and children under Article 15(3)
- Article 16 provides the equal opportunity for all citizens relating to employment or appointment to any office under the state;
- Article 39A provides that State shall secure that the operation of the legal system promotes justice on a basis of equal opportunity to men and women, and shall in particular, provide free legal aid, by suitable legislation or schemes or in any other way, to ensure that opportunities for securing justice are not denied to any citizen by reason of economic or any other disability.
- Article 39(d) contains equal pay for equal work for both men and women.
- Article 42 provides provision for humane conditions of work and maternity relief.
- Article 51A(e) suggests to promoting 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.
- Articles 243(d) and 243(T) provide the reservation of not less than one-third of total seats for women in direct election to local bodies, i.e. Panchayats and Municipalities.

PRACTICE QUESTIONS

Answer the following questions by selecting the most appropriate option.

1. **The Monarchy form of government is defined as**
 - (1) a single family rule through generations
 - (2) the common public rule in the country
 - (3) the President rule the country alone
 - (4) the Prime Minister rule the country alone
2. **According to the 73rd Constitutional Amendment Act, the minimum age for contesting elections to the Panchayati Raj Institutions (PRIs) should be**
 - (1) 21 years (2) 18 years
 - (3) 25 years (4) 30 years
3. **Through the _____ Amendment Act, the institution of Panchayati Raj was constitutionalised.**
 - (1) 73rd Constitutional (2) 74th Constitutional
 - (3) 47th Constitutional (4) 43rd Constitutional
4. **What is the member strength of Delhi Assembly?**
 - (1) 343 (2) 143
 - (3) 140 (4) 70
5. **The Indian Parliament consists of**
 - (1) Lok sabha and Rajya sabha
 - (2) Lok sabha, Rajya sabha and vidhan sabha
 - (3) Lok sabha, rajya sabha, vidhan sabha and vidhan parishad
 - (4) Lok sabha, Rajya sabha and President
6. **Constitutionally, the strength of Lok sabha cannot exceed**
 - (1) 545 (2) 552
 - (3) 245 (4) 700
7. **The first general election in India was held in**
 - (1) 1948 (2) 1949
 - (3) 1951 (4) 1952
8. **Which Article pertains to the composition of Rajya Sabha in the Indian Constitution?**
 - (1) Article 370 (2) Article 52
 - (3) Article 80 (4) Article 81
9. **What is ordinary law?**
 - (1) A law made by the Supreme Court
 - (2) A law made by the High Court
 - (3) A law made and enforced by the government
 - (4) A law made by the common people
10. **Which of the following states does not have Panchayati Raj Institutions?**
 - (1) Kerala (2) Assam
 - (3) Nagaland (4) Tripura
11. **The name of the upper house of the Indian Parliament is:**
 - (1) Senate (2) House of Lords
 - (3) Legislative Assembly (4) Rajya Sabha
12. **Which of the following is the first linguistic state created by the Government of India?**
 - (1) Andhra Pradesh (2) Tamil Nadu
 - (3) Karnataka (4) Maharashtra
13. **Which of the following Articles of the Indian Constitution describes India, as a 'Union of States' rather than a 'Federation of States'?**
 - (1) Article 1 (2) Article 2
 - (3) Article 5 (4) Article 7
14. **Which of the following is not a Union Territory?**
 - (1) Nagaland
 - (2) Puducherry
 - (3) Lakshadweep
 - (4) Dadra and Nagar Haveli
15. **If the President wants to resign from his office, he may do so by writing to the**
 - (1) Vice President
 - (2) Speaker of Lok Sabha
 - (3) Prime Minister
 - (4) Chief Justice of India
16. **The minimum age to become the member of the Lok sabha is**
 - (1) 21 years (2) 25 years
 - (3) 30 years (4) 35 years
17. **Who preside the joint session of parliament?**
 - (1) Speaker of Lok Sabha
 - (2) Vice President
 - (3) Deputy Speaker of rajya Sabha
 - (4) None of these
18. **Who are members of the electoral college in the election of a member of Rajya Sabha?**
 - (1) Members of Vidhan Sabha and Vidhan Parishad
 - (2) Members of Vidhan Sabha
 - (3) Members of Vidhan Parishad
 - (4) Elected members of Vidhan Sabha
19. **From which state do maximum number of Lok Sabha members come?**
 - (1) Uttar Pradesh (2) Maharashtra
 - (3) Bihar (4) Rajasthan
20. **Which of the following states/union territories does not have representation in Rajya Sabha?**
 - (1) Puducherry (2) Delhi
 - (3) Sikkim (4) Chandigarh
21. **The form of government in which all the powers enjoyed by few people or by a dominant class or group within the society is known as**
 - (1) anarchism (2) oligarchy
 - (3) authoritarian (4) monarchy

- 22. Article 368 of the Indian Constitution deals with**
(1) Right to Primary Education
(2) Right to Information
(3) Amending Procedure
(4) Emergency Provisions
- 23. Who among the following was known as 'the father of local self-government' in India?**
(1) Lord Mountbatten
(2) Lord Ripon
(3) Jai Prakash Narayana
(4) Mahatma Gandhi
- 24. Ashok Mehta Committee (1977) recommended for the establishment of**
(1) Gram Panchayat (2) Mandal Panchayat
(3) Panchayat Samiti (4) Village Panchayat
- 25. Which part of the Constitution of India has been described as the soul of the Constitution?**
(1) Fundamental Rights
(2) Directive Principles of State Policy
(3) Preamble
(4) Panchayat
- 26. Village Panchayat bodies are accountable to the**
(1) State Government (2) Zila Parishad
(3) Panchayat Samiti (4) None of the above
- 27. Maximum age of superannuation for the Judges of the Supreme Court of India is**
(1) 62 years (2) 65 years
(3) 60 years (4) 70 years
- 28. Which of the following is not a part of the Civil Society?**
(1) Same Interest Groups
(2) Non-Government Organisations
(3) Neighbours
(4) Legislature
- 29. In our Constitution, Social and economic planning comprise in the**
(1) State List of the VI Schedule
(2) Concurrent List of the VII Schedule
(3) Union List of the VII Schedule
(4) None of the above
- 30. The Inter-State Council has been established under**
(1) Article 273 (2) Article 263
(3) Article 290 (4) Article 342
- 31. The Union Government can give direction to the State Government with regard to subjects in**
(1) the Concurrent List (2) the Union List
(3) the State List (4) none of these
- 32. The concept of 'equality before law' has been taken from the Constitution of which country?**
(1) Britain (2) America
(3) Ireland (4) Germany
- 33. If an emergency has been made under article 356 of the Constitution in a state,**
(1) Article 19(1) is suspended in the state
(2) The State Assembly is automatically dissolved
(3) Central government assumes the power to legislate on the subjects in the State list
(4) Article 354 comes into force automatically
- 34. Which of the following statement is true regarding Centre-State financial relations?**
(1) States cannot levy income tax.
(2) States can claim 100 percent share in excise duty on goods produced in the state.
(3) States can bypass the Center while taking foreign loans.
(4) Amount given by Centre is the only source of income to states.
- 35. Which of the following state/UT has more than one Lok Sabha constituency?**
(1) Puducherry (2) Delhi
(3) Andman and Nicobar (4) All of the above
- 36. Speaker of Lok Sabha is elected by?**
(1) Simple majority (2) Two-third majority
(3) Unanimously (4) None of the above
- 37. Which article contains the provision of national Emergency?**
(1) Article 352 (2) Article 356
(3) Article 360 (4) Article 342
- 38. Which article of Indian constitution gives the power to the Indian parliament to amend the constitution?**
(1) Article 352 (2) Article 214
(3) Article 368 (4) Article 67
- 39. Rajya Sabha can hold money bill for a period of**
(1) 14 days (2) 7 days
(3) 3 months (4) None of these
- 40. In which of the following cases, was it ruled by the Supreme Court that Parliament cannot amend the basic structure of the constitution of India?**
(1) Golaknath Case
(2) Keshvanand Bharti Case
(3) Vishakha vs. State of Rajasthan
(4) None of these
- 41. The concept of 'equal protection of laws' has been taken from which of the following country's Constitution?**
(1) Britain (2) America
(3) Ireland (4) Germany
- 42. Which among the following is/are the essential parts of the democracy?**
(1) Majority rule
(2) Sovereignty of the people
(3) Respect for minority rights
(4) All of the above

- 43. Who conceived the concept of Gram Swaraj?**
(1) Raja Ram Mohan Roy
(2) Jaya Prakash Narain
(3) Lord Mountbatten
(4) Mahatma Gandhi
- 44. Which was the first Indian state to establish Panchayati Raj system?**
(1) Haryana
(2) Rajasthan
(3) Uttar Pradesh
(4) Maharashtra
- 45. Sarkaria Commission was set up to report on _____ by the government of India.**
(1) SCs/ STs Development
(2) centre-state relations
(3) status of women
(4) electoral reforms
- 46. National Emergency can be declared by**
(1) Prime Minister of India
(2) Parliament
(3) President
(4) Supreme Court
- 47. On whose recommendation national emergency can be declared?**
(1) Prime Minister of India
(2) Council of ministers headed by Prime Minister
(3) Cabinet Ministers headed by Prime Minister
(4) Chief Justice of India
- 48. What is the quorum to constitute a meeting of Lok Sabha or Rajya Sabha?**
(1) One-tenth of the total members of the House
(2) One-Sixth of the total members of the House
(3) Two- third of the total members of the House
(4) None of these
- 49. The chairman of Rajya Sabha is elected by**
(1) Members of Rajya Sabha
(2) Elected members of Lok Sabha and Rajya Sabha
(3) All members of Lok Sabha and Rajya Sabha
(4) None of these
- 50. Which Article of the Indian Constitution mentions financial emergency?**
(1) 360
(2) 350
(3) 340
(4) 330
- 51. The speaker of Lok Sabha is elected by?**
(1) Members of Lok Sabha
(2) Elected members of Lok Sabha and Rajya Sabha
(3) All members of Lok Sabha and Rajya Sabha
(4) None of these
- 52. Who is the first law officer of the Central Government of India?**
(1) Attorney general of India
(2) Chief justice of the Supreme Court
(3) President of India
(4) None of these
- 53. Who was the first speaker of the Lok Sabha?**
(1) G.V. Mavalankar (2) Sukumar Sen
(3) Suchita Kriplani (4) None of these
- 54. Who was the first chairman of the Rajya Sabha?**
(1) G. V. Mavalankar
(2) Neelam Sanjeev Reddy
(3) Dr. S. Radhakrishnan
(4) None of these
- 55. The Parliament can make a law on a subject in the State List when**
1. two or more states make a request to the Parliament to make a law on a subject
2. either in the whole country or in any part of it, emergency is declared
3. Rajya Sabha passes a resolution with two third majority stating that such subjects have acquired national importance.
(1) 1 only (2) 1 and 3
(3) 1 and 2 (4) 1, 2 and 3
- 56. Consider the following statements:**
Bill passed by the Legislature of a State is presented to the Governor. Governor may
1. assent to the Bill
2. withhold assent
3. reserve the Bill for the consideration of the President
4. veto the Bill
Which of these are correct?
(1) 1, 2 and 4 (2) 3 and 4
(3) 1, 2 and 3 (4) 1, 2, 3 and 4
- 57. If the President wishes to resign, he should submit his/her resignation in writing addressed to**
(1) The Speaker of Lok Sabha
(2) Chief Justice of India
(3) The Prime Minister of India
(4) None of the above
- 58. The Constitution of India was adopted and enacted on**
(1) 23 January 1949, 29 August 1949
(2) 26 November 1949, 26 January 1950
(3) 27 October 1950, 1 December 1950
(4) 13 March 1946, 24 December 1950
- 59. Which of the following is not a necessary feature of a democracy?**
(1) The judiciary is independent.
(2) The press is free.

- (3) The judiciary is responsible to the legislature.
(4) There is freedom to express opinions publicly.
- 60. What is the age of retirement for the judges of the Supreme Court?**
(1) 65 years (2) 62 years
(3) 60 years (4) 55 years
- 61. What does Article 17 of the Indian Constitution do?**
(1) Protects individual freedom
(2) Abolishes untouchability
(3) Grants right to equality
(4) Grants right to constitutional remedies
- 62. On the ground of _____, a Supreme Court judge can be removed from his/her office.**
(1) Religious views
(2) Political views
(3) Wrong judgement
(4) Proven misbehaviour or incapacity
- 63. The Indian Constitution was divided into how many parts at the time of its commencement?**
(1) 11 (2) 12
(3) 21 (4) 22
- 64. Schedule VII of the Indian Constitution contains**
(1) Presidential election
(2) Acts beyond judicial review
(3) States and Union territories
(4) Division of Powers into 3 lists
- 65. Which of the following recommended reservation for the Other Backward Classes (OBCs)?**
(1) Mandal Commission (2) Kothari Commission
(3) Sachar Committee (4) None of these
- 66. The Preamble of the Constitution was firstly amended by the**
(1) 42nd Amendment Act (2) 62nd Amendment Act
(3) 44th Amendment Act (4) 39th Amendment Act
- 67. The Preamble was proposed before the Drafting Committee by**
(1) Dr. B. R. Ambedkar (2) Jawahar Lal Nehru
(3) B. N. Rao (4) Dr. Rajendra Prasad
- 68. The Judicial Review concept in India is borrowed from**
(1) USA (2) Britain
(3) Germany (4) Switzerland
- 69. What is the age of retirement for the judges of high courts?**
(1) 70 years (2) 60 years
(3) 62 years (4) 65 years
- 70. The judges of the Supreme Court of India are appointed by**
(1) President (2) Prime Minister
(3) Vice-president (4) Home Minister
- 71. Which article of the Constitution says that Indian citizens shall not be discriminated on the basis of religion, caste, sex or place of birth?**
(1) Article 15 (2) Article 16
(3) Article 14 (4) Article 19
- 72. Which of the following is the correct order in which various Presidents served?**
(1) N S Reddy, Dr Shankar Dayal Sharma, R Venkataraman, Gyani Zail Singh
(2) R Venkataraman, Dr Shankar Dayal Sharma, Gyani Zail Singh, N S Reddy
(3) N S Reddy, Gyani Zail Singh, R Venkataraman, Dr Shankar Dayal Sharma
(4) N S Reddy, R Venkataraman, Gyani Zail Singh, Dr Shankar Dayal Sharma
- 73. The article that is related to the abolition of untouchability is**
(1) Article 17 (2) Article 23
(3) Article 29 (4) Article 16
- 74. In the Constituent Assembly of India, the chairman of Union Constitution Committee was**
(1) Rajkumari Amrit Kaur
(2) G. V. Mavalankar
(3) Dr. John Mathai
(4) Jawaharlal Nehru
- 75. The Preamble of our Constitution reads: India is a**
(1) secular, socialist, sovereign, democratic republic
(2) socialist, sovereign, secular, democratic republic
(3) sovereign, socialist, secular, democratic republic
(4) secular, sovereign, democratic, socialist republic
- 76. Which amendment changed the words 'unity of the nation' to 'unity and integrity of the nation' in the Preamble?**
(1) 42nd Amendment (2) 24th Amendment
(3) 44th Amendment (4) 1st Amendment
- 77. The Right to Private Property is a**
(1) directive principle of state policy
(2) fundamental right
(3) legal right
(4) personal right
- 78. According to the Indian Constitution, on 26 January 1950, India was declared**
(1) a democratic state
(2) a sovereign state
(3) a republic
(4) a sovereign democratic republic
- 79. Article 368 of Indian Constitution provides**
(1) reservation of seats in the municipality for SCs and STs
(2) that amendment bills may be presented in either House of Parliament
(3) free and compulsory education for children
(4) uniform civil code for citizens

- 80. The process of increasing or decreasing the area of any state is stated under**
(1) Article 32 of the Indian Constitution
(2) Article 3 of the Indian Constitution
(3) Article 46 of the Indian Constitution
(4) Article 11 of the Indian Constitution
- 81. Which of the following is not a qualification criterion for the judge of the Supreme Court?**
(1) He should be a citizen of India.
(2) He should be in the opinion of the President a distinguished jurist.
(3) He should have been a judge of a high court or two or more such courts in succession.
(4) He should possess a degree of PhD in jurisprudence.
- 82. The salaries of Supreme Court judges can be reduced during**
(1) financial emergency (2) state emergency
(3) national emergency (4) inflation
- 83. In a district, the highest court for criminal matters is the**
(1) high court
(2) court of first class magistrate
(3) court of second class magistrate
(4) court of the Session Judge
- 84. The meaning of Judicial Review is**
(1) the power of courts to define the Constitution
(2) the power of courts to make laws
(3) the power of courts to define laws
(4) the power of courts to declare any legislative or executive act as unconstitutional, which is against the provision of the Constitution
- 85. The Indian Prime Minister _____ appointed the Sachar Committee.**
(1) Rajiv Gandhi
(2) V. P. Singh
(3) Dr. Manmohan Singh
(4) Atal Bihari Vajpayee
- 86. Directive Principles of State Policy are based on**
(1) political principles (2) moral principles
(3) legal principles (4) ethnic principles
- 87. For the enforcement of fundamental rights, the courts can issue a/an**
(1) notification (2) decree
(3) ordinance (4) writ
- 88. The salaries and allowances of judges are determined by**
(1) President (2) Parliament
(3) Prime Minister (4) judiciary
- 89. High courts can also issue writs like Mandamus, Habeas Corpus, etc., according to**
(1) Article 375 (2) Article 22
(3) Article 156 (4) Article 226
- 90. According to the Indian Constitution, money bills can be introduced in**
(1) the Council of Ministers
(2) Lok Sabha only
(3) Rajya Sabha only
(4) joint sessions of Rajya Sabha and Lok Sabha
- 91. Which one of the following is directly elected in India?**
(1) Member of Legislative Assembly
(2) Member of Rajya Sabha
(3) President of India
(4) Vice President of India
- 92. Fundamental rights in Part III of the Constitution can be suspended by the**
(1) President during all types of emergencies
(2) President during a national emergency
(3) President with prior approval of the Supreme Court
(4) Chief Justice of India at any point of time
- 93. The oath of office to the Chief Justice of India is administered by the**
(1) President
(2) Vice-president
(3) Law minister
(4) Speaker of Lok Sabha
- 94. Which of the following is not correct as regards the powers of a high court?**
(1) It can issue writs for enforcement of any of the rights conferred upon by Part III of the Indian Constitution and for any other purpose.
(2) It is a court of record.
(3) It can decide disputes arising out of the election of the President of India.
(4) It can exercise the power of superintendence over all courts under its jurisdiction.
- 95. International Women's Day is celebrated on**
(1) March 8 (2) March 9
(3) March 11 (4) March 12
- 96. The purpose behind the setting up of Anganwadis is**
(1) to provide education to adults
(2) to take care of children in the rural areas
(3) to assist the farmers
(4) to assist the visually impaired people
- 97. When the National Emergency is declared, which of the following remain suspended?**
(1) Directive Principles of State Policy
(2) Judiciary
(3) Fundamental Duties
(4) Fundamental Rights
- 98. Female literacy is least amongst _____.**
(1) Christian (2) Hindus
(3) Muslims (4) Sikhs

- 99. The Indian Prime Minister who imposed Emergency in India during 1975-1977 was**
(1) Indira Gandhi
(2) Gulzarilal Nanda
(3) Rajiv Gandhi
(4) Lal Bahadur Shastri
- 100. Scheduled languages of India are mentioned in which of the following schedule?**
(1) One
(2) Fourth
(3) Eighth
(4) Ninth
- 101. Which among the following is not a scheduled language of India as per the 'Eighth Schedule'?**
(1) Bhojpuri (2) Nepali
(3) Kashmiri (4) Dogri
- 102. Right to Information (RTI) Act was passed in**
(1) 2001 (2) 2003
(3) 2005 (4) 2007
- 103. The largest media group in India is**
(1) HT Media Limited
(2) The Times Group
(3) ABP Group
(4) Indian Express Limited
- 104. Which among the following scheduled language of India is/are not an official language in any state of the Union of India?**
(1) Sanskrit (2) Kashmiri
(3) Sindhi (4) All of the above
- 105. Which of the following languages is the second most spoken language in India?**
(1) English (2) Hindi
(3) Urdu (4) Telugu
- 106. Gender is**
(1) a word for the biological division of men and women
(2) not a valid term in contemporary society
(3) a psychological term
(4) defined as roles and characteristics a society assigns to its men and women
- 107. Who is known as the father of Indian Press?**
(1) James Augustus Hickey
(2) Ganga Kishore Bhattacharya
(3) Raja Ram Mohan Roy
(4) Vivekananda
- 108. Which among the following languages belong to the Dravidian family?**
(1) Tamil (2) Telugu
(3) Malayalam (4) All of the above

ANSWERS AND EXPLANATIONS

1. (1) Till the 19th century, monarchy was the most common form of government in which a single family used to rule through generations.
2. (2) In the 73rd Constitutional Amendment Act, the eleventh Schedule of Part IX lists 29 functional items that panchayats are supposed to deal with under Article 243-G. The minimum age for contesting elections to PRIs is 18 years according to provisions provided in the amended act.
3. (1) 24th April, 1993 was the historic day, on which Panchayati Raj Institutions (PRIs) in India were constitutionalised through the 73rd Constitutional Amendment Act, 1992.
4. (4) The National Capital Territory of Delhi is a unicameral legislature body and has 70 Members.
5. (4) According to Article 79 of the Constitution of India, the Parliament consists of Upper House, i.e. Rajya Sabha and Lower House, i.e. Lok Sabha, respectively, along with the President.
6. (2) Constitutionally, the strength of Lok Sabha cannot exceed 552. At present its strength is 545, which includes 2 nominated members.
7. (4) After the adoption of the Indian Constitution on January 26, 1950, the first general election in India was held in 1952, conducted by the election commission of India.
8. (3) Article 80 of the Indian Constitution pertains to the composition of Rajya Sabha. The President can nominate 12 members having special knowledge or practical experience in the fields of literature, science, art and social service.
9. (3) An ordinary law refers to a law made and enforced by the government through the Parliament or by the representatives having executive powers.
10. (3) Nagaland, Meghalaya and Mizoram do not have Panchayati Raj Institutions (PRIs) though Mizoram has elected Village Councils.
11. (4) The Rajya Sabha, also known as the Council of States, is the upper house of the Indian Parliament. The Rajya Sabha can have a maximum of 250 members at a time.
12. (1) In October, 1953, the Government of India separated the Telugu speaking areas from the Madras state and called it as Andhra Pradesh, on linguistic ground.
13. (1) The Article 1 of the Indian Constitution describes that India shall be a Union of States. The territory of India shall consist of the territories of the states, the union territories or/and any territories that may be acquired.
14. (1) Nagaland is a north-eastern Indian state which borders Assam, Manipur, Arunachal Pradesh and Myanmar. Its capital is Kohima.
15. (1) The President may resign from office and hand over his/her resignation to the Vice-President according to Article 56 of the Indian Constitution.
16. (2) Article 84 of the Indian Constitution proclaims that a citizen should not be less than twenty-five years of age to become the member of the Lok Sabha
17. (1) Article 108 of the Indian Constitution proclaims that the Speaker of the Lok Sabha presides the joint session of the Parliament.
18. (4) Article 80(4) of the Indian Constitution provides that only elected members of Vidhan Sabha vote in the election of members of Rajya Sabha.
19. (1) The number of Lok Sabha seats in Uttar Pradesh, Maharashtra, Bihar and Rajasthan is 80, 48, 40 and 25, respectively.
20. (4) Every states/UTs, which has its own legislative assembly, has also participation in Rajya Sabha. All states and two UTs (Delhi and Puducherry) have their own legislative assemblies and so representation in Rajya Sabha. Since Chandigarh is a UT and does not have legislative assembly, it has no representation in Rajya Sabha.
21. (2) Oligarchy is the form of government, in which the few people or a dominant class enjoys all the powers and are distinguished by royalty, wealth, education or military command.
22. (3) Article 368 of the Indian Constitution deals with the procedure to amend the Constitution and the methods of amendment. An amendment can be initiated only in the circumstance when a Bill proposing an amendment is introduced in the Parliament.
23. (2) Lord Ripon was known as "the father of local self-

government” in India. The resolution was passed in 1882.

- 24.** (2) Ashok Mehta Committee recommended replacement of three-tier system of Panchayati Raj Institutions (PRIs) with two-tier system - at district level, Zila Parishad and at middle level, Mandal Panchayat, comprising of a group of villages covering a population of 15,000 to 20,000.
- 25.** (3) The Preamble is referred to as the ‘soul’ of the Indian Constitution as it provides the purpose and principles of the Indian Constitution. It also highlights the hopes and aspirations of the Indian people.
- 26.** (4) The Village Panchayat is accountable to the general body of the village well-known as Gram Sabha, which meets minimum twice a year.
- 27.** (2) The maximum age of superannuation of Supreme Court judges in India is 65 years.
- 28.** (4) Civil Society is considered as a community of citizens, associated by collective activities and common interests.
- 29.** (2) In the Constitution of India, Social and economic planning is included in the Concurrent List of the Schedule VII and entry no. 20.
- 30.** (2) Article 263 of the Indian Constitution provides for the formation of an Inter-State Council. This is the only article of the sub-chapter ‘Co-ordination among States’ of Chapter II -Administrative Relations of Part XI of the Constitution - Relations among the Union and the States.
- 31.** (4) In certain situations, the Central Government can make laws on subjects mentioned in the State list, then the parliament has to pass a resolution with 2/3rd majority that it is convenient to legislate on this State list in the national interest. In concurrent list, the power to make the law on the list rests with central government.
- 32.** (1) From the British Constitution, the concept of ‘equality before law has been taken.
- 33.** (3) If a proclamation of emergency is in force under article 356 of the Constitution, Parliament assumes the power to legislate on the subjects mentioned in all the lists that includes state lists also.
- 34.** (1) The state government has four sources of revenue, i.e. non-tax revenue, tax revenue, grants-in-aid from Government of India and State’s share of union taxes and duties.
- 35.** (2) In Delhi, there are seven Lok Sabha constituencies while all other six UTs have one Lok Sabha constituency each.
- 36.** (1) Only simple majority is required for the election of speaker of Lok Sabha.
- 37.** (1) Article 352 of the Indian Constitution proclaims that if the President is satisfied that a grave emergency exists whether by war or external aggression or armed rebellion, the President can proclaim emergency to that effect. Such a proclamation can be made for the whole of India or of such part of the territory thereof.
- 38.** (3) Article 368 of the Constitution gives the impression that Parliament’s amending powers are absolute and encompass all parts of the document-
- 39.** (1) Rajya Sabha cannot amend the money bill but it can recommend amendments. The Lok Sabha Speaker certifies the bill as a money bill before sending it to the Rajya Sabha, and the decision of the Speaker is binding on both the Houses. A money bill must be returned to the Lok Sabha within 14 days or the bill is deemed to have been passed.
- 40.** (2) The Supreme Court, in the Kesavananda Bharti vs State of Kerela case, gave a verdict that though the Parliament has the power to amend the Constitution but it cannot amend the basic structure of the Constitution.
- 41.** (2) From the American Constitution, the concept of ‘equal protection of laws’ has been taken.
- 42.** (4) In democracy, the government is based on parliamentary majorities which should protect the rights and sovereignty of the citizens, and respect for the minorities with extra provisions under Constitution, i.e. Indian Constitution under article 29 enshrines various provisions for the protection of the rights and interest of the minorities.
- 43.** (4) Mahatma Gandhi conceived the concept of Gram Swaraj in his book ‘Village Swaraj’.
- 44.** (2) Rajasthan was the first state to adopt the Panchayat Raj System in 1958.
- 45.** (2) Sarkaria Commission was set up in June 1983 by the Government of India to report on centre-state relations.
- 46.** (3) According to Article 352, if the President is satisfied that a grave emergency exists whereby the security of India or of any part of the territory

- thereof is threatened, whether by war or external aggression or armed rebellion, he may, by Proclamation, made a declaration to that effect in respect of the whole of India or of such part of the territory of India.
- 47.** (3) Article 352 of the Indian Constitution proclaims that the President shall not issue a Proclamation of Emergency unless the decision of the Union Cabinet (i.e. the Council consisting of cabinet ministers headed by the Prime Minister under Article 75) regarding the issuance of such a Proclamation has been communicated to him in writing.
- 48.** (1) Minimum one-tenth of the total members of the House is required to run the house.
- 49.** (3) The Vice President of India is the ex-officio Chairman of the Rajya Sabha. The Vice President of India is elected by all the members of Lok Sabha and Rajya Sabha.
- 50.** (1) Article 360 of the Indian Constitution mentions financial emergency which refers to an economic situation that may threaten the financial stability of the country. A state of financial emergency can be declared by the President provided the Parliament approves the said emergency within a period of two months.
- 51.** (1) The speaker of Lok Sabha is elected by members of Lok Sabha.
- 52.** (1) Attorney general of India is known as the first law officer of Government of India.
- 53.** (1) Ganesh Vasudev Mavalankar was the first speaker of the Lok Sabha.
- 54.** (3) Dr. S. Radhakrishnan was the first vice-president of India and subsequently, he was the ex-officio chairman of Rajya Sabha.
- 55.** (4) According to the 7th Schedule of the Constitution, two or more states can make a request to the Parliament to make a law on a subject. According to Article 353 of the Indian Constitution, if in the entire country or in any part of it, emergency is declared Under [Article 352(1)], parliament can make laws about the subjects mentioned in all the lists including state lists for the whole of the country or a part of it. According to Article 249 of the Constitution of India, Rajya Sabha may also pass a resolution with a two third majority stating that such subjects have acquired national importance.
- 56.** (3) According to article 200, if a bill passed by the Legislature of a State is presented to the Governor, he may assent to the Bill, withhold assent or reserve the Bill for the consideration of the President, but cannot veto the Bill.
- 57.** (4) The President of India has to submit his resignation to the Vice-President, according to Article 56 of the Indian Constitution.
- 58.** (2) The Indian Constitution was adopted on 26 November 1949 (by the Constituent Assembly) and put into effect on 26 January 1950.
- 59.** (3) The judiciary is independent from the legislative and executive branches of the government.
- 60.** (1) The retirement age for the judges of the Supreme Court is 65 years under Article 124(2) of the Indian Constitution.
- 61.** (2) Article 17 of the Indian Constitution abolishes untouchability and forbids its practice in any form.
- 62.** (4) On the ground of proven misbehaviour or incapacity, a Supreme Court judge can be removed from his/her office following the procedure as laid down under Article 124(4) of the Indian Constitution.
- 63.** (4) The Indian Constitution had 395 Articles, 22 Parts and 8 Schedules at the time of its commencement.
- 64.** (4) Schedule VII of the Indian Constitution contains the division of powers into three lists, namely the Union List, the State List and the Concurrent List.
- 65.** (1) The Mandal Commission was set up in 1979 with the aim to identify the socially and educationally backward classes of India. The Commission was headed by B P Mandal.
- 66.** (1) The Preamble to the Constitution of India was amended for the first time by the 42nd Amendment Act, 1976, whereby the words 'socialist, secular and integrity' were included in the Preamble.
- 67.** (2) The Preamble was proposed before the Constitution's Drafting Committee by Jawaharlal Nehru on 13 December 1946.
- 68.** (1) Just like the United States Constitution, we have also made a provision for an apex court (Supreme Court) in India with the power of Judicial Review.
- 69.** (3) In the beginning, high court judges' age of retirement was fixed at 60, but it was extended to 62 through the 15th Constitutional Amendment Act, 1963.

- 70.** (1) According to Article 124(2) of the Indian Constitution, the judges of the Supreme Court of India shall be appointed by the President of India.
- 71.** (1) Article 15 in Part III of the Constitution says that Indian citizens shall not be discriminated on the basis of religion, caste, sex or place of birth.
- 72.** (3) N S Reddy served as the sixth President of India from 1977 to 1982. Gyani Zail Singh served as the seventh President of India from 1982 to 1987. R Venkataraman served as the eighth President of India from 1987 to 1992. Dr Shankar Dayal Sharma served as the ninth President of India from 1992 till 1997.
- 73.** (1) Article 17 of the Indian Constitution prescribes that untouchability in any form should be abolished.
- 74.** (4) Jawaharlal Nehru was the chairman of Union Constitution Committee, States Committee and Union Powers Committee.
- 75.** (3) The Preamble of the Constitution goes as: 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; and 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.
- 76.** (1) The 42nd Amendment Act, 1976, modified the Preamble and changed the description of India from "Sovereign, Democratic, Republic" to "Sovereign, Socialist, Secular, Democratic, Republic", and also changed the words "unity of the nation" to "unity and integrity of the nation".
- 77.** (3) In the Constitution's initial draft, the Right to Property was preserved as a fundamental right. However, by the 44th Amendment Act, this right was removed from Part III of the Constitution. Now, it is considered only a legal right under the provision of Article 300-A.
- 78.** (4) The Constitution of India came into force on 26 January 1950, and its Preamble clarifies that India is a sovereign democratic republic.
- 79.** (2) As per the procedure laid out under Article 368 for amendment of the Constitution of India, an amendment can be introduced only by the introduction of a bill in either House of Parliament.
- 80.** (2) Under Article 3 of the Indian Constitution, the Parliament may form a new state by separation of a territory from any state or by uniting two or more states or parts of states or by uniting any territory with a part of any state.
- 81.** (4) Article 124(3) provides the qualifications required for an Indian citizen to be appointed as a Supreme Court judge. This Article does not mandate that he/she should possess a PhD degree in jurisprudence for the appointment.
- 82.** (1) The salaries of judges of the Supreme Court can be reduced during a financial emergency declared by the President under Article 360.
- 83.** (4) In a district, the highest court for criminal matters is the court of the Session Judge. It exercises its jurisdiction on criminal matters under the Code of Criminal Procedure.
- 84.** (4) Judicial Review is the power bestowed upon courts to declare any legislative or executive act is unconstitutional and thus unenforceable.
- 85.** (3) To prepare a report on the socio-economic and educational conditions of Muslims in India, the Sachar Committee was appointed by the former Prime Minister Dr. Manmohan Singh in 2005.
- 86.** (2) Directive Principles of State Policy may be referred to as moral principles because these all cannot be enforced by the court.
- 87.** (4) To enforce fundamental rights, the courts can issue a writ under Article 32 (by Supreme Court) and Article 226 (by high courts) of the Constitution of India.
- 88.** (2) Under Article 125 of the Indian Constitution, the salaries and allowances of judges are determined by the Parliament.
- 89.** (4) Article 226 of the Indian Constitution deals with the power of high courts to issue certain writs like Mandamus, Habeas Corpus, etc.
- 90.** (2) Under Article 109(1) of the Constitution of India, a money bill cannot be introduced in Rajya Sabha. It can be introduced only in Lok Sabha.
- 91.** (1) A member of the Legislative Assembly is directly elected by the voters of an electoral district to the Legislature of a State. The elected representative should be an

- Indian citizen and not below the age of 25 years.
- 92.** (2) Article 352 provides that the freedoms assured under Article 19 automatically get suspended on declaration of a national emergency. For this, Article 352 empowers the President to suspend the fundamental rights.
- 93.** (1) Article 60 of the Constitution of India states that the President of India will administer the oath of office to the Chief Justice of India.
- 94.** (3) Under Article 71 of the Constitution, disputes arising out of the election of the President of India shall be inquired into by the Supreme Court of India.
- 95.** (1) International Women's Day is annually held on 8th March to celebrate women's achievements across nations and throughout history. It is also recognised as the United Nations (UN) Day for Women's Rights and International Peace.
- 96.** (2) Anganwadis have been set up to promote health and nutritional needs of children from 0-6 years in the rural areas.
- 97.** (4) During the state of national emergency, the fundamental rights of citizens are suspended. A state of emergency can be declared by the President when he/she receives a written request from the Council of Ministers headed by the Prime Minister of India.
- 98.** (3) Less than 41 per cent of the nation's 67 million Muslim women were literate, versus 46 per cent of the country's 430 million non-Muslim women.
- 99.** (1) Direct censorship on media was imposed during the imposition of national emergency period, i.e. 1975-1977, by the then Indira Gandhi Government.
- 100.** (3) The "Eighth Schedule" of the Indian Constitution contains a list of 22 Scheduled languages.
- 101.** (1) Nepali, Kashmiri, and Dogri are contained in the 'Eighth Schedule' of the Indian Constitution.
- 102.** (3) RTI Act was passed in 2005 and utilised as a citizen's gateway to access the information to promote transparency and accountability in any government body.
- 103.** (2) The Times Group is the largest media group in India. It has over 11,000 employees and revenue exceeding \$1.5 billion.
- 104.** (4) Kashmiri, Sindhi, Sanskrit, and Nepali are among the list of those 22 scheduled languages which are mentioned in the 'Eighth Schedule' of Indian Constitution.
- 105.** (4) Telugu is commonly spoken in Andhra Pradesh that qualifies for second most spoken language in India after Hindi.
- 106.** (4) Gender is defined as 'the relations among women and men, both material and perceptual. It is not determined biologically, as a consequence of sexual characteristics of either men or women, but is constructed socially.
- 107.** (1) James Augustus Hickey launched the first printed newspaper, i.e. Bengal Gazette in January 1780.
- 108.** (4) Apart from Tamil, Telugu and Malyalam languages, Kannada also belonged to the Dravidian family.

5

BIOLOGY**FOOD**

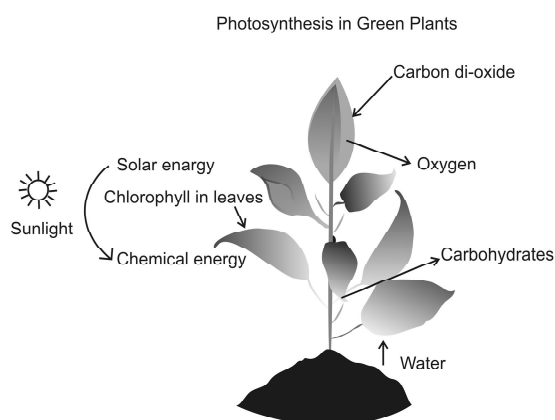
All living organisms need food to survive. Food provides them energy to perform different functions. Intake of food by an organism, its absorption and utilisation in the body is called **nutrition**. Living organisms get their food from various sources.

Green plants have an ability to synthesise their own food from water and carbon dioxide in the presence of sunlight. The green pigment or the chlorophyll present in the leaves converts solar energy into chemical energy. The process by which green plants synthesise their own food is called **photosynthesis**.

The leaves of plants are specially designed for this process. They are thin and flat. They have chlorophyll in their cells to capture solar energy and small pores called 'stomata' on their epidermis for gaseous exchange (carbon dioxide and oxygen) from air. They also have pipelike structures called xylem vessels in their veins (which are connected to similar vessels in the stem and roots) for the transportation of water and minerals.

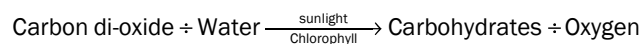
Solar energy is converted into chemical energy by chlorophyll molecules. This chemical energy is used to split water molecules into hydrogen and oxygen molecules. Oxygen is released into the air through stomata and hydrogen reduces carbon dioxide through a series of chemical reactions to produce carbohydrates.

The figure given below shows photosynthesis in green plants:



Photosynthesis in Green Plants

Carbohydrates are stored in the plant body whereas oxygen is released into the air through stomata. The equation is



Since plants use the food prepared on their own, their mode of nutrition is called **autotrophic**.

Organisms that cannot prepare their own food are called **heterotrophic**. They have to depend on others for their food. All animals and non-green plants come in this category. Let's see how they get their food.

Animals that get their food from plants are called **herbivores**. Examples of herbivores are cow, horse, rabbit, giraffe, etc.

Animals that kill other animals to eat their flesh are called **carnivores**. Examples are lion, leopard, python, etc. The animal that is killed is called the prey and the animal which kills and eats the other animal is called the predator. If a lion kills and eats a deer, then deer is the prey and lion is the predator.

Animals that eat both plants and animals are called **omnivores**. Examples are human being, dog, bear, rat, etc.

There are some animals as well as plants that feed on other living organisms without killing them. They are called **parasites**. For example, mosquitoes, leeches, head louse, bed bug, etc. The organism on which the parasite feeds is called **host**.

Cuscuta (Amarbel) is a parasitic plant that feeds on the stem and branches of host plant by inserting its haustoria (tissue that absorbs nutrition) in them. Sandalwood tree is a root parasite. Its roots send haustoria to the roots of the trees growing nearby.

There are some plants that feed on insects to fulfill their nitrogen requirement. They are found in places where soil is deficient in nitrogen salts. In Meghalaya, soil is very poor in minerals due to excessive rains that wash them away. So, we find insectivorous plants like pitcher plant, sundew and venus fly trap that eat insects in Meghalaya.

Some organisms like non-green plants e.g. fungi (mushrooms, bread mould) and bacteria eat the dead and decaying plants and animals. They are called **saprophytes**. They are also called decomposers as they convert the dead organic matter to inorganic matter.

Sometimes two organisms live together and share their shelter and nutrients. Both are benefitted from each other. Examples are lichen which has an alga and a fungus living together. The alga is green and can synthesise food whereas fungus provides shelter and helps to absorb water and minerals. Similarly, rhizobium (bacteria) lives in the root nodules of leguminous plants (that bear pods or beans) and gets its food from them. In return it fixes nitrogen of the air to soluble nitrogen salts which are easily absorbed by the plants to make their proteins. Grams, peas, moong and other pulses are all leguminous plants. They are good sources of proteins (can you tell why?). Because of rhizobium bacteria, the soil in which leguminous plants grow becomes rich in nitrogen salts. That is why farmers sow a leguminous crop between two cereal crops. This practice is called crop rotation.

FOOD AND NUTRITION IN HUMAN BEINGS

Human beings are omnivores. Their food comes from plant sources as well as animal sources. We get cereals (wheat, rice, maize, millets), pulses (moong, urad, gram), vegetables (potato, tomato, carrots), fruits (mango, grapes, guava), oils (groundnut, coconut, mustard, etc.) from plants. We also get milk, eggs, meat, etc. from animals.

Whatever is the source of our food, it mainly contains five components, i.e. carbohydrates, fats, proteins, vitamins and minerals. For a healthy body, we need them all. Let's have a look at their sources and functions in our body:

1. **Carbohydrates:** Sugars, starches and cellulose, all made up of carbon, hydrogen and oxygen
 - **Sources:** Grains like wheat, rice, maize, millets (bajra, jowar), potato, sweet potato, beet root and sugarcane

- **Functions:** Provide energy to the body. Energy from 1 gm of carbohydrates = 4 kilocalories. Carbohydrates are broken down into sugars (mainly glucose) and oxidised to get energy.
2. **Fats:** Made of carbon, hydrogen and oxygen
- **Sources:** Milk, ghee, butter, cream, cheese, vegetable oils (mustard, groundnut, coconut, sunflower, etc.), fish–liver oil
 - **Functions:** Provide energy to the body. Energy from 1 gm of fats = 9 kilocalories. Extra food is stored by the body in the form of fats in the liver and under the skin. Body needs fats to dissolve and use fat-soluble vitamins like vitamin A and D.
3. **Proteins:** Made of nitrogen containing compounds called amino acids
- **Sources:** Milk, cheese, pulses, eggs, fish, meat, poultry
 - **Functions:** Help in growth and repair of the body. Growing children need more proteins than the adults (can you tell why?).
In the absence of fats and carbohydrates (during starvation) proteins break up to provide energy to the body. Energy from 1 gm of proteins = 4 kilocalories.
4. **Vitamins:** Vitamin A, B-complex, C, D, E, K
- Vitamins are required in small quantities but they are essential for proper functioning of our body.
 - **Vitamin A:** Fat soluble
 - **Sources:** Yellow and green vegetables like carrots, pumpkin, fruits like mango, apricot and butter, egg yolk, milk, fish–liver oil etc.
 - **Functions:** Helps in good vision and healthy skin. Also helps in the growth of bones and teeth.
 - **Vitamin B Complex** (Water Soluble). It is a group of eight vitamins - B1, B2, B3, B5, B6, B7, B9, B12.
 - **Sources:** Curd, cheese, yeast (fermented foods), meat, fish, poultry and green leafy vegetables
- **Functions:** Helps in proper functioning of nerves and muscles
 - **Vitamin C:** Water soluble
 - **Sources:** Found mostly in citrus fruits like lemon, orange etc. Also present in amla, cabbage, tomatoes, lettuce, guava, strawberries, mango, kiwi, papaya and even in green chillies
 - **Functions:** Helps to stay healthy by improving the immune system. It is an antioxidant and helps in iron absorption and keeps gums healthy.
 - **Vitamin D:** Fat soluble
 - **Sources:** Fish–liver oil, milk, egg yolk, fortified milk and ghee. Our skin can synthesise vitamin D when exposed to the Sun.
 - **Functions:** Helps the body to absorb calcium and thus makes bones and teeth strong
 - **Vitamin E:** Fat soluble
 - **Sources:** Wheat germ (dalia), liver, egg yolk, nuts, green leafy vegetables, plant oils like soybean oil, sunflower oil
 - **Functions:** It is an antioxidant. It delays the process of ageing.
 - **Vitamin K:** Fat soluble
 - **Sources:** Leafy green vegetables like cabbage, spinach etc. Also produced by the bacteria present in the intestinal tract.
 - **Functions:** It helps in proper blood clotting whenever there is an injury.
5. **Minerals:** Minerals are also required in small quantities but they are essential for proper functioning of our body. Some of the important minerals are as follows:
- Calcium**
- **Sources:** Milk, meat, eggs, fish, pulses, vegetables, etc.
 - **Functions:** Helps to make bones and teeth strong. Also helps in proper functioning of muscles. Calcium aids in blood clotting also.

Phosphorus

- **Sources:** Milk, meat, eggs, fish, pulses, vegetables, etc.
- **Functions:** Helps to make bones and teeth strong. It also helps in production of ATP (energy molecules) in the cells.

Iron

- **Sources:** Green leafy vegetables like spinach, soybean, liver, pumpkin seeds, beans, chickpeas etc.
- **Functions:** Required to form haemoglobin in red blood cells of our blood. More haemoglobin means more oxygen supply and thus, more energy. Due to blood loss during menstruation, iron requirement in girls is more as compared to boys.

Iodine

- **Sources:** Iodised salt, potatoes and other vegetables, strawberries, beans, yogurt
- **Functions:** Iodine is required for the production of thyroxin, hormone secreted by the thyroid gland. This hormone controls our body metabolism.

Sodium

- **Sources:** Table salt, bread, soy sauce; large amounts in processed foods like cheese; small amounts in milk, vegetables and unprocessed meats
- **Functions:** Needed for proper fluid balance, nerve transmission and muscle contraction

Potassium

- **Sources:** Bananas, oranges, beans, carrots, sweet potato, beet root, milk, yogurt, fish.
- **Functions:** Helps to build proteins and muscles, controls acid-base balance and electrical activity of muscles (muscle contraction)

Apart from these five components, our body also requires dietary fibres or roughage and water.

Dietary fibres

- **Sources:** Vegetables (specially the green leafy vegetables), fruits, whole grains and pulses

- **Functions:** Add to the bulk of food and provide a sense of fullness. Help in the bowel movement and prevents constipation.

Water

- **Sources:** Drinking water and fluids like milk, tea, buttermilk (lassi), sherbet, vegetables and fruits
- **Functions:** Water is a solvent. It dissolves the food and helps in digestion. It also helps absorb nutrients from the digested food. It is a major component of our blood and also helps in the excretion of waste material from the body.

Diet of a person depends on his/her age (compare the food of a small baby, a growing child, a young person engaged in hard manual work and an old person). It also depends on the geographical location of the person as food availability in different parts of the earth is different (Compare the food of a person living in the mountains with that of a person living near a sea shore). The preparation of food from the same ingredients differs from family to family depending on their culture and taste. For example biryani, pongal, idli, dosa, pitha and kheer are all different but made out of rice. Whatever food a person eats irrespective of the age, place, culture or taste, the five main food components along with the roughage and water should be included in the diet.

Balanced Diet

To stay healthy and grow well, our body needs food components in right quantities. The body shows deficiency symptoms if one or more of the food components is less than the required quantity. Too much of a food component in the body also creates problems.

A diet which contains all the food components in the right quantity is called a balanced diet.

What if one or more food components are lacking in the diet of a person for a long time? It results in a **deficiency disease**.

If a person is not taking sufficient amount of proteins and carbohydrates (many poor families get very little to eat and that too only once in a day), it results in **Protein Energy Malnutrition**. The symptoms are severe weakness and stunted growth. Deficiency of proteins results in loss of muscle mass, skin pigmentation,

swelling of face and diarrhoea. The symptoms are more prominent in children. Sometimes there is huge muscle loss and the child has just skin on the bones. Such a condition is called **marasmus**. Children showing swelling on face and protruding belly due to protein deficiency are said to be suffering from **kwashiorkor**.

Vitamins and minerals are required by the body in very small amounts but they are essential. Their deficiency in the body results in various deficiency diseases as shown in the table below:

Table: Vitamins and Minerals Deficiency Diseases

Vitamins/ Minerals	Deficiency Diseases	Symptoms
Vitamin A	Night blindness	Poor vision, loss of vision in darkness
Vitamin B1	Beriberi	Weak muscles, fatigue
Vitamin C	Scurvy	Bleeding gums, wounds take long time to heal
Vitamin D	Rickets	Bones become soft and bent
Calcium	Osteoporosis (Bones and tooth decay)	Weak bones, tooth decay
Iodine	Goitre	Thyroid gland in the neck gets swollen, mental disability in children
Iron	Anaemia	General weakness, fatigue

Eating too much food, especially fats, results in obesity. Obesity gives way to several other diseases like fatty liver, heart problems, joint pain, etc.

Test for Presence of starch, Protein or Fats in Food

We can test for the presence of starch, protein or fats in a given food item by the following simple tests:

Take a small sample of food item. Pour 2-3 drops of dilute iodine solution on it. If it turns blue-black in colour, it contains **starch**.

Make a powder/paste of a small amount of food item and put it in a clean test tube. Add a little water and stir.

To this add 2 drops of copper sulphate solution and 10 drops of caustic soda solution. Shake well and let the mixture settle down for some time. Presence of violet colour signifies the presence of **proteins**.

Take a small quantity of the given food item on a piece of paper. Fold the paper and crush the food item present in it. Open the paper. If the food item leaves an oil patch on the paper, it contains **fats**.

Digestion of Food in Human Beings

Breaking down of complex food molecules into simpler ones that can be easily absorbed and used by the body is called **digestion**. Human beings have an alimentary canal in which the food is digested and absorbed by the blood. This alimentary canal starts with the mouth (buccal cavity) and ends up in the anus. The main parts of this alimentary canal are buccal cavity (mouth), oesophagus (food pipe), stomach, small intestine, large intestine and the anus.

Liver and pancreas are other organs that contribute to the process of digestion. Let's have a look at what happens to the food in different parts of the alimentary canal.

Buccal Cavity

There are three main organs that help in digestion in the buccal cavity. They are teeth, tongue and the salivary glands.

Teeth

Teeth is the hardest organ of our body. They help in cutting, tearing and grinding the food in the mouth. The well grinded food is easy to digest and move in the alimentary canal.

There is a set of 32 teeth in an adult mouth, i.e., 16 in each jaw (some may have 28 teeth as 4 wisdom teeth come late or may not come out at all!). Depending on their shapes and functions, teeth have been classified as:

Incisors (8): 4 + 4 teeth located in the middle (front teeth) of the upper and lower jaws. They are used for cutting the food.

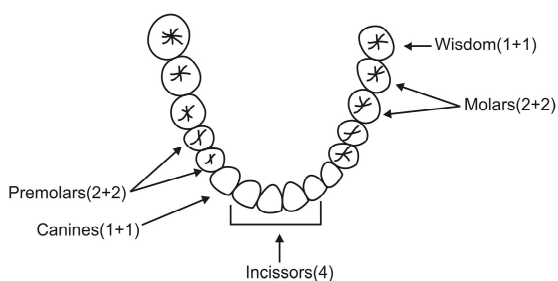
Canines (4): 2 pointed teeth in each jaw separated by its incisors. They are used for tearing food.

Premolars (8): 4 teeth in each jaw, 2 on either side between the canines and molars. They are used for grinding the food.

Molars (8): 4 teeth in each jaw, 2 on either side. They are somewhat flat and are present at the rear of the mouth. Molars also grind the food.

Wisdom teeth (4): One each found at the end (both sides) of each jaw. These teeth erupt at a later stage (at the age of 18+). Most of the times they don't find enough space in the mouth and so are removed by the dentist. If present, they also help in grinding the food.

The following figure shows human teeth in one jaw:



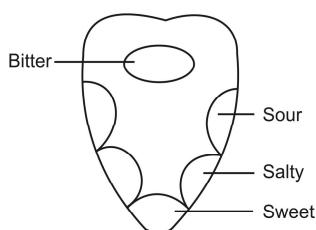
Human Teeth in One Jaw

Children have a set of 20 temporary teeth or milk teeth. They don't have molars. These teeth fall down as children grow and are replaced by 32 permanent teeth.

Tongue

The tongue is a small muscular organ in the mouth which tells the taste of the food and helps to mix saliva with the food. It also helps to push the food into the oesophagus through the pharynx.

The surface of the tongue is rough. There are a number of taste buds on it that help identify sweet, salty, sour and bitter tastes. The taste buds for identifying different tastes are clustered in different regions of the tongue as shown in the figure below:



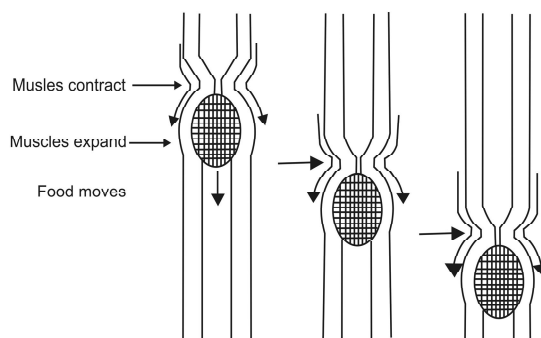
Zones of Taste Buds on the Tongue

Salivary Glands

There are three pairs of salivary glands that are present around the mouth cavity and leave their secretions known as 'saliva' into the mouth. Saliva lubricates the food and the enzyme 'salivary amylase' present in it breaks starch into sugars.

Oesophagus

After the food is pushed from the mouth by the tongue into the pharynx, the food pipe opens. Pharynx opens into two pipes- the wind pipe which is usually open and the food pipe or the oesophagus which opens only when the food comes. When food comes, epiglottis (a thin flap) covers the wind pipe and food enters the food pipe. From the oesophagus, food moves down to the stomach by the repeated contraction and expansion of the muscles of the food pipe. This type of movement is called 'peristaltic movement'. All along the alimentary canal, food moves this way only. The following figure shows the movement of food through oesophagus:



Movement of Food through Oesophagus

Stomach

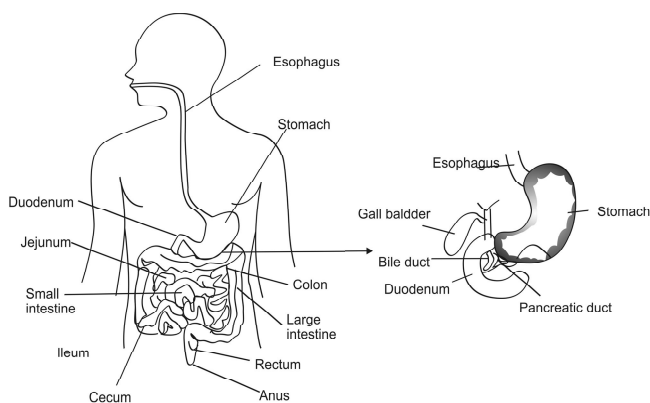
Once food reaches the stomach, it is mixed with hydrochloric acid secreted in the stomach. This acid destroys the bacteria if present in the food and also makes the food acidic. The stomach also secretes mucous which prevents its inner wall from the corrosive action of strong acid present inside. Digestive juice secreted by the stomach (pepsin) acts on the acidic food and breaks down proteins present in the food to simpler compounds.

Small Intestine

From the stomach, food moves on to the small intestine which is about 7.5 m long. It has three parts-duodenum, jejunum and ileum. The first part of the small intestine is

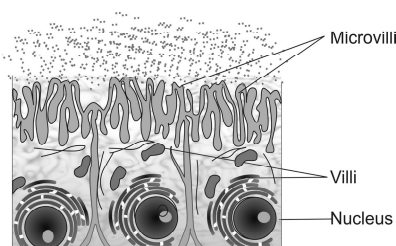
a c-shaped structure called duodenum. In duodenum, liver pours its alkaline bile juice stored in gall bladder through a bile duct. The acidic semi-fluid food (called chyme) coming out of the stomach becomes alkaline when alkaline bile juice mixes with it in the duodenum. Bile juice emulsifies fats present in the food, i.e., large globules of fats are converted to small globules for the better action of digestive enzymes. There is another duct opening into the duodenum. It is the pancreatic duct that brings a number of enzymes from pancreas and mixes them with the chyme. The pancreatic juice contains enzymes like trypsin, chymotrypsin, lipase, amylase, etc. These enzymes can act only in alkaline medium (that bile juice has already provided). Trypsin and chymotrypsin break peptides (simpler form of proteins) into amino acids, lipase breaks fats into fatty acids and glycerol, and amylase converts sugars into glucose. The process of digestion is completed in the small intestine.

The figure given below shows digestive track of human body:



Digestive Tract of Human Body

The digested food is absorbed by the walls of the small intestine, mainly the middle part, i.e. jejunum. Small intestine is specially designed for the purpose of absorption. The inner wall of the small intestine contains a number of villi, shown in the figure given below:



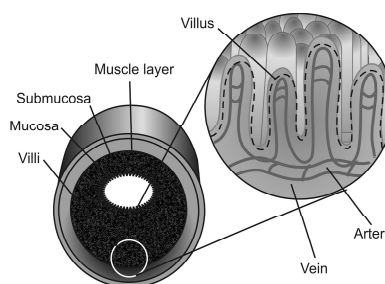
Epithelial Cell

The epithelial cells that line these villi have microvilli. These villi and microvilli help to increase the surface area of the intestine for the better absorption of the food. There are a number of thin blood capillaries in the villi that bring the absorbed food into the blood. These capillaries join to form veins that carry blood towards the liver and from there to the heart.

From the heart, the digested food is transported by blood to different organs of the body. In each cell of the body, the food is oxidised and energy is produced which helps us to do work.

Large Intestine

The undigested food is passed on to the large intestine. It is about 1.5 m in length. It represents the end of the digestive tract. Here excess water and some useful salts are absorbed. It reduces acidity, produces antibodies and protects from infection. In the large intestine, the mucous membrane (Mucosa) acts as a protective layer that prevents harmful bacteria from being reabsorbed into the body. The following figure shows the structure of mucosa:



Structure of Mucosa

Anus

The remaining waste in the form of semi-solid mass is stored in the rectum. From there, it is passed out through the anus (opening at the extreme end of the digestive tract). This process is called egestion.

MICROORGANISMS

Microorganisms are a large group of organisms that are visible clearly only through a microscope. They were discovered in 1674 by Antonie Van Leeuwenhoek. Microorganisms may be unicellular or multicellular. They are found everywhere on this earth, even in the most

extreme conditions (from glaciers to hot springs, deep under earth, high up in the atmosphere). Almost half of the biomass on this earth consists of microorganisms. Microorganisms include viruses, bacteria, protozoans, microscopic algae and microscopic fungi. When we look at the five kingdom classification proposed by Whittaker (Monera, Protista, Fungi, Plantae and Animalia), we find that three kingdoms (Monera, Protista and Fungi) belong to microorganisms.

Let's look at each kingdom and microorganisms they represent.

1. **Monera:** Microorganisms placed under this kingdom are **prokaryotes**, i.e., they do not have a well-defined nucleus or cell organelles. Their single celled body is enclosed in a cell membrane. They may or may not have a cell wall. Examples are bacteria, blue green algae (cyanobacteria) and mycoplasma (smallest bacteria without a cell wall). Some of them are autotrophic and others are heterotrophic.

Examples of heterotrophic monerans are shigella, campylobacter, salmonella, etc.

Autotrophic monerans are as follows:

- i. **Blue-green algae or cyanobacteria:** They have chlorophyll similar to plants. So they prepare their food by the process of photosynthesis. They can also fix atmospheric nitrogen (convert it into nitrates and nitrites). For example, nostoc, anabaena etc.
 - ii. **Chemosynthetic bacteria:** They oxidise different chemicals and get energy from them. Examples are methanobacteria, that are found in the rumen of cattle; sulphur bacteria, that are found in deep sea; and nitrogen fixing bacteria (e.g. rhizobium), that are found in soil or in plant roots.
2. **Protista:** Protists may be single celled or multicellular. They are **eukaryotes**, i.e. they have a well-defined nucleus. Most of them live in water or moist soil. They are:
Autotrophic protists: Algae (chlamydomonas, spirogyra) prepare their own food by the process of photosynthesis.

Heterotrophic protists: Protozoans like amoeba and paramecium feed on small microscopic organisms found in water. Plasmodium is a parasite that infects blood and liver. It is transmitted by mosquitoes. Slime moulds are saprophytic organisms that feed on dead and decaying organic matter.

3. **Fungi:** Fungi are eukaryotes, i.e., they have a well-defined nucleus in their cells. Most of them are multicellular (yeast is single-celled). Most of them are made up of filamentous structures called hyphae which come together to form mycelium.

All fungi are heterotrophic. Most of them are saprophytic (bread mould), some are parasitic that cause diseases to plants and animals (puccinia causes rust disease in crops), some are used to ferment food (yeast) and some are used to make antibiotics (penicillium).

Importance of Microorganisms

1. A large number of autotrophic microorganisms contribute to the production of oxygen (a byproduct in the process of photosynthesis) and thus enrich the air with oxygen.
2. Saprophytic microorganisms feed on dead and decaying matter and thus help to convert organic matter to inorganic nutrients. Humus made by decomposition of dead leaves is full of minerals and useful for plant growth. It is also food for various animals that live in soil, for example, earthworms and several insects.
3. Dairy products like curd, cheese are made by the activity of microorganisms (lactobacillus). Microorganisms (yeast) also help in making bread, cakes, wine, etc. The process of using desirable microorganisms to convert carbohydrates to alcohols and carbon dioxide is called **fermentation**. Fermentation was discovered by Louis Pasteur in 1857.
4. Microorganisms help in separating fibers (jute, flax or linen) from other plant tissues and cleaning the leather of animals for use in leather industry.
5. A large number of microorganisms (Bacillus, Pseudomonas, Vorticella) are used in sewage treatment.

6. A number of antibiotics are made from the microorganisms like *Penicillium*, *Aspergillus*, etc. The chemicals that kill or prevent the growth of bacteria are antibiotics. They are used to treat bacterial infections.

The first antibiotic 'penicillin' was discovered by **Alexander Fleming**. Microorganisms are also used in the production of vaccines, enzymes and vitamins (B₂). **Edward Jenner** was the first to produce and try a vaccine for smallpox. With the help of that vaccine, smallpox has been eradicated from the entire world. Now, we are trying to eradicate polio. For this, in India, 'Pulse Polio Campaign' has been launched.

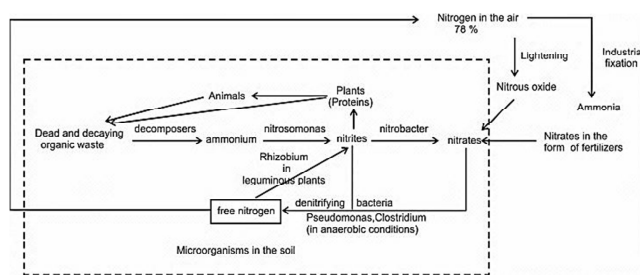
7. Microorganisms maintain nitrogen balance in nature. They are mainly responsible for the nitrogen cycle.

Nitrogen Cycle in Nature

About 78% of the air in Earth's atmosphere is nitrogen. Nitrogen is an integral part of all proteins and nucleic acids in all organisms. Proteins are synthesised by plants using nitrates and nitrites (soluble salts of nitrogen). They are not able to use gaseous nitrogen for this purpose. Animals depend directly or indirectly on plants for their requirement of proteins. Gaseous nitrogen therefore needs to be fixed into soluble nitrogen salts for use by plants. It is released back into the air by the process of denitrification. Some amount of nitrogen is fixed during lightning and in the fertiliser industries (by the Heber-Bosch process) in the form of ammonia. But microorganisms play a major role in this process.

Nitrogen-fixing bacteria convert gaseous nitrogen into soluble nitrogen salts (nitrates and nitrites) which are extremely useful for plants. Ammonifying bacteria convert ammonia into nitrates. Denitrifying bacteria (*Pseudomonas*, *Clostridium*) help in converting nitrates and nitrites into gaseous nitrogen. Nitrogen fixing bacteria present in the root nodules of leguminous plants (symbiotic relationship) called *Rhizobium* convert gaseous nitrogen into nitrates for the nutrition of plant. Plants are consumed by animals. The dead remains of plants and animals are again decomposed by decomposers (bacteria and fungi).

The nitrogen cycle is shown in the figure given below:



Nitrogen Cycle

Harmful Microorganisms

1. Microorganisms are responsible for spoiling food. They spoil eatables, and sometimes large-scale losses occur when they attack granaries. They flourish in humid conditions.
2. A number of microorganisms are pathogens and cause various diseases in plants and animals. In human beings bacteria cause diseases like cholera, typhoid, pneumonia, whooping cough, tetanus, tuberculosis, anthrax, gonorrhoea, syphilis, food poisoning, etc. In plants, bacteria and fungi can cause blights, rust, smut, canker, rots, mildews, etc. There are a number of antibiotics available that can kill bacteria that cause these diseases, only the timely action is important.
3. Viruses are very harmful pathogens and cause a number of diseases in animals and plants. Viruses activate themselves only inside living cells of hosts. They have a very few biochemical processes of their own. Therefore, while it is easy to kill bacteria with the help of antibiotics and other medicines, it is very difficult to kill viruses. The body's immune system has to fight them on its own. Some of the common diseases caused by them in human beings are common cold, influenza, dengue, HIV, Hepatitis B, measles, polio, rabies, etc. In plants, they cause mosaics, yellowing of leaves, curly tips, etc.

Since microorganisms are not visible to the naked eye, it took quite some time to prove that they cause many diseases. The contribution of Robert Koch in identifying bacteria causing tuberculosis (*Mycobacterium tuberculosis*) and anthrax (*Bacillus anthracis*), and of Ronald Ross, who discovered plasmodium as cause of malaria and its carrier—female *Anopheles* mosquito, are worth mentioning here.

Diseases caused by these pathogens are communicable. It means they can be transmitted easily from one person to another through air, water, soil, direct/indirect contact or through a carrier (housefly spreads bacteria of cholera; female anopheles mosquito carries plasmodium, a protozoan that causes malaria, in its saliva; Aedes mosquito carries the virus that causes dengue).

Steps to prevent diseases caused due to microorganisms are:

1. **Immunisation or vaccination:** We can prevent ourselves/children from the attack of several pathogens by timely getting immunised with the help of vaccines. BCG vaccine prevents us from tuberculosis. Other vaccines for diseases like polio, typhoid, influenza, tetanus, whooping cough, diphtheria, cholera, hepatitis A and B, measles, diarrhea caused by rotavirus, etc. are available and help us get immunised from these diseases.
2. **Keeping your hands clean:** Wash your hands with soap and clean water frequently. Personal hygiene helps to keep away from pathogens.
3. **Avoiding contact with infected persons:** Patients suffering from air-borne diseases should be kept in isolation. They should use a handkerchief while sneezing or coughing and stay away from crowds and dirty places.
4. **Drinking clean water:** It is better to boil water and store it in clean utensils. Also, you should eat well-cooked food.
5. **Protecting yourself from mosquito bite:** Use mosquito repellants and nets. Don't allow mosquitoes to breed in your vicinity.

Preservation of Food

Microorganisms spoil our food. Eating spoiled food leads to food poisoning. So, we have to protect our food from microbial attack. There are a number of ways to do this. Some of them are as follows:

1. Boiling/heating food kills bacteria. **Pasteurisation** (heating to 70°C for about 15–30 seconds and then suddenly cooling) prevents milk from getting spoiled early.

2. Drying the food (vegetables and fish) in sun, rubbing with salt, and smoking (exposing the food to the smoke of the burning plant material like wood) also helps in preservation of food.
3. Making pickles, jams, jellies, squashes etc. are also ways to preserve food. Salt and sugar increase the concentration of the medium and this causes plasmolysis of the cells of the microbes (water content of their cells moves out, the microbial cells shrink and die). Oil and vinegar also don't allow bacteria to grow.
4. Adding food preservatives like sodium benzoate and sodium metabisulphite and storing food items in cold storage.

FOOD RESOURCES

With growing population, demand for food is also increasing continuously. We need to improve our agricultural practices to get higher yield out of the limited land that we have under cultivation.

We have a vast variety of crops growing in our country. They can be classified in two categories depending on seasons in which they are sown:

- (i) **Kharif crops:** They are sown in the rainy season (June to September). Examples are paddy, maize, soybean, groundnut, cotton, etc.
- (ii) **Rabi crops:** They are sown in the winter season (October to March). Examples are wheat, gram, pea, mustard, linseed etc.

The basic agricultural practices that we follow are:

- (i) **Preparation of soil:** Soil is loosened by ploughing and then levelled using traditional (plough) or modern (tractors) means.
- (ii) **Sowing:** Seeds are sown by different methods (scattering or through seed drill).
- (iii) **Adding manure and fertilisers:** It depends on the nutrient content of the soil and requirement of the crop to be sown.
- (iv) **Irrigation:** This is done by different means like canals, tube wells, sprinklers, drip irrigation.
- (v) **Harvesting:** This is done by cutting the crop when it matures by hands or machines.

(vi) **Storage:** Storage of grains/produce should be done at the right places which are protected from pests and microorganisms.

In order to enhance the crop yield, we undertake three types of activities:

1. **Crop variety improvement:** This is done by selecting crop variety that gives high yield and is not susceptible to diseases. Continuous research programmes are going on in our agricultural research institutes to develop high yielding varieties through breeding (two crops having desired traits), irradiation (radioactive rays), genetic engineering (genetically modifying plants by introducing the genes of desired traits into its DNA). The seeds of the crop showing best results are selected and multiplied to be grown on a large scale.
2. **Crop production improvement:** This is done by enhancing the yield using modern farming practices and agricultural technologies. Efforts are made to:
 - i. Reduce the demand for fertilisers and use green manure, compost manure and promote vermicomposting. Biofertilisers in which the culture of blue-green algae, Rhizobium bacteria etc. are being tried. Crops produced through less or no use of chemical fertilisers, pesticides and weedicides are called organic crops.
 - ii. Improve irrigation systems where water is used economically and still the crop gets a good amount of it for its growth are being tried.

Different cropping patterns are being tried such as:

- (a) **Mixed cropping:** It means growing two or more crops simultaneously in a single field. For example, wheat + gram, wheat + mustard, groundnut + sunflower. This reduces the risk for the farmers (in case one crop fails, others bring relief).
- (b) **Inter-cropping:** It is similar to mixed cropping but here two or more crops are sown simultaneously if there is a definite pattern (e.g. in alternate rows). This caters to different nutrient requirements of different crops. Another benefit is that the pest of one crop finds it difficult to cross over other crop to infect. This way damage due to pests is also minimised.

(c) **Crop rotation:** Crops are grown in a set sequence so that the fertility of the soil is maintained. For example, if a leguminous crop is grown after harvesting a wheat crop, the soil gets enriched in nitrates. After this, again we can grow wheat without the need of using a nitrate fertiliser.

3. **Crop protection management:** Proper control of weeds and pests prevents crop loss. Timely detection, use of pesticides and weedicides, use of disease resistant varieties of seeds etc. are some of the protective measures that have to be undertaken. Moreover protection of the stored grains itself is of great importance. Grains have to be protected from moisture, rodents, pests and microorganisms. Clean and dry godowns, use of pesticides, fumigation etc. have to be done from time to time.

THE WORLD OF THE LIVING

We can broadly classify the things around us into living things and non-living things. Living things have certain specific characteristics in them. They need food to get energy, respire, grow, show motion, respond to stimuli, excrete and reproduce their own kind. All living things have a limited span of life.

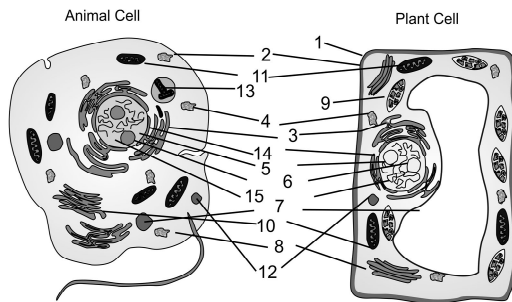
The body of all living things is made of cells. Cells were first discovered by **Robert Hooke** with the help of a microscope in 1665. Cells are the structural and functional units of an organism's body. The number of cells varies in different organisms. Some are unicellular (single celled), while others are multicellular. In single celled organisms like amoeba and paramecium, all the functions (feeding, respiration, excretion, movement, reproduction etc.) have to be performed by the single cell. Single celled organisms may be prokaryotes (in which the nucleus is not well defined and is without a nuclear membrane) or eukaryotes (having well defined nucleus with a nuclear membrane). Multicellular organisms develop from a single cell and may have trillions of cells when they grow up.

Shapes of the cells also vary from being irregular (can change when desired) to round, polygonal, cylindrical etc. Size of the cells also vary from 0.1 micrometre (bacteria) to 170 mm × 130 mm (egg of an ostrich).

Structure of Cell

Cell carries a number of cell organelles suspended in a jelly like substance called cytoplasm which again is bounded by cell membrane. Most of the cell organelles are common in animals as well as plants.

The given figure shows the cell organelles (with numbers) in animal and plant cells:



Cell Organelles in Plant and Animal Cells

Various cell organelles (with numbers) and their functions have been given below in brief:

- Cell wall:** In plants the rigid outer wall is made of cellulose. It gives a definite shape to the cell and provides strength and protection. It is absent in animal cells.
- Cell membrane:** The semi permeable membrane that covers the entire cell and acts as a gate keeper allowing only certain things to pass and acting as a barrier for others.
- Endoplasmic reticulum:** It forms a large network of interconnected membranous tubules that connect nucleus with the cell's outer boundary. Ribosomes are found attached to it (rough endoplasmic reticulum) where protein synthesis takes place. It also helps to transport material from the nucleus to outside the cell.
- Ribosomes:** They are responsible for protein synthesis.
- Nucleus:** It is the master controller of entire cell functions. It contains chromosomes that contain genes for controlling different functions.
- Nucleolus:** A small dark coloured body in the nucleus that is mainly responsible for the synthesis of protein and RNA.
- Vacuoles:** They are absent or of small size in animal cell but big sized storage places for plant cells. They also help in secretion and excretion in plant cells.
- Cytoplasm:** It is a jelly like substance which fills the entire cell and organelles are found embedded in it. It helps to maintain the osmotic concentration of the cells.
- Chloroplast and other plastids:** They are present in the plant cells only. They contain pigments specially the green coloured chlorophyll that absorbs solar energy and converts it to chemical energy to be used in the process of photosynthesis.
- Golgi apparatus:** They are flattened sac like structures responsible for secretion and act as packaging units.
- Mitochondria:** It is also called the power house of the cells. It is here that the food (glucose) gets oxidised and energy in the form of ATP molecules is produced.
- Lysosomes:** They are also called suicidal bags. They contain digestive juices that help to break down the waste or non performing organelles.
- Centrosome:** It is present only in animal cells near the nucleus. It is functional during cell division when it helps to form spindle fibres on which chromosomes get attached.
- Nuclear membrane:** It is the outer membrane of the nucleus. It is porous double membrane structure that helps in transporting substances in and out of the nucleus.
- Chromosomes:** Chromosomes are made up of DNA, the genetic material that actually controls all the functions of the body and is responsible for transmission of characters from one generation to the other. In every species, there are definite number of chromosomes in the nucleus of its cells.

A tissue is formed by a group of similar cells that perform similar functions. Tissues found in human beings are:

- Epithelial tissue** or the covering tissue, which are found on the internal and external surface of every organ and the skin.

- (ii) **Muscular tissue**, that form bulk of the body. They are attached to the bones (skeletal muscles), internal organs and blood vessels (smooth muscles), and the heart is made of them (cardiac muscles).
- (iii) **Connective tissue** (bones, cartilage, blood) that connect, bind or separates other tissues or organs.
- (iv) **Nervous tissue**, which is found in the brain, spinal cord and nerves.

Tissues found in plants are:

- (i) **Meristematic tissue**, having cells that keep on dividing and contribute in the growth of plants.
- (ii) **Parenchyma tissue**, having thin walled cells with intercellular spaces. This tissue acts as filler and stores food.
- (iii) **Collenchyma tissue**, that has thickened corners of the cells. It provides strength and shape to the plants.
- (iv) **Sclerenchyma tissue**, the hard woody tissue which is dead but useful in giving mechanical strength to the plant.
- (v) **Vascular tissue** that is made of xylem and phloem. Xylem conducts water from roots to all parts of the plants through its hollow xylem vessels and phloem conducts food through its sieve tube cells that are devoid of nucleus to make room for the food to pass through.

Different tissues are set together to form a set of organs working in coordination, which forms an organ system. All organ systems together make the body of an organism.

THE PLANTS

We have a variety of plants around us that can be classified as herbs (short plants having soft and green stems), shrubs (hard but not very thick plants, branching at the base), trees (tall, hard, thick stems branching at the top). Plants with weak stems that stay on the ground are called creepers whereas plants with weak stems standing upright by holding a support are called climbers.

Parts of Plants

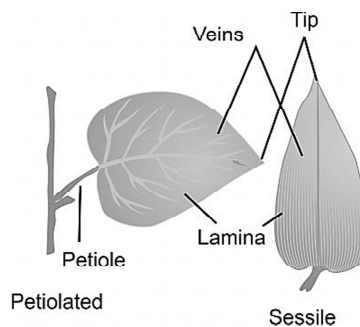
1. **Roots** are the underground part that hold the plant firmly in the soil and also absorb water for the plant from the soil. Roots are of three types:

- (i) Tap root, in which there is one main root and this gives out lateral branches
- (ii) Fibrous roots, where there is no main root (moong, spinach), many roots seem to originate together from one point (grasses)
- (iii) Adventitious roots that come at different places in the plant other than at the base of the stem (banyan, sugarcane).

There are xylem vessels and tracheids in roots and stems of plants that are just like pipes and help transport water and minerals from roots to stem to leaves, flowers and fruits. There are some roots that store food also (carrots, radish, and tapioca). Roots of some plants give rise to new plants (dahlia, sweet potato). Roots of a plant always move towards water (hydrotropism) and earth (geotropism).

2. **Stem** of the plant is the main body that bears leaves, flowers and fruits. Stem along with its branches help the leaves get maximum sunlight for use in photosynthesis. It carries water and minerals from the roots to leaves, flowers and fruits. The food prepared by the leaves is transported by the stem (phloem sieve tubes) to all the parts including roots. Extra food is sent to be stored to fruits, seeds, sometimes roots and even in the stem (sugarcane, potato). So stem helps to transport water as well as food. Many plants are grown from their stem cuttings (rose, money plant, sugarcane, potato). Stem of a plant always moves towards light (phototropism).
3. **Leaves** are the food factories of plants. They are of different shapes and sizes. They are attached to the stem by a petiole. Some leaves don't have petioles. They are called sessile.

The figure given below shows Petiolated and Sessile leaves

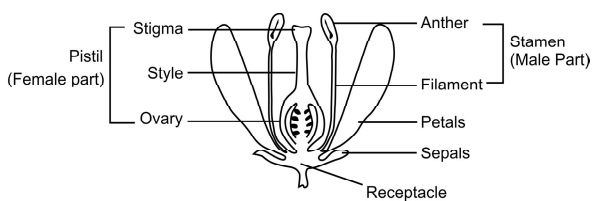


Petiolated and Sessile Leaves

Most of the leaves are green in colour as they have chloroplasts in their cells. Leaves have a number of veins running in their lamina that carry water for use in the process of photosynthesis. The arrangement of these veins is of two types:

- (i) Reticulate, in which there is one main vein called midrib and a number of lateral veins coming out of the midrib that form a network and spread to each and every part of the leaf (neem, mango, rose, peepal)
- (ii) Parallel, in which veins run parallel to each other (all grasses).

4. **Flowers** are the reproductive parts of the plant. Parts of a typical flower (shown in the figure below) are: sepals, petals, stamens and pistil. Their functions are as follows:



Parts of a typical flower

- (i) **Receptacle:** The base of a flower where its different parts are attached.
- (ii) **Sepal:** The green, leaf like outer parts of the flower. It covers and protects the bud till it blooms into a flower.
- (iii) **Petal:** The parts of a flower that are mostly bright in colour to attract the insects and birds for pollination.
- (iv) **Stamen:** The male reproductive organ of the flower. It has two parts:
 - (a) **Anther:** The part of the stamen where pollens (which contain male gametes) are produced.
 - (b) **Filament:** A thin thread like structure that carries the anther.
- (v) **Pistil:** The female reproductive organ of the flower. It has three parts:
 - (a) **Ovary:** The swollen lower part of the pistil where ovules are produced. On maturity

ovary becomes the fruit and ovules become the seeds.

- (b) **Style:** A long filamentous structure.
- (c) **Stigma:** The uppermost sweet and sticky part of the pistil. When pollens fall on it, they germinate. The male gametes move towards the ovary and fuse with the female gamete present in the ovule.

All the flowers are not bisexual (those having stamens and pistils both). Flowers of some plants like cucumber, maize, papaya, coconut etc. have separate male (only stamens) and female (only pistils) flowers. They are called monosexual flowers.

Pollination is the process of transferring pollens from anthers to stigma of pistil. This is done by air, water, insects, birds or animals. Flowers pollinated by air (wheat, maize) and water (hydrilla, vallisneria) don't have bright colours or scent (can you tell why?). Flowers pollinated by insect, birds or animals are brightly coloured and have nectar in them. Flowers blooming in the night are generally white in colour and have pleasant scent (can you tell why?).

If pollens of the same flower or same plant fall on the stigma, it is called self-pollination. If pollens of a different plant (of the same species) fall on the stigma, it is called cross pollination.

On the stigma pollens germinate and its pollen tube carrying male gametes grow out the style to the ovary. One of pollen tube reaches the ovary, gets inside the ovule and fuses with the female gamete. Zygote formed as a result of this fusion undergoes several divisions to form embryo.

5. **Fruit** is the seed bearing structure formed from the ovary after flowering and ovule matures to form the seed.

The seeds formed in the fruits come out in different ways and get dispersed by wind, water, birds, animals and human beings.

In dicot seeds (beans, gram) food for the embryo is stored in the cotyledons (till it gets green leaves and start photosynthesis). In monocots food is stored in the endosperm (wheat, maize).

Embryo in the seeds remain dormant till favourable conditions for germination (air, water, light and temperature) are met. When everything is fine, the seed germinates to form a new plant.

Plants also reproduce by asexual reproduction like vegetative propagation (cutting of stem or root, or through buds), budding (yeast), fragmentation (spirogyra), spore formation (bread mould, ferns) etc.

SOIL

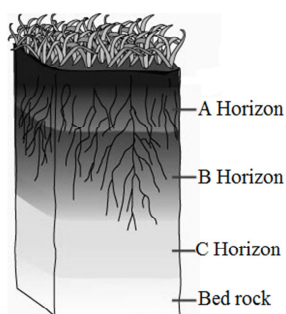
Plants need soil to grow. Soil is formed by the weathering of rocks, i.e., breaking down of rocks over the years by the action of wind, water and climate. The nature of soil depends on the type of rocks from which it has been formed and the plants growing over it. The soil profile is the vertical section of soil that describes all its horizons.

Layers of Soil

There are four main layers that are distinct. They are as follows:

- (i) **A horizon** or the top soil is the fertile layer, dark in colour, full of humus and nutrients. Many insects and small animals live in this zone. Plants get their nutrients from this layer. It is home to many insects, worms and small animals (rodents).
- (ii) **B horizon** is rich in nutrients but amount of humus is less. It is harder and compact as compared to A horizon.
- (iii) **C horizon** has small pieces of rocks with crevices.
- (iv) **Bed rock** is hard, difficult to dig.

The figure given below shows the vertical section of different layers of soil:



Different Layers of Soil

Removal of soil from A horizon due to deforestation and the effect of strong winds and flowing water is called soil erosion. Soil erosion makes the soil infertile for crops.

Types of Soil

Soils can be classified into three types:

- (i) **Sandy soil** has large particles. It is porous and water passes through it very easily.
- (ii) **Clayey soil** has very fine particles. It is almost non-porous and water is not absorbed in it.
- (iii) **Loamy soil** has a mix of larger and smaller particles. It also contains silt and humus and is ideal for plants as it holds the water for a longer time.

The percolation rate of soil can be calculated as the amount of water going down from a unit area in unit time. Different crops need different types of soils, e.g., wheat, gram grow well in clayey or loamy soil, paddy grows well in clayey soil with good amount of humus, pulses grow well in loamy soil and cotton grows better in sandy or loamy soils.

Soil contains air and moisture that helps the bacteria, insects, worms etc. to live comfortably.

ANIMALS

Animals are heterotrophic, i.e., they can't prepare their own food like green plants. So they have to move a lot in order to get food. They also have to move to protect themselves from their enemies and to find mate for themselves.

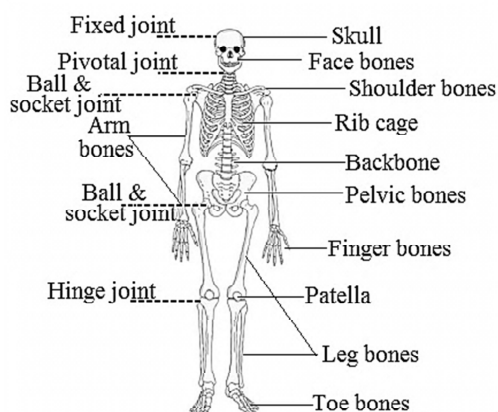
Movement

Animals move in different ways using their legs, wings, fins, scales etc. They walk, run, fly, jump, creep, crawl, slither or swim.

Movement in Human Beings

Human beings have a framework of bones in their body which are covered and connected with muscles. They have joints at specific points that help in bending, lifting, turning and walking.

The figure given below shows the bones and joints in a human body:



Bones and Joints in a Human Body

The major bones of the human body are: skull, face bones, backbone, rib cage made of ribs and sternum, shoulder bones, pelvic bones, and the bones of arms and legs.

Mainly six types of joints are present in human body:

- (i) **Fixed joint** (immovable) as in the skull
- (ii) **Pivotal joint** which allows left, right, up, down movements (neck bone with skull)
- (iii) **Ball and socket joint** that allows circular movement in all directions (joint of arm with shoulder bone and leg with pelvic bone)
- (iv) **Hinge joint** that allows back and forth movement (elbow, knee)
- (v) **Gliding joint** that allows bones to glide past one another on any direction (up down, left right, diagonally) as in wrist and ankle
- (vi) **Saddle joint** where one bone acts as a saddle and the other acts like a rider (as in the thumb). It allows greater flexibility than the hinge joint.

Another part of the skeleton is the **cartilage** a strong but flexible tissue which is found in the ear lobes, front part of the nose and also at the ends of the bones (joints).

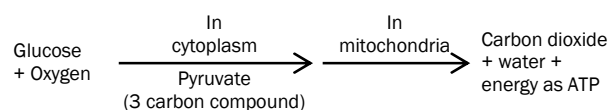
Bones are attached to the muscles in the body. It is the contraction of muscles that pulls the bones to cause movement.

Movement in Other Animals

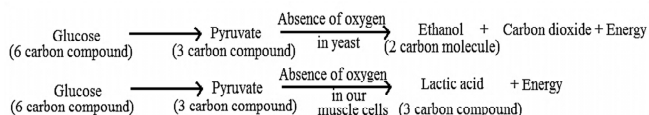
Earthworm moves by holding and releasing the surface of the earth with its setae (tiny bristles on its body). Snail moves with the help of its foot made of strong muscles, cockroaches and other insects have three pairs of joined legs for movement, some have wings as well. Birds have streamlined body suitable for flying, strong shoulder bones and muscles on the breastbone, hollow and light bones and forearms modified into wings. Fish also has streamlined body suitable for swimming, fins to make a balance and also act as steering and brakes. Snakes move with the help of their strong muscles attached to their backbone. The muscular movement helps them to make body loops. This type of movement is called slithering.

RESPIRATION

All living organisms need energy to perform various functions. Every cell needs energy to stay alive. To get energy, every cell needs food and oxygen. Organisms take the food, digest it and the digested food is transported to each and every cell. Similarly, oxygen is taken from the air by a process called **breathing** and transported to all the cells. Food is oxidised in the cells to produce energy along with carbon dioxide and water. This is called cellular respiration. This reaction takes place in cytoplasm and mitochondria in the cell.

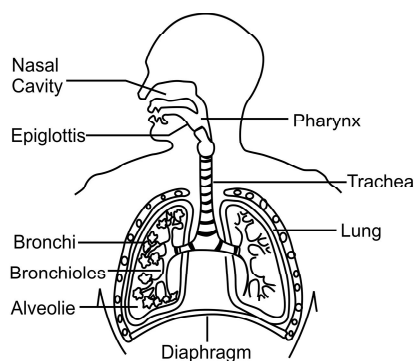


Respiration in the presence of oxygen is called aerobic respiration. Sometimes, and in some organisms, respiration takes place in the absence of oxygen. Such a respiration is called anaerobic respiration. For example, yeast respire in the absence of oxygen. As a result a little amount of energy is produced along with ethanol (alcohol) and carbon dioxide. In our body also when energy demand increases and oxygen is in short supply (during heavy exercise, fast running), anaerobic respiration takes place in which lactic acid and carbon dioxide are produced. Lactic acid causes pain and fatigue in the muscles and on getting oxygen, it is converted back to carbon dioxide and water.



Breathing is an act of taking in air, absorbing oxygen from it, releasing carbon dioxide, giving out the air (with less oxygen and more carbon dioxide). Taking in of air is called inhalation and giving out of air is called exhalation. Inhaled air contains about 21% oxygen and 0.04% carbon dioxide. The exhaled air contains 16.4% oxygen and 4.4% carbon dioxide. Breathing is performed by the respiratory system.

The main organs of the respiratory system (as shown in the figure below) are as follows:



Human Respiratory System

- (i) **Nasal Cavity:** It is present in the nose and has small hair and mucous which filters the suspended impurities in the air and also warms up the air.
- (ii) **Pharynx:** It is an opening into the oesophagus and the wind pipe. These pipes are covered with epiglottis. Inhaled air enters the pharynx and from there to the wind pipe or trachea.
- (iii) **Epiglottis:** It ensures that air passes into the trachea, and food passes into the oesophagus.
- (iv) **Trachea:** It is a tube made of cartilage rings. It is the passage through which air enters the lungs. Its walls are lined with cilia that prevent the suspended particles from being lodged in the lungs if any in the air.
- (v) **Bronchi:** It connect trachea to the lungs. Air passes through them to a large number of bronchioles.
- (vi) **Bronchioles:** They are the small narrow tubes that cover the entire area of lungs. Each bronchiole opens in to an alveolus.

(vii) **Alveoli:** They are hollow, sac like structures attached to the bronchioles. They have extremely thin walls. Each alveolus is covered by a network of capillaries. Exchange of oxygen and carbon dioxide take place between blood and air in the alveoli through these two walls (walls of the alveoli and blood capillary).

(viii) **Diaphragm:** It is a muscular organ situated beneath the lungs. It is mainly responsible for the breathing mechanism. When it contracts and moves down, the intercostal muscles also contract, which moves the rib cage up and out. The area inside the lungs increases creating a low pressure zone forcing air from outside to get in (inhalation). The expansion of diaphragm makes it go up, and intercostals muscles expand to bring the rib cage back again. The lung area is reduced and extra air inside is pushed out (exhalation).

In between inhalation and exhalation, the gaseous exchange, take place in between the lungs and the alveoli. Blood flows away from the lungs is rich in oxygen. It is sent through heart to the cells of different parts of the body for cellular respiration to take place.

Most of the animals breathe through lungs just like human beings. Cockroaches have spiracles (openings in the body) through which air enters the body into a network of trachea. Every cell gets oxygen from the trachea through diffusion. Earthworms breathe through their skin (that's why their skin should always remain moist). Frogs can breathe through their lungs as well as through their skin. Fishes have gills for breathing. They absorb oxygen dissolved in water.

Respiration in Plants

Plants don't have any special organ for respiration. Each cell has to absorb oxygen from neighbourhood by the process of diffusion. Root cells take oxygen from the soil. For the same reason, overwatering of plants is harmful for them. Plants respire day and night and consume oxygen for this purpose. But the amount of oxygen released by them in the process of photosynthesis (during the day) is much higher than the total amount of oxygen consumed by them in the process of respiration.

CIRCULATORY SYSTEM

Organisms need to transport a number of things from one part of the body to another. This requires a transport mechanism. In human beings, the transport medium is the 'blood' which is pumped into the vessels by the 'heart'. Blood is composed of a fluid medium called plasma, a pale yellow liquid which is 95% water in which proteins, hormones, glucose and carbon dioxide are dissolved. Three types of blood cells remain suspended in plasma. They are:

- (i) **Red blood cells:** These cells don't have nucleus in them. They have red coloured pigment (haemoglobin) that helps to transport oxygen (haemoglobin with oxygen forms oxyhaemoglobin).
- (ii) **White blood cells:** They have irregular shape just like amoeba. They fight against germs.
- (iii) **Platelets:** They are small cells and help make clot over the wound and prevent blood loss.

Blood flows in the blood vessels (this was first discovered by **William Harvey**). There are three types of blood vessels in our body:

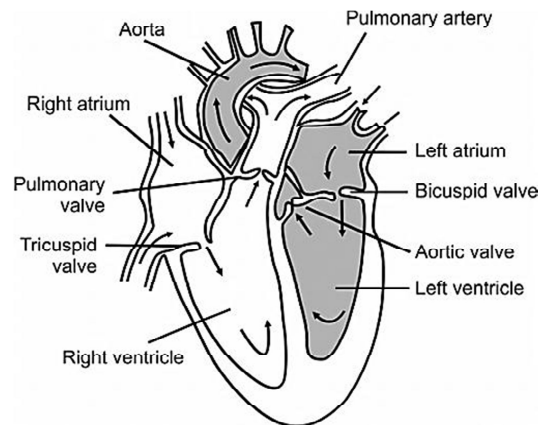
- (i) **Arteries:** They carry blood away from the heart to various parts of the body.
- (ii) **Veins:** They carry blood towards the heart.
- (iii) **Capillaries:** They are thin walled vessels that start from an artery, make a network and then join again to form a vein. Thin walls of capillaries make it easier for different substances to diffuse in and out of the blood.

Heart pumps the blood in to the arteries with pressure. This pressure is exerted on the walls of the arteries. The blood pressure of a normal human being is 120/80 mm Hg. One contraction and expansion of heart makes one beat and it can be felt in the arteries, it's called pulse rate. In a healthy person, the pulse rate is 72 per minute.

Structure of the Heart

There are four chambers in human heart – two atria and two ventricles.

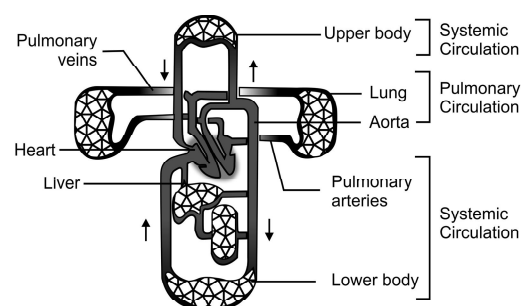
The figure given below shows the structure of human heart:



The Human Heart (Inner View)

Right atrium is connected to the right ventricle and left atrium is connected with the left ventricle. Right atrium receives deoxygenated blood from the body from two major veins. Left atrium receives oxygenated blood coming from the lungs through pulmonary veins. Atrium and ventricle of left side are separated from the atrium and ventricle on the right with the help of a muscular partition called septum. This prevents the oxygenated blood from mixing up with deoxygenated blood. When atria contract, blood flows down to ventricles through tricuspid and bicuspid (mitral) valves. When ventricles contract, blood from the right ventricle passes through pulmonary artery to the lungs carrying deoxygenated blood and blood from left atrium passes through aorta to supply oxygenated blood to the entire body including the heart.

The figure give below shows the circulation of blood in human body:



The Circulatory System in Humans

Transportation of Substances in Plants

Higher plants have vascular tissues for the transportation of water, minerals and the food to different parts. Water

is absorbed by the roots from the soil. Roots have root hair that increase the surface area in contact with the soil to absorb more water. Water diffuses up to the xylem vessels (pipe like structures) in the vascular bundles. Xylem vessels of roots, stem, leaves are all interconnected to provide a free passage to water and minerals. Carbohydrates prepared by the leaves are distributed to all the cells of the plant through phloem (another vascular tissue). Phloem has interconnected sieve tubes that do not possess nuclei. Absence of nucleus provides space for transportation of food in the sieve tube.

Plants lose a considerable part of water they absorb from the leaves (through stomata). This process is called **Transpiration**. Transpiration offers suction to the water column in xylem vessels (just like you drink cold drink with a straw). This way it helps the continuous flow of water upwards even in very tall trees.

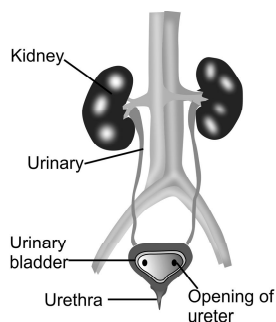
EXCRETION

There are a number of substances formed in our body which are harmful and have to be removed from the body. The process of eliminating the waste products of metabolism (such as carbon dioxide, urea, salts, and uric acid) and other non-useful materials is called excretion.

Excretory System in Humans

Human beings have an excretory system composed of a pair of kidneys, ureters (tubes that connect kidneys with the urinary bladder), urinary bladder (a muscular bag like structure with flexible walls and urethra), which opens outside the body.

The figure given below shows the urinary system in humans:



The Human Urinary System

The waste substances dissolved in blood are carried to the kidneys for filtration. During the filtration of blood, many useful things also get filtered along with the waste things. They are reabsorbed and the waste products are dissolved in water to form urine. Urine contains 95% water, 2.5% urea and 2.5% other wastes. Urine is collected from the kidneys by two tubes called ureters that open into a muscular bag called urinary bladder. When the bladder gets full, urine is passed out through urethra.

In case both kidneys of a person fail to work, blood is cleaned by a process called dialysis and a more permanent solution is kidney transplantation.

Extra salts are also removed from our skin in the form of sweat. Sweat also helps to keep the body cool in summers.

Excretory System in Animals

There are no special excretory organ in lower animals (like hydra, sponges, amoeba). Fishes and other aquatic animals excrete their waste product in gaseous form (ammonia), birds and reptiles excrete uric acid, and mammals excrete urea.

REPRODUCTION

Reproduction is necessary for the continuation of species. It may be asexual or sexual. Asexual reproduction takes place in small organisms like hydra, amoeba, paramecium etc. Hydra reproduces by budding. Animals like amoeba, paramecium reproduce by binary fission.

These days scientists have made a great progress in the field of genetic engineering. They have been successful to develop a clone of a sheep from the cells of the mammary gland. Since only one animal is needed to develop its clones, this is also an example of asexual reproduction (only one parent is needed).

Sexual reproduction needs two types of gametes, male gametes (sperms) produced in male reproductive organs and female gametes (ova) produced in female reproductive organs. Normally in animals, sperm from male and ovum from female fuses to form a zygote, which grows into a new organism. Sperms have tails which help them move towards the ovum. As many sperms are not able to reach their destination so, the

number of sperms produced is also many times more than the ova. How do sperms reach the ova and fertilize them?

Fertilisation may be external (outside the body of female) or internal (inside the body of the female).

In fishes and frogs, the fertilisation is external. Female frog lays eggs in water and male frog pours sperms over them. All the ova and sperms are encased in a jelly like substance that protects them. Fertilisation is in water and zygotes so formed hatch into tadpoles. In external fertilisation, the number of eggs produced is also more as there is always a scope of failures.

In most of the animals, the fertilisation is internal. The male deposits his sperms inside the body of the female. The sperms swim over to the ovum and the first one to reach there fertilises the egg.

Human Reproductive System

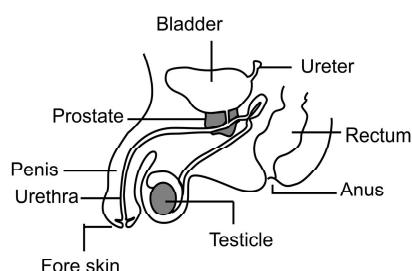
Males and females have different reproductive systems.

Male Reproductive Organs

The major parts of the male reproductive systems are:

- (i) **Testes:** They are the main reproductive organs of male body that produce sperms (male cells). They hang outside the body in scrotal sacs as they need a temperature lower than the body temperature. Testes also act as endocrine glands and produce male reproductive hormones (testosterone).
- (ii) **Prostate gland:** It secretes prostate fluid, one of the components of semen.
- (iii) **Urethra:** It is the tube that carries urine or semen. It is the continuing part of the sperm duct.
- (iv) **Penis:** It provides common passage for the urine and the semen.

The figure given below shows the parts of male reproductive system:



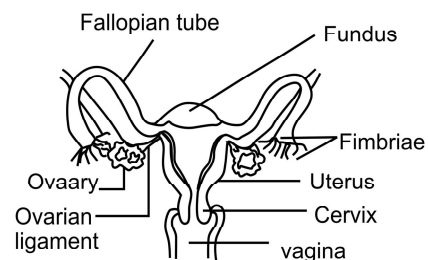
Male Reproductive System

Female Reproductive Organs

The major parts of the female reproductive organ are:

- (i) **Ovaries:** They are the main reproductive organs of female body. They produce ova. Females are born with hundreds of undeveloped female egg cells or ova (singular: ovum). These eggs are stored in the ovaries and released every month, after puberty. Unused eggs dissolve and pass out during menstruation. Ovaries also act like endocrine glands and produce hormones like estrogens and progesterone.
- (ii) **Fallopian tube:** Through the fallopian tube, egg cell travels to the uterus. Each ovary is connected to the uterus by a fallopian tube. In the fallopian tube, there are very tiny hairs called cilia, that help in the smooth passage of the matured egg to the uterus.
- (iii) **Uterus:** It is a bag like structure that appears like an inverted pear. It is held in place by ligaments and muscles. It's inner lining or the endometrium is built and shed (as menstrual fluid) periodically (28 days) till pregnancy occurs. In that case, it holds the fertilised egg till it develops fully into a baby.
- (iv) **Cervix:** It is a ring of muscle located at the lower portion of the uterus. It forms a barrier between the uterus and the vagina.
- (v) **Vagina:** It is an elastic and muscular canal that connects the cervix to the outside of the woman's body. It is the tube that receives the male organ during sexual intercourse.

The figure given below shows the parts of a female reproductive systems:



Female Reproductive System

Development of an Embryo

After fertilisation of an ovum with a sperm, a zygote is formed which starts dividing soon after. It rolls into the

uterus and gets implanted there and develops into a baby.

There are many animals that have internal fertilisation (like birds) but they reproduce by laying eggs are called 'oviparous' whereas animals that give birth to young ones are called 'viviparous'.

After Birth

The young ones of most of the animals look like their parents when they are born. But some animals have difference in the appearance of young one and the adult. For example, egg of a butterfly transforms into larva. Then it changes its appearance, becomes pupa and finally it takes the appearance of the adult butterfly. Similarly, eggs of frogs hatch into tadpoles which look totally dissimilar to adult frogs. Then they undergo 'metamorphosis' and look like adult frogs.

Adolescence and Puberty

Animals have to reach up to a certain age for reproduction. In human beings the changes appear in the body after the age of around 11 years. This age is known as adolescence or teen age (onset of puberty). The changes that come are: growth in height, body shape, voice in boys get significantly deeper, increase in mental, intellectual and emotional maturity, increased activity of sex glands, maturity of ovaries and testes, development of breast in girls, beard and moustaches in boys. All these changes are controlled by 'hormones'. Hormones are the chemicals produced by the endocrine glands that are sent to the target site by the blood. With puberty, girls start to menstruate every 28–30 days. This is the period when egg cell matures, the uterine wall

becomes thickened. If fertilisation takes place, zygote is formed and starts developing into embryo which gets implanted in the uterine wall. This is called pregnancy. In the absence of pregnancy, the inner uterine wall is shed and it comes out in the form of menstrual fluid. This menstrual phase starts at the age of 10–12 years (menarche) and goes up to 45–50 years when it stops (menopause). Adolescent children need to take care of their body by keeping it clean, eating nutritious food, doing physical exercise to stay fit and to stay away from drugs and other evils.

Sex Determination

Human cells have 23 pairs of chromosomes in each cell. Out of these one pair is the sex chromosomes. In males the sex chromosomes are of two types called X and Y. In females, both sex chromosomes are similar i.e. X and X. All egg cells contain (22 + X) i.e. 23 chromosomes. A sperm may be either (22 + X) or (22 + Y). When 22 + X egg is fertilised by 22 + X sperm, the zygote 44 + XX will develop into a girl and if 22 + X egg is fertilised by 22 + Y sperm, the zygote 44 + XY will develop into a boy.

Our body has a number of endocrine glands that produce hormones controlling various functions. Pituitary gland in the brain is the master gland. All other glands work as per the instructions of pituitary gland which secretes growth hormones as well. Growth hormones control the growth of the body (height). Thyroid gland in the neck region produces thyroxin which controls our body metabolism. Insulin secreted by pancreas controls the blood sugar level. Adrenalin secreted by adrenals controls our stress level.

PRACTICE QUESTIONS

Answer the following questions by selecting the most appropriate option.

- 1. Which of the following sets has all heterotrophs?**
 - (1) Rabbit, lion, amoeba, algae
 - (2) Mushroom, horse, snake, frog
 - (3) Elephant, peepal, rhinoceros, whale
 - (4) Lizard, sparrow, spinach, parrot
- 2. Given below are some food items:**
 - (A) Boiled and mashed potato
 - (B) Boiled and chewed rice
 - (C) A slice of bread
 - (D) Sugar solution
 - (E) Coconut oil

Which of the above will give blue-black colour when tested with iodine solution?

 - (1) A and C
 - (2) B and D
 - (3) A, B and C
 - (4) A, C and E
- 3. Which of the following have their own nitrogen fixing mechanism?**
 - (1) Mustard, sunflower, sesame
 - (2) Grams, peas, moong
 - (3) Wheat, rice, maize
 - (4) Almonds, walnuts, cashew nuts
- 4. Which of the following is a heterotrophic plant?**
 - (1) Coriander
 - (2) Cuscuta
 - (3) Coconut
 - (4) Cauliflower
- 5. The minerals required in the right amount for proper functioning of muscles are**
 - (1) Iron and calcium
 - (2) Sodium and potassium
 - (3) Iodine and fluorine
 - (4) Iron and iodine
- 6. Polio is caused by a**
 - (1) Protozoa
 - (2) Virus
 - (3) Bacteria
 - (4) Fungi
- 7. Plants appear green in colour due to**
 - (1) Photosynthesis
 - (2) Chlorophyll
 - (3) Respiration
 - (4) Transpiration
- 8. Quinine is provided by**
 - (1) Money plant
 - (2) Eucalyptus plant
 - (3) Aconite Plant
 - (4) Cinchona plant
- 9. The type of kidneys present in a frog are**
 - (1) Metanephros
 - (2) Archinephros
 - (3) Pronephros
 - (4) Mesonephros
- 10. Vaccination is**
 - (1) Innate passive immunity
 - (2) Artificial passive acquired immunity
 - (3) Artificial active acquired immunity
 - (4) Natural acquired immunity
- 11. The process of decomposing organic waste in the presence of air is termed as**
 - (1) Salvaging
 - (2) Oxidation
 - (3) Pulverising
 - (4) Incineration
- 12. Which of the following vitamins is necessary for the clotting of blood?**
 - (1) K
 - (2) C
 - (3) A
 - (4) B
- 13. Influenza virus contains**
 - (1) RNA only
 - (2) DNA only
 - (3) Both RNA and DNA in equal proportion
 - (4) DNA with very small proportion of RNA
- 14. Lungfish is a link between**
 - (1) Amphibian and birds
 - (2) Reptiles and birds
 - (3) Amphibian and reptiles
 - (4) Reptiles and mammals
- 15. Adding salt and sugar to food substances helps in preserving them for a longer duration. It is because excess salt and sugar**
 - (1) Plasmolyse the microbial cells
 - (2) Cause rupturing of microbial cells
 - (3) Cause change in the shape of microbial cells
 - (4) Remove water from food
- 16. Which of the following is the correct sequence of steps in the process of nutrition in animals?**
 - (1) Digestion, Absorption, Ingestion, Assimilation, Egestion
 - (2) Absorption, Ingestion, Assimilation, Digestion, Egestion
 - (3) Ingestion, Digestion, Absorption, Assimilation, Egestion
 - (4) Digestion, Assimilation, Absorption, Ingestion, Egestion
- 17. Green plants appear to release oxygen instead of carbon dioxide into the atmosphere during the daytime because**
 - (1) Green plants do not respire during the night time
 - (2) Green plants respire only during the night time
 - (3) Green plants respire during the day time but are involved in photosynthesis during the night time
 - (4) The rate of photosynthesis is higher than the rate of respiration during the day time

18. Muscle loss and decolouration of hair are the symptoms of

- (1) Protein deficiency
- (2) Calcium deficiency
- (3) Deficiency of Vitamin B complex
- (4) Iron deficiency

19. _____ and _____ both help to make bones and teeth strong.

- (1) Iodine; Iron
- (2) Sodium; Potassium
- (3) Calcium; Phosphorus
- (4) Sodium; Iron

20. Night blindness occurs when there is

- (1) Deficiency of vitamin B Complex
- (2) Deficiency of iron
- (3) Deficiency of vitamin K
- (4) Deficiency of vitamin A

21. Antibiotics are effective against

- (1) Dengue fever
- (2) Cholera
- (3) Influenza
- (4) Hepatitis A

22. Excess dose of which of the following vitamins is harmful to the body?

- (1) A, B, D, E
- (2) C, D, E, K
- (3) A, D, E, K
- (4) B, C, D, E

23. Which group of seeds are rich source of fats?

- (1) Mustard, sesame, gram, coriander
- (2) Groundnut, mustard, olive, sesame
- (3) Sesame, groundnut, wheat, moong
- (4) Mustard, sesame, soybean, coriander

24. The term nutrition means

- (1) Selecting good food, cooking it and eating
- (2) Intake of food, its absorption and utilisation in the body
- (3) Ensuring that all food components are included in diet
- (4) The process of digestion of food

25. The two raw materials required by green plants during photosynthesis are

- (1) Carbohydrates and oxygen
- (2) Carbon dioxide and oxygen
- (3) Carbohydrates and water
- (4) Carbon dioxide and water

26. Match the organisms in Column A with their actions in Column B

- | | |
|-------------------|----------------------|
| Column - A | Column - B |
| i. Lactobacillus | a. Nitrogen Fixation |
| ii. Protozoan | b. AIDS |
| iii. Rhizobium | c. Malaria |
| iv. Virus | d. Curd formation |

The correct matching is:

- | | | | | |
|-----|---|----|-----|----|
| | i | ii | iii | iv |
| (1) | a | d | c | b |
| (2) | d | c | a | b |
| (3) | d | a | b | c |
| (4) | a | b | c | d |

27. Malaria is caused by a

- (1) Protozoan
- (2) Virus
- (3) Bacteria
- (4) Fungi

28. Which of the following plants is a root parasite?

- (1) Palm tree
- (2) Sandalwood tree
- (3) Pine tree
- (4) Silver oak tree

29. Which one of the following represents a group of autotrophs?

- (1) Tulsi, Algae, Cuscuta (Dodder), Mushroom
- (2) Algae, Spinach, Tomato, Banana
- (3) Algae, Cuscuta (Dodder), Banana, Mango
- (4) Spinach, Mushroom, Tomato, Yeast

30. Photosynthesis is a process in which

- (1) Plants produce energy from food
- (2) Plants synthesise their food from water and minerals from soil
- (3) Green plants synthesise food using solar energy, oxygen and water
- (4) Green plants synthesise food using solar energy, carbon dioxide and water

31. Rhizobium bacteria living in the root nodules of leguminous plants helps the plant by

- (1) Absorbing water from soil for the plant
- (2) Fixing gaseous nitrogen into soluble nitrogen salts
- (3) Synthesising proteins for the plant
- (4) Making roots healthy and strong

32. The special structure that is sent to the host plant by a parasitic plant to absorb nutrients is called

- (1) Haustoria
- (2) Sporangia
- (3) Pseudopodia
- (4) Villi

33. Which of the following generates bioluminescence in living organisms?

- (1) Chlorophyll
- (2) Luciferin
- (3) Carotenoid
- (4) Betalain

34. Which one of the following is the correct sequence of the ecosystem in the order of decreasing productivity?

- (1) Mangroves, grasslands, lakes, oceans
- (2) Mangroves, oceans, grasslands, lakes
- (3) Oceans, mangroves, lakes, grasslands
- (4) Oceans, lakes, grasslands, mangroves

- 35. In grasslands, trees do not replace the grasses as a part of ecological succession because of**
(1) Limited sun light and paucity of nutrients
(2) Water limits and fire
(3) Insects and fungi
(4) None of the above
- 36. The deficiency of molybdenum in plants affects the activity of**
(1) Nitrate reductase
(2) Nitrogenase
(3) Chlorate reductase
(4) All of these
- 37. The dietary fibres are**
(1) Also called roughage
(2) Made up of cellulose and proteins
(3) Made up of collagen fibres
(4) Made up of proteins
- 38. Select from the following, a group of diseases caused by bacteria.**
(1) Chickenpox, Influenza and Polio
(2) Tuberculosis, Pneumonia and Typhoid
(3) Malaria, Polio and Typhoid
(4) Chickenpox, Meningitis and Tuberculosis
- 39. Growing a leguminous crop after harvesting a wheat crop makes the soil rich in**
(1) Nitrates (2) Calcium
(3) Potassium (4) Magnesium
- 40. Two organisms are best friends and live together. One provides shelter, water and nutrients while the other prepares and provides food. Such an association of organisms is termed as**
(1) Autotrophy (2) Parasitism
(3) Heterotrophy (4) Symbiosis
- 41. Select the correct sequence of parts in the human alimentary canal.**
(1) Mouth → oesophagus → stomach → small intestine → large intestine
(2) Mouth → stomach → oesophagus → small intestine → large intestine
(3) Mouth → oesophagus → stomach → large intestine → small intestine
(4) Mouth → stomach → oesophagus → large intestine → small intestine
- 42. Food moves in the forward direction in the alimentary canal due to**
(1) Force of gravity that is exerted on the food
(2) Repeated contraction and expansion of the muscles of the alimentary canal
(3) Pressure exerted by the food over the previously eaten food
(4) Pressure of water in the alimentary canal
- 43. Outside the nucleus, the DNA is found in**
(1) Endoplasmic reticulum
(2) Golgi bodies
(3) Mitochondria
(4) Ribosome
- 44. The maximum fixation of solar energy is done by**
(1) Green plants (2) Bacteria
(3) Fungi (4) Protozoa
- 45. Animal protein is called first class protein because it is**
(1) Delicious in taste
(2) Cheaper in the market
(3) Easily digestible
(4) Rich in essential amino acids
- 46. Reserve transcription was discovered by**
(1) Watson & Crick
(2) Har Govind Khorana
(3) Temin & Baltimore
(4) Beadle & Tatum
- 47. Pulses are obtained from the family**
(1) Liliaceae (2) Fungi
(3) Cycadaceae (4) Leguminosae
- 48. Which of the following plants shows chloroplast dimorphism?**
(1) Sugarcane (2) Sugar beet
(3) Rice (4) Wheat
- 49. Which among the following is an abiotic factor?**
(1) Moisture (2) Insects
(3) Rodents (4) Mites
- 50. Leaves of many plants are capable of folding and unfolding because**
(1) They have stomata on both sides of the leaf.
(2) They have high levels of silica.
(3) They have specialised bulliform cells.
(4) Their mesophyll is not differentiated into palisade and spongy parenchyma.
- 51. Which one of the following is an egg-laying mammal?**
(1) Duck-billed platypus (2) Kangaroo
(3) Bandicoot (4) Sloth
- 52. Which blood vessels carry pure blood from the lungs to the heart?**
(1) Cardiac artery (2) Cardiac vein
(3) Pulmonary arteries (4) Pulmonary veins
- 53. Kala-azar is transmitted by**
(1) Black fly (2) Mites
(3) Sand fly (4) Tsetse fly
- 54. Fibrinogen is converted into fibrin by**
(1) Thrombokinase (2) Thromboplastin
(3) Thrombin (4) Prothrombin

- 55. Which of the following are used to prepare the main storage (starch) form of food in plants?**
(1) Carbon dioxide and nitrogen
(2) Carbon dioxide and water
(3) Carbon dioxide and oxygen
(4) Water and oxygen
- 56. Presence of excess fluorine in water causes**
(1) Tooth Decay
(2) Respiratory disease
(3) Fluorosis
(4) Dental Cavity
- 57. Wood is a common name of**
(1) Secondary Xylem (2) Secondary Phloem
(3) Cambium (4) Primary Phloem
- 58. Which part of potato is edible?**
(1) Fruit (2) Flower
(3) Leaf (4) Stem
- 59. Cocaine is**
(1) Nerve stimulant
(2) Nerve impulse initiator
(3) Nerve depressant
(4) Nerve initiator
- 60. Transport of oxygen in human body takes place in**
(1) Body cavity (2) Alimentary canal
(3) Body fluids (4) Blood
- 61. Rate of photosynthesis is maximum in**
(1) Red light (2) Blue light
(3) Green light (4) None
- 62. In soil, nitrites are converted into nitrates by**
(1) Nitrobacter (2) Azotobacter
(3) Nitrosomonas (4) Pseudomonas
- 63. Which of the following is the vector of malaria?**
(1) Female Culex mosquito
(2) Female Anopheles mosquito
(3) Both female and male Culex mosquito
(4) Both female and male Anopheles mosquito
- 64. Name the gland which has both exocrine and endocrine functions.**
(1) Liver (2) Thymus
(3) Pituitary (4) Pancreas
- 65. Lichens are examples of**
(1) Xerophytes (2) Epiphytes
(3) Mesophytes (4) Symbionts
- 66. In the treatment of skin disease, the radioisotope used is**
(1) Radio phosphorous
(2) Radio iodine
(3) Radio lead
(4) Radio cobalt
- 67. Green plants appear to release oxygen instead of carbon dioxide into the atmosphere during the daytime because**
(1) Green plants do not respire during the night time
(2) Green plants respire only during the night time
(3) Green plants respire during the day time but are involved in photosynthesis during the night time
(4) The rate of photosynthesis is higher than the rate of respiration during the day time
- 68. Fertilisation takes place in flowering plants when**
(1) Insects sit on its flowers
(2) Pollens reach the stigma of the pistil
(3) The male nucleus from the pollen grain fuses with the female nucleus in the ovule
(4) The pollen tube carrying male nuclei reach up to the ovary
- 69. Choose the set that represents only the biotic component of a habitat.**
(1) Sand, turtle, crab, rocks
(2) Insects, frog, fish, aquatic plants
(3) Tiger, deer, grass, soil
(4) Insects, water, aquatic plants, fish
- 70. Biosphere reserves conserve**
(1) Wildlife
(2) Traditional tribal life
(3) Forest resources
(4) All of the above
- 71. Which one out of the following cell organelles is not present in an animal cell?**
(1) Nucleus (2) Golgi Body
(3) Cytoplasm (4) Cell Wall
- 72. Consider the following statements about biodiversity**
A It refers to the total number of individuals of a particular species living in an area.
B It refers to only the flora and fauna of a particular species in a given area.
C It refers to the various (variety of) species of flora and fauna present in an area.
D It is an artificially protected area for animals.
The true statement(s) about biodiversity is/are
(1) A, B and C
(2) A, C and D
(3) A and B only
(4) C only
- 73. Which out of the following hormones is responsible for the development of secondary sexual characters in boys?**
(1) Progesterone (2) Testosterone
(3) Estrogens (4) Adrenalin

- 74. Which of the following processes decrease the concentration of carbon dioxide in the air?**
(1) Respiration
(2) Photosynthesis
(3) Combustion
(4) Decomposition of dead plants and animals
- 75. Which force carries water from the ground up to the tip of a tall tree?**
(1) Root pressure (2) Osmosis
(3) Active transport (4) Transpiration pull
- 76. 'Estrogens', the female sex hormones, are produced in the**
(1) Uterus (2) Ovaries
(3) Pituitary Gland (4) Liver
- 77. Sexual reproduction happens when**
(1) Male and female organisms mate
(2) Male and female gametes are produced
(3) A new organism is born
(4) Male and female gametes fuse to form a zygote
- 78. Which of the following are present only in the animal cells?**
(1) Cytoplasm
(2) Endoplasmic reticulum
(3) Mitochondria
(4) Centrosome
- 79. Which of the following contain oxygenated blood?**
(1) Right atrium (2) Pulmonary artery
(3) Pulmonary vein (4) Right ventricle
- 80. Which of the following is not a function of blood?**
(1) Transport oxygen, carbon dioxide, hormones, metabolic wastes etc.
(2) Regulate body temperature
(3) Provide defence to the body against foreign invaders (germs)
(4) Storage of extra oxygen
- 81. Which of the following plants are mostly grown from stem cuttings?**
(1) Spinach, curry leaves, carrot
(2) Rose, sugarcane, potato
(3) Coriander, brinjal, tulsi
(4) Petunia, phlox, turnip
- 82. Which part of the flower becomes the seed on maturity?**
(1) Ovary
(2) Ovule
(3) Female gamete after fusion with male gamete
(4) The pollens
- 83. In maize seed, food is stored in the**
(1) Cotyledon (2) Seed coat
(3) Endosperm (4) Embryo
- 84. Which of the following is not a characteristic of clayey soil?**
(1) It has very fine particles.
(2) It has the highest water holding capacity.
(3) Its particles are loosely packed with large air spaces.
(4) It is almost non-porous and fails to absorb water.
- 85. What is the major excretory product in human beings?**
(1) Ammonium chloride (2) Urea
(3) Ammonia (4) Uric acid
- 86. External fertilisation takes place in**
(1) Frog (2) Hen
(3) Sheep (4) Rat
- 87. Which one of the following is different from others in terms of reproduction?**
(1) Dog (2) Hen
(3) Mouse (4) Cat
- 88. Foetus is a/an**
(1) Fertilized egg
(2) Embryo
(3) New born baby
(4) Embryo in which all the body parts can be identified
- 89. The number of chromosomes in the sperms of human beings is**
(1) 46 (2) 44 + XY
(3) 22 + X or 22 + Y (4) 44 + X or 44 + Y
- 90. Pancreas of a person is not secreting sufficient amount of insulin. What disease is that person suffering from?**
(1) Diabetes (2) Anxiety
(3) Goitre (4) Dwarfism
- 91. Micro-organisms help the dead plants to produce**
(1) Sand (2) Mushrooms
(3) Humus (4) Wood
- 92. The process of respiration is**
(1) Taking in of oxygen rich air and giving out carbon dioxide rich air
(2) Producing energy from the food inside the cells, with or without oxygen
(3) Distributing food and oxygen to the cells
(4) Diffusion of oxygen from air in the alveoli to blood in the capillaries
- 93. Which features do polar bears adapt to live in an extremely cold climate?**
(1) A white fur, fat below skin, keen sense of smell
(2) Thin skin, large eyes, a white fur
(3) Small eyes, strong claws, white large paws
(4) White body, paws for swimming, extra gills for respiration

94. Root cap is absent in

- (1) Xerophytes (2) Hydrophytes
(3) Mesophytes (4) Halophytes

95. What would you say about a person whose blood pressure is 120/80 mm Hg and the pulse rate is 72?

- (1) The person is suffering from hypertension and must visit a doctor.

- (2) There is a little problem with the heart; should take rest.
(3) The person is absolutely healthy.
(4) The person is weak; should take a nutritious diet.

ANSWERS AND EXPLANATIONS

1. (2) Mushroom is a non-green plant and all others are animals that are heterotrophs. In rest of the options at least one plant (autotroph) has been mentioned.
2. (1) The food items containing starch gives blue-black colour with iodine solution. Starch is found in food items like potatoes, bread, rice, etc.

Boiling the food does not kill the starch. So when we test boiled and mashed potatoes for the presence of starch, it would give a positive test. A slice of bread also contains starch. So, it will also give blue-black colour with iodine solution. Chewed rice would not give positive test for starch because the rice is mixed with saliva. In saliva, the digestive enzyme—salivary amylase is present, which breaks down starch into sugar. Sugar doesn't give positive test with iodine solution. Coconut oil does not contain starch. So, it does not give blue-black colour with iodine.
3. (2) Grams, peas and moong are all leguminous plants that have root nodules. These nodules have nitrogen fixing bacteria (Rhizobium) that fix gaseous nitrogen of the air into nitrates. None of the other options belong to this category.
4. (2) Cuscuta is a parasite. It draws its food from the stem of the host plant with the help of haustoria. Other options are all autotrophs.
5. (2) The minerals required for proper functioning of muscles are sodium and potassium. Iodine plays a role in the functioning of thyroid gland. Iron helps in the formation of haemoglobin in red blood cells while fluorine helps in preventing dental caries. Calcium is important for making teeth and bones strong.
6. (2) Polio is a viral disease that is caused by the infection of polio virus. Humans get infected by the virus by consuming food or water infected by the virus.
7. (2) Plants appear green in colour due to chlorophyll, a green pigment, which absorbs red light and reflects green light in the light spectrum.
8. (4) Quinine is a medicine that is used to treat malaria and is extracted from the cinchona plant.
9. (4) Mesonephros serves as a temporary kidney in aquatic vertebrates such as frogs.
10. (3) A vaccination refers to the dispensing of antigenic material to trigger an individual's immune system to develop adaptive immunity to a pathogen. It is an artificially acquired active immunity.
11. (4) Incineration refers to the waste treatment process that combusts the organic substances present in waste materials. Incineration is also known as 'thermal treatment'.
12. (1) Vitamin K, a fat-soluble vitamin, is essential for the coagulation of blood. It also helps in building strong bones, preventing heart disease and fighting against cancer by slowing the growth of cancer cells.
13. (1) Influenza virus contains only RNA which includes six genera namely, Influenza virus A, Influenza virus B, Influenza virus C, Isa virus, Thogotovirus and Quarantavirus.
14. (3) Lungfish respire through both gills (when in water) and lungs (when on land). It is characterised as an important evolutionary link between amphibians (respire through gills) and reptiles (respire through lungs).
15. (1) Excess salt and sugar make the medium highly concentrated. When a living cell is kept in this concentrated medium, it loses water from its cytoplasm and gets shrunk. This is called plasmolysis. Adding excess salt or sugar to food plasmolyses the microbes and kills them. This helps our food to remain preserved for a long time.
16. (3) The food is first taken in (ingestion). It is then digested with the help of digestive enzymes. The digested food is absorbed and sent to all the cells for use (assimilation). The waste left in the alimentary canal is passed out of the body (egestion).
17. (4) The rate of photosynthesis is higher than the rate of respiration during the day-time. The green plants respire 24 hours a day at an almost constant rate. The rate of photosynthesis in plants decreases in the morning and evening. There comes a time when the amount of oxygen produced by the plants in photosynthesis is used up in respiration and the amount of carbon dioxide produced in respiration is used in photosynthesis. So, the net result is plant is neither taking any gas from the air nor releasing any gas. This is called the compensation point.
18. (1) Muscles and hair are made of proteins. So, protein

deficiency results in muscle loss and decolouration of hair. Calcium deficiency mainly affects bones and teeth (though it also affects the working of muscles), deficiency of vitamin B complex causes weakness in muscles and fatigue, deficiency of iron causes general weakness and fatigue.

- 19.** (3) Calcium and phosphorus both help to make bones and teeth strong. Iodine (in thyroxin) affects body metabolism, iron (in haemoglobin) helps in the better supply of oxygen to the body, sodium and potassium together maintain the electrolyte balance.
- 20.** (4) The deficiency of vitamin A causes night blindness as it keeps the retina healthy. Vitamin B complex keeps nerves and muscles healthy, iron maintains the level of haemoglobin in the blood, vitamin K helps in blood clotting.
- 21.** (2) Cholera is the only bacterial disease in this list. Antibiotics destroy bacteria by dissolving their cell wall or the cell membrane. They are not effective against viruses because they don't have any structures of their own. They use the cells and cell organelles of the host for their biochemical functions and reproduction.
- 22.** (3) Vitamin A, D, E and K all these are fat soluble. They dissolve in fats and get stored in the liver for a long time. Their extra quantity in the body causes hypervitaminosis. Water soluble vitamins are removed from the body through kidneys if taken in greater amounts.
- 23.** (2) Groundnuts, mustard, olive and sesame, all are rich in fat. Gram, moong and soybean are rich sources of proteins.
- Coriander is rich in minerals and vitamins.
- 24.** (2) Nutrition means intake of food, its absorption and utilisation in the body. Though we use this term for the food we eat, it actually means eating, digesting, absorbing and utilising the food for different purposes (assimilation). The remaining three options give only incomplete meanings of nutrition.
- 25.** (4) Carbon dioxide and water are the two raw materials required for the process of photosynthesis. Carbohydrates and oxygen are its end products.
- 26.** (2) Lactobacillus is a bacteria and it helps in the formation of curd from milk. Malaria is a protozoan disease caused by a protozoan parasite, Plasmodium. Rhizobium is a bacteria found in the root nodules of leguminous plants where it helps in nitrogen fixation. AIDS is a viral disease caused by HIV (Human Immunodeficiency Virus).
- 27.** (1) Malaria is caused by a protozoan called 'Plasmodium'. This parasite spreads through a vector found in the saliva of female anopheles mosquito and when a person is bitten by such a mosquito, the protozoans (plasmodium) is injected into the body with the saliva. It multiplies in the red blood cells and causes malaria.
- 28.** (2) Sandalwood tree is a root parasite. Its roots spread to reach nearby trees under the soil where it sends its haustoria in their roots and absorbs their food and minerals.
- 29.** (2) Algae, spinach, tomato and banana are all autotrophs. Cuscuta is a parasite and mushroom is a saprophyte.
- 30.** (4) Photosynthesis is a process in which green plants synthesise food using solar energy, carbon dioxide and water. Oxygen is an end product of photosynthesis, not a raw material.
- 31.** (2) Rhizobium bacteria help the plants by fixing gaseous nitrogen into soluble nitrogen salts. They don't absorb water for the plants, nor do they synthesise proteins. They have no contribution in making roots healthy and strong, rather they depend on plants for their food, water and place to live.
- 32.** (1) Haustoria are root-like structures in parasitic plants that penetrate the host plant's root or stem and get nutrients from them. Sporangia are spore producing bodies in fungi. These spores are carried by the air at different places and they grow to form a new colony of fungi wherever they find a suitable place (having food and moisture). Pseudopodia or the false feet are main characteristics of amoeba. They take out pseudopodia wherever and whenever they need to move and to capture food. Villi are the folds in the inner surface of small intestine that help to increase the surface area for better absorption of food.
- 33.** (2) Luciferin is a light emitting compound that induces bioluminescence in living organisms such as fireflies, snails and squids.
- 34.** (1) The correct sequence of ecosystems in a decreasing order of productivity of organic matter, that is, biomass production, is: mangroves, grasslands, lakes and oceans.
- 35.** (2) Grasslands are grass ecosystems where there is not

enough rainfall to sustain a forest. In the grasslands, trees do not replace the grasses as a part of an ecological succession because of limitation of water and frequent forest fires in such regions.

- 36.** (1) Molybdenum deficiency affects the activity of Nitrate reductases. These are essential enzymes for nitrate metabolism, which reduce nitrates to nitrite.
- 37.** (1) Dietary fibres are also called roughage. They are largely made up of cellulose that human beings are not able to digest. Their function is to increase the bulk of food and help it in moving smoothly in the alimentary canal. Roughage in the food helps us prevent the problem of constipation.
- 38.** (2) The diseases caused by bacteria include tuberculosis (by *Mycobacterium*), typhoid (by *Salmonella typhi*) and pneumonia (by *Streptococcus pneumoniae*), etc. Pneumonia can also be caused by virus and fungi.
- 39.** (1) Nitrates as the leguminous plants have nitrogen fixing bacteria in their root nodules. For rest of the nutrients (if soil is deficient in them), compost manure or chemical fertilisers may be added.
- 40.** (4) In symbiotic association, two organisms live together to obtain benefits from one another. For example, lichens are the symbiotic association between algae and fungi in which the fungal partner provides shelter, water and nutrients to the algae and in return the algal partner prepares food by photosynthesis for fungi.

Autotrophic organisms prepare their own organic food from inorganic components. Parasites

get their food from the bodies of other living animals (their hosts). Heterotrophic organisms obtain food directly or indirectly from plants.

- 41.** (1) The food ingested by humans passes from the mouth to the stomach via oesophagus (food pipe). From the stomach, the food passes to the small intestine where it is completely digested and absorbed. The undigested food passes into the large intestine from where some water and salts are reabsorbed. From the large intestine, the faecal matter passes to rectum for egestion.
- 42.** (2) Food moves in the forward direction in the alimentary canal due to repeated contraction and expansion of the muscles of the alimentary canal. This movement is called 'peristaltic movement'.
- 43.** (3) Outside the nucleus, DNA is found in mitochondria. Mitochondria are an organelle, like nucleus, which are found inside the cell.
- 44.** (1) The maximum fixation of solar energy is done by green plants through a process called photosynthesis. Plants convert light absorbed through solar energy into chemical energy in photosynthesis.
- 45.** (4) Protein from animals is termed as first-class protein because it is rich in essential amino acids, some of which even the human body cannot produce.
- 46.** (3) Reverse transcription was discovered by Howard Temin and David Baltimore in the year 1970. They were awarded the Nobel Prize for Medicine or Physiology in 1975 for their efforts.
- 47.** (4) Pulses are obtained from the family of Leguminosae. Pulses

are rich in protein and fibre. Some common types of pulses are chickpeas, lentil edible beans, etc.

- 48.** (1) Sugarcane shows signs of chloroplast dimorphism. Chloroplast dimorphism is the presence of bundle sheath along with chloroplast in leaves lacking in starch.
- 49.** (1) Moisture is an abiotic factor as it is a non-living thing, which influences an ecosystem and organisms.
- 50.** (3) Bulliform cells are epidermal cells of monocot plants that help in folding and unfolding of leaves to regulate the water supply.
- 51.** (1) The duck billed platypus is an egg laying mammal. It is found in eastern Australia and Tasmania.
- 52.** (4) The pulmonary veins receive oxygenated blood from the lungs which subsequently drains into the left atrium of the heart. These veins carry pure blood to the heart.
- 53.** (3) Kala-azar, also known as black fever, is transmitted by sand flies. The disease affects the liver, spleen and the bone marrow. The symptoms of kala-azar are fatigue, weight loss, anemia, fever and swelling of the spleen and the liver.
- 54.** (3) Thrombin converts fibrinogen into fibrin strands during blood coagulation.
- 55.** (2) Plants use carbon dioxide and water to make a sugar called glucose. The glucose is converted into starch and stored by the plants.
- 56.** (3) Fluorosis is caused by the presence of excess fluoride in water. Fluorosis refers to the hypomineralisation of tooth enamel which causes tooth decolouration.

57. (1) Wood or plant tissue is the common name of the secondary xylem. Secondary xylem transport water and minerals in plants.
58. (4) The stem part of a potato is edible. This stem is also known as a tuber. Potato is a root crop which means that it is grown underground.
59. (1) Cocaine is a nerve stimulant which is mostly used as a recreational drug to induce a feeling of euphoria, energy and motor activity. It is also used for medical purposes, such as numbing or reducing the rate of bleeding.
60. (4) Transportation of oxygen in the human body takes place through blood.
61. (1) Plants are green in colour because of the pigment chlorophyll which absorbs the red light in an efficient manner converting the light into energy for the plant. This is the reason why the rate of photosynthesis is highest in red light.
62. (1) In soil, nitrites are converted into nitrate by bacteria of the genus Nitrobacter. This process is called Nitrification and it is a part of the nitrogen cycle in soil.
63. (2) Only female anopheles mosquitoes are a vector of malaria as it needs to feed on blood, preferably that of humans and cattle, in order to lay eggs.
64. (4) Pancreas has both endocrine and exocrine functions. Its endocrine function is to produce the hormones insulin and glucagon. The exocrine function of the pancreas helps the digestive system in the processing of proteins, fats and carbohydrates in food.
65. (2) Lichens are examples of epiphytes—which are plants that grow on other plants absorbing nutrients from air and rain. They are not parasitic in nature.
66. (1) Radio phosphorous is an isotope that is used in the treatment of skin cancer. It is used for identifying malignant tumours. Cancerous cells tend to accumulate more phosphate than normal cells which help in their detection.
67. (4) It is true that green plants release more oxygen than carbon dioxide during day time. The reason for this is that photosynthesis occurs in plants during day time and its rate is higher than the rate of respiration.
- The carbon dioxide released by the plants during day time is absorbed by the plants for photosynthesis; thus, the amount of net carbon dioxide released by the plants during day time in atmosphere is negligible. Plants release oxygen during photo-synthesis which is used for respiration by animals as well as by the plants.
68. (3) The male nucleus from the pollen grain fuses with the female nucleus in the ovule. All other options (1), (2), and (4) are the stages that lead to stage (3). There is no fertilisation without the fusion of a male and a female gamete.
69. (2) There are two components of habitat, i.e., biotic and abiotic. The abiotic components include all the non-living things like water, air, rocks, soil and sand. The biotic components include all the living things like animals, plants, insects and micro-organisms.
70. (4) Biosphere reserves are the areas that help in conserving the biodiversity and also promote the sustainable use of resources. They also protect the culture of the areas along with protecting all the species of flora and fauna of the area.
71. (4) Cell wall is the correct option. Plant cells have a definite shape and they are rigid because of the cell wall. It is made of cellulose and pectin and is responsible for giving structural support to the cell and protects it from mechanical stress.
72. (4) Biodiversity refers to all the varieties of various species that are present in an ecosystem. It includes all the species of flora and fauna in a given area. It is a natural habitat of plants and animals.
73. (2) Testosterone is the male sex hormone that controls the development of secondary sexual characters in boys. Progesterone and estrogens are female sex hormones. Adrenalin hormone is stress controlling hormone secreted by adrenal glands.
74. (2) Photosynthesis uses carbon dioxide as a raw material and releases oxygen.
- Carbon dioxide + Water → Glucose + Oxygen
- Respiration, aerobic as well anaerobic, both release carbon dioxide.
- Glucose + Oxygen → **Carbon dioxide** + Water (Aerobic respiration)
- Glucose → Ethyl alcohol + **Carbon dioxide** (Anaerobic respiration)
- Combustion of wood, coal etc. also gives out carbon dioxide.
- Glucose + Oxygen → **Carbon dioxide** Decomposition of dead plants and animals also produces carbon dioxide, ammonia, methane etc.

- 75.** (4) Transpiration pull is created when water evaporates from the surface of the leaves and a low pressure zone is created. This is filled by water coming up in the xylem vessels in the veins of the leaves.
- Water is absorbed from the soil by osmosis. It reaches the xylem vessels through various cells by the process of osmosis. Water accumulated in the roots creates an upward pressure that is called root pressure. Root pressure is not sufficient to push water in tall trees. Active transport is the movement of molecules across a cell membrane from a region of lower concentration to a region of higher concentration against the concentration gradient using energy. It has nothing to do with upward movement of water.
- 76.** (2) Ovaries produce estrogen. These hormones control the secondary sexual characters in females, regulate the menstrual cycle and development of endometrium (uterine lining).
- Uterus does not produce estrogens, pituitary gland controls the production of estrogens by ovaries through FSH and LH but do not produce estrogens. Liver has no role in the production of hormones.
- 77.** (4) Only mating of male and female is not sufficient. Their male and female gametes should fuse to form zygote. Again production of male and female gametes doesn't imply sexual reproduction unless they fuse. A new organism may be formed by asexual reproduction also.
- 78.** (4) Centrosomes are present only in the animal cells and they help in spindle formation during cell division.
- 79.** (3) Pulmonary veins that bring blood to the left atrium from the lungs contains oxygenated blood. All the rest have deoxygenated blood.
- 80.** (4) We don't have any mechanism of storing extra oxygen in our body. It has to be regularly taken from the air. All other options are the functions of blood in our body.
- 81.** (2) Rose, sugarcane and potatoes are normally grown from stem cuttings. All the rest are grown from their seeds.
- 82.** (2) The ovule on maturity becomes the seed. The ovary becomes the fruit. Female gamete on fusion with male gamete forms zygote which develops into the embryo. Pollens do not form the seeds.
- 83.** (3) In monocots, there is only one cotyledon that is mostly rudimentary and does not store food. The food is stored in the endosperm. This food is used by the embryo to grow into a plant after which it synthesises its own food by the process of photosynthesis. Seed coat is a thin covering of the seed and does not store food.
- 84.** (3) Particles of clay are very small and tightly packed. They don't even allow water to pass through them easily. Therefore, (3) is not a characteristic of clayey soil.
- 85.** (2) Human beings excrete urea as a major metabolic waste. Fishes excrete ammonia, birds and reptiles excrete uric acid.
- 86.** (1) Female frog produces lots of eggs and delivers them on the shallow side of the pond over which the male frog delivers its sperms. This cluster of eggs and sperms gets enclosed in a jelly like mass and fertilisation takes place externally. In rest of the animals (hen, sheep and rat) the fertilisation is internal.
- 87.** (2) Hen is different from all others as it is oviparous, i.e., it lays eggs while all others are viviparous i.e. they give birth to the young ones.
- 88.** (4) An embryo in which all the body parts can be identified is called a foetus.
- 89.** (3) A sperm has half the number of chromosomes that an ordinary body cell has. Similarly ovum also has half the number of cells. When sperm and ovum fuse, the number of chromosomes again comes out to be the same as in other body cells. In human beings males have two different types of sex chromosomes in their cells (X and Y) while females have similar chromosomes (X and X). So, a female has 44 + XX chromosomes in her cells and a male has 44 + XY chromosomes in his cells. Since the number of chromosomes is half in ova and sperms, all ova will be the same (22 + X) while sperms will be of two types (22 + X or 22 + Y).
- 90.** (1) Diabetes is a disease in which the body is not able to control sugar level in the blood and sugar exceeds the normal range causing harmful effects of other tissues and body organs. Anxiety is a state of mind which is controlled by hormone adrenalin. Goitre is a condition in which neck protrudes out due to enlargement of thyroid gland and the person becomes lazy and lethargic due to less production of hormone thyroxin. Dwarfism is a condition caused by under secretion of the growth hormone by pituitary gland.
- 91.** (3) Humus is the decomposed organic matter, rich in nutrients and good for the growth of plants.

- 92.** (2) Respiration implies production of energy from food. Usually the food is 'glucose' and it gets oxidised by oxygen and energy is produced and stored in the form of ATP. Respiration also takes place in the absence of oxygen and the products are either ethyl alcohol and carbon dioxide or lactic acid and carbon dioxide. Option (1) is in fact the breathing process, option (3) is transportation (mostly through blood) and option (4) is also a part of breathing in which gaseous exchange takes place between alveoli and the blood in the capillaries.
- 93.** (1) Adaptive features of polar bear for living in extremely cold climates are:
Presence of white fur on its body for insulation and camouflage
Presence of a layer of fat under the skin for providing insulation
Strong sense of smell that helps in detecting prey from large distances
- Strong legs for walking and swimming
- 94.** (2) Root cap refers to the tissue found at the tip of the root. All terrestrial plants possess root cap. Hydrophytes (plants found in water) lack root cap because the roots in these plants are very poorly developed due to availability of plenty of water.
- 95.** (3) The blood pressure of a normal, healthy person is 120/80 mm Hg and the pulse rate is 72.

6

PHYSICS

MOTION

Motion is the change of position of an object with respect to another object or a reference point. It is described in terms of the distance moved or the displacement.

Depending on the changing velocity of an object, its motion could be uniform or non-uniform. There are mainly three types of motions – rectilinear (in a straight line), circular (in a circular path) and periodic (to and fro like a pendulum).

$$\text{Speed of a moving object} = \frac{\text{Distance covered while moving (in meters)}}{\text{Time taken (in seconds)}}$$

While the speed of an object is the distance covered per unit time, its velocity (speed in a given direction) is the displacement per unit time. The SI unit of speed is metre per second (m/s) or kilometre per hour (km/h).

The acceleration of an object is the change in velocity per unit time. Cars and other vehicles have 'odometers' that show the distance travelled by the vehicle.

The motion of an object moving with a constant speed has a straight line graph (distance-time).

NEWTON'S LAWS OF MOTION

Newton gave three basic laws of motion, which describe the relation between a body, the force acting upon it and the body's motion in response to that force.

First Law

A body continues to be in its state of rest or of uniform motion along a straight line unless it is acted upon by some external force to change the state. It is also called the law of inertia.

Second Law

The rate of change of momentum of a body is directly proportional to the external force applied on the body. This change always takes place in the direction of applied force.

If a body of mass m , moves with velocity v , then its linear momentum can be given by $p = mv$

If force F is applied on a body and acceleration produced in the body is a , then $F = ma$

Force = Mass \times Acceleration

Third Law

To every action, there is always an equal (in magnitude) and opposite (in direction) reaction.

FORCE

Force applied to an object may be in the form of a pull or a push. It requires at least two objects to interact. Force has magnitude as well as direction. Force can stop a moving object, change the speed of it, or even change the direction of motion or shape of it.

Two or more forces applied in the same direction add to one another, while forces acting opposite to one another tend to nullify the effect of one another. The net force acting on a body would be the difference in sum of the forces acting on the opposite sides.

Force can be applied by direct contact with the body; e.g., using muscular force or due to friction (when the surface of an object comes in contact with the surface of another). These are called **contact forces**.

Forces can also be applied without coming in contact with the object like attraction or repulsion by a magnet, electrostatic forces or moving of an object towards the force of gravity. These are called **non-contact forces**.

PRESSURE

Force applied per unit area is called pressure. For the same amount of force, more the area in contact, less is the pressure, i.e.

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

On the walls of a container, the fluids (liquids and gases) inside it exert pressure. Pressure at the base of the container is more (more fluid over it exerts more pressure) than the pressure at the top of it. Air exerts pressure around us, which is known as atmospheric pressure. We do not feel the pressure of air over us because the air inside our body has an equal pressure to that of the outside air.

FRICTION

The force of friction is caused when irregularities of two surfaces in contact get interlocked. The smoother the

surfaces, the less is the friction. Static friction occurs when an object at rest is pushed or pulled. Once it starts moving, the friction is less as particles don't get enough time to get interlocked. This is called sliding friction. So, sliding friction is less than static friction. The force that slows down the rolling of a ball or wheel is called rolling friction. Since rolling is easier than sliding, rolling friction is less than sliding friction.

Friction, if desired, can be increased by making surfaces more uneven or rough; for example, the sole of shoes and the tyres of a vehicle are treaded to increase friction.

Birds and fish have streamlined bodies to cut across air and water currents. Aeroplanes and ships are also made streamlined for the same reason.

Friction can be reduced by the use of lubricants.

Advantage of friction

Friction helps hold things, write on a surface, light a matchstick, move on a road, drive vehicles, etc.

Disadvantage of friction

Friction is the cause of wear and tear of machineries, problems in movement in air and water.

SOUND

Sound is produced by vibrating objects. All musical instruments produce sound only when their stretched strings or membranes vibrate. In human beings, sound is produced in the larynx, an organ present at the mouth of wind pipe. It has two vocal cords, and sound is produced when these vocal cords vibrate.

Sound needs a medium (solid, liquid or gas) to travel. It cannot travel in vacuum. Sound travels faster in liquids and solids than in gases (air). Human ear is a specially designed organ that helps us hear the sounds around us. The outer part of ear is funnel-like, which collects sound vibrations and transmits them inside the ear. These vibrations in turn vibrate the eardrum (at the end of ear canal). From there, the vibrations are passed over to three little bones and then the inner ear. From the inner ear, vibrations are felt by the nerves, and signals are sent to the brain. The brain deciphers the sounds as meaning the same thing by being flexible enough to adapt new information into existing frameworks.

Vibrations are to and fro or back and forth motion of the particles of an object. This to and fro motion is called oscillation. The number of oscillations or vibrations per second is called the frequency of oscillation. Its unit of measurement is hertz (Hz). If an object oscillates once in a second, its frequency is 1Hz.

The maximum displacement or distance moved by a point on a vibrating body measured from its equilibrium position is amplitude. The larger the amplitude of vibration, the louder is the sound.

The following figure shows the amplitude of vibration (oscillations):

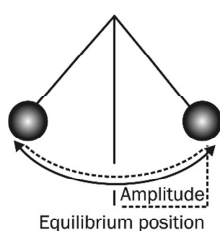


Figure 1: Amplitude of Vibrations

Loudness of sound is directly proportional to the square of amplitude of the sound producing vibrations. If we double the amplitude, the loudness will increase four times. The loudness is expressed in a unit called decibel (dB).

Shrillness or pitch of sound depends on the frequency of vibration. The higher the frequency of vibration, the higher is the pitch and shriller is the sound. We cannot hear sound if its frequency is less than 20 vibrations per second (20 Hz) or more than 20,000 vibrations per second (20 KHz). The audible frequency range of human ear is from 20Hz to 20,000 Hz.

Sounds that are unpleasant to hear are called noise. The excessive or unwanted sounds causing health problems are called noise pollution. Too much noise and for too long creates tension, anxiety, hypertension, sleeplessness, deafness, etc. Efforts should be made to create less noise. Suggestions to reduce noise pollution are playing music/TV at low volume, not honking unnecessarily on roads, moving noise-producing factories away from residential places, and growing trees along the roadsides

and other places where more sound is produced (as trees are known to be good barriers of noise).

LIGHT

Light is a form of energy. Light is not visible but objects illuminated by it are visible to us. There are certain objects that emit light. They are called luminous objects, e.g., Sun, stars, burning candle, torch, bulb, etc. The objects that do not emit light are called non-luminous objects; e.g., chair, table, etc.

Non-luminous objects can be of three types:

- **Opaque objects:** Objects that do not allow light to pass through them. For example, apple, furniture, etc.
- **Transparent objects:** Objects that allow light to pass through them, and we can see through these objects clearly. For example, glass, diamond, etc.
- **Translucent objects:** Objects that allow light to pass through them partially. For example, butter paper, thin sheet of plastic, etc.

Light travels in a straight line. When an opaque object comes in the path of light, it does not allow light to pass through it. The area behind the object where light does not fall remains dark and forms shadow. It is seen only on the screen, on the wall at the back, on the ground or any other surface that is behind the object.

Pinhole camera can be made with simple materials and can be used to image the Sun and brightly lit objects. Images of objects seen in the pinhole camera are inverted.

Reflection of Light

A mirror alters the direction of light falling on it. This is called reflection of light. Mirror reflection shows us undimmed images. Images and shadows are very different. Images are clear and true reflections of the object, whereas shadows give a vague idea of the shape of the object and are always black.

Any surface that is polished or shining acts as a mirror.

Some surfaces reflect light more than the others. Reflection from smooth and polished surfaces is called 'regular reflection' (as in the case of plane mirrors in our dressing tables). Diffused or irregular reflection is reflection from a rough surface such as clothing, paper, etc.

Light is reflected in a set pattern from the surface of a mirror. A ray of light falling on the mirror is called the incident ray and the ray of light reflected back from the mirror is called the reflected ray. The angle between the incident ray and the normal line is called the angle of incidence, and the angle between the reflected ray and the normal line is called the angle of reflection.

Laws of Reflection

The figure below shows the laws of reflection:

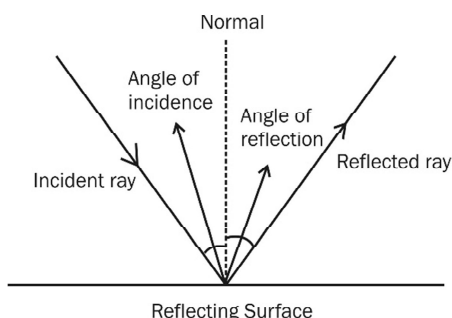


Figure 2: Laws of Reflection

The measure of angle of incidence and angle of reflection is equal.

Incident ray, reflected ray and the normal drawn at the point of incidence to the reflecting surface lie in the same plane.

All reflecting surfaces (whether smooth or rough, plane or spherical) follow the laws of reflection.

We use plane mirror in our dressing table. We cannot obtain the image formed in the plane mirror on a screen and the image that cannot be obtained on a screen is called a virtual image. Image formed in a plane is virtual, erect and of the same size. But it is laterally inverted, i.e. the left side appears to be on the right and the right side appears to be on the left. The image behind the mirror is equidistant to the object in front of it.

Multiple images are formed when two mirrors are inclined to each other at an angle. Even when two

mirrors are standing parallel to each other (with reflective faces towards each other), a number of images are formed. Multiple reflections are beautifully seen in a kaleidoscope (in which three mirror strips are placed inclined to each other and multiple images of coloured glass pieces are formed).

A real image is that which can be obtained on a screen.

Spherical Mirrors

Spherical mirrors have curved reflective surfaces. They are cut out of spherical objects. The figure below shows the reflecting surfaces of concave and convex mirrors:

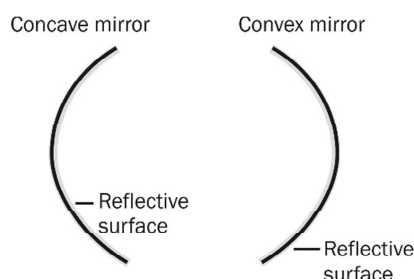


Figure 3: Reflecting Surface of Concave and Convex Mirrors

The centre of the sphere from which the mirror has been cut is called the centre of curvature. The line that passes through the centre of curvature and touches the middle point on the mirror (at 90°) is called the principal axis.

The following figure shows the centre of curvature and principal axis of mirror:

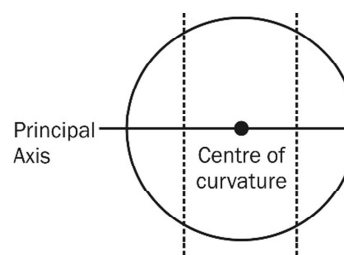


Figure 4: Principal Axis and Centre of Curvature of Spherical Mirror

The point at which the principal axis touches the mirror is the pole 'P' of the mirror. Distance between the centre of curvature and the pole is called the radius of curvature (R). The point on the principal axis where a parallel beam of light falling on the mirror gets focussed is called the focus point (f). Its distance from pole (P) is called focal length of the mirror. The focal length is half of the radius of curvature.

The figure below shows the focal length of the spherical mirror:

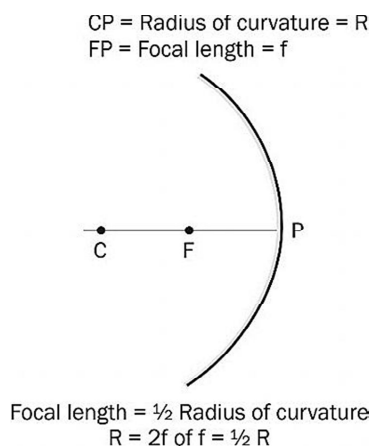


Figure 5: Focal Length of Spherical Mirror

A concave mirror forms real and inverted images. However when the object is placed very close to the concave mirror, the image formed is virtual, erect and magnified (It is visible inside the mirror only). Concave mirror plays an important role in our daily life as it is used by dentists, in the reflectors of torches, headlights of cars, etc.

Convex mirrors forms an image that is erect, virtual and smaller in size than the object. Therefore, they are used as car's and scooter's side mirrors.

Mirror formula

The distance of an object from the pole P is represented by 'u' and the distance of image from P is represented by 'v'. 'u', 'v' and focal length (f) are related as $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$.

This is called mirror formula. If we know any two of these variables, we can find the third.

Magnification (magnification of image with respect to object)

If h and h' are the heights of the object and the image, respectively, then the magnification m produced by a spherical mirror is given by:

$$m = \frac{\text{Height of the image (h')}}{\text{Height of the object (h)}} \text{ or } m = \frac{h'}{h}$$

In terms of object and image distances, $m = \frac{-v}{u}$

Refraction of Light

Light travels through transparent substances. Most of the times, the densities of two substances are different (the substance through which it has come and the substance in which it is entering). The difference between densities of substances changes the speed of light (It is faster in rarer substances and slower in denser substances). That is why when it enters from one medium (substance) to the other medium, it bends its path (depending on whether it is moving from denser to rarer medium or rarer to denser medium). This is called the refraction of light. A ray of light travelling from a rarer medium to a denser medium slows down and bends towards the normal, and the one moving from a denser medium to a rarer medium bends away from the normal.

Laws of Refraction

All refracting substances obey the following laws of refraction:

The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane.

The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media. (Snell's Law of Refraction).

If i is the angle of incidence and r is the angle of refraction, then

$$\frac{\sin i}{\sin r} = \text{constant}$$

This constant value is known as the refractive index of the second medium with respect to the first and is written as n_{21} .

$$n_{21} = \frac{\text{Speed of light in medium 1}}{\text{Speed of light in medium 2}} = \frac{v_1}{v_2}$$

Absolute refractive index of a medium is its refractive index with respect to vacuum or air.

$$n_m = \frac{\text{Speed of light in air}}{\text{Speed of light in medium}} = \frac{c}{v}$$

Lenses

A piece of transparent material that refracts light and produces images is known as lens. Mainly, there are two types of lenses:

Convex lens: The lens which are thicker at the centre than at the edges

Concave lens: The lens that are thinner at the centre than at the edges

The following figure shows the two types of lenses:

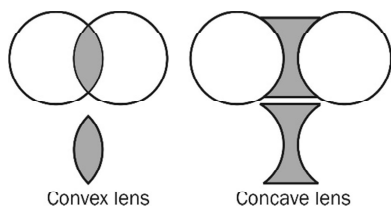


Figure 6: Types of Lenses

Terms Related to Lens

Principal axis: The imaginary line that passes through the centres of the spheres of which the lens is a slice.

Vertical axis: The line that divides the lens longitudinally into two equal halves.

Optical centre (O): Central point in the lens where principal axis and vertical axis meet.

Focal point: The point at which a parallel beam of light coming through the lens converges. If it is a concave lens, then the focal point is the point where the diverging rays meet when traced back. Lenses have two focal points, which are represented by F1 and F2.

Focal length: The distance between the focal point and the optical centre of a lens is called its focal length. It is represented by the letter F.

Centre of curvature: Centre of the sphere of which a lens is supposed to be the slice. It is also written as 2F since it is at double distance from O as compared to F.

The figure below shows the terms related to lens:

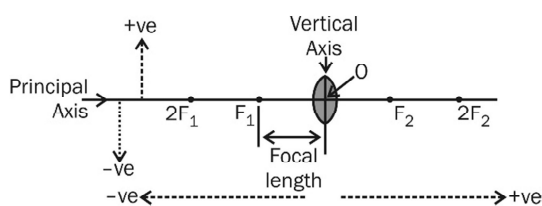


Figure 7: Terms Related to Lens

Lens formula

The distance of an object from optical centre O is represented by 'u' and the distance of image from O is represented by 'v'. 'u', 'v' and 'f' are related as $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$. This is called lens formula. If we know any two of these variables, we can find the third.

A real and inverted image is formed by a convex lens. Magnifying glasses are convex lenses. A virtual, erect and magnified image is formed when the object is placed very close to the lens. The image formed by a concave lens is erect, virtual and smaller than the object.

In fact, all surfaces reflect light.

Magnification: (magnification of image with respect to the object)

If the height of the object and the height of image are h and h', respectively, then the magnification m produced by a lens is given by

$$m = \frac{\text{Height of image (h')}}{\text{Height of object (h)}} \text{ or } m = \frac{h'}{h}$$

In terms of object and image distances, $m = \frac{v}{u}$

Power of Lens

Power of lens is the degree of convergence or divergence of light rays by the lens. It is reciprocal of its focal length and is represented by the letter P.

The power P of a lens of focal length f is given by $P = \frac{1}{f}$

The SI unit of power is 'diopetre'. If focal length is measured in meters, then power is measured in dioptres. Convex lens has positive power, and concave lens has negative power. If more than two lenses are joined together, their powers get added.

Given table shows the positions, sizes and nature of images formed by different mirrors and lenses:

Table: Positions, Nature and Sizes of Images formed by different Lenses and Mirrors

Position of the object	Position of the image	Relative size of the image	Nature of the image
Concave Mirror			
At infinity	At the focus F	Highly diminished	Real and inverted

Position of the object	Position of the image	Relative size of the image	Nature of the image
Beyond C	Between F and C	Diminished	Real and inverted
At C	At C	Same size	Real and inverted
Between C and F	Beyond C	Enlarged	Real and inverted
At F	At infinity	Highly enlarged	Real and inverted
Between P and F	Behind the mirror	Enlarged	Virtual and erect
Convex Mirror			
At infinity	At the focus F behind the mirror	Highly diminished, point-sized	Virtual and erect
Between infinity and the pole P of the mirror	Between P and F behind the mirror	Diminished	Virtual and erect
Convex Lens			
At infinity	At focus F ₂	Highly diminished	Real and inverted
Beyond 2F ₁	Between F ₂ and 2F ₂	Diminished	Real and inverted
At 2F ₁	At 2F ₂	Same size	Real and inverted
Between F ₁ and 2F ₁	Beyond 2F ₂	Enlarged	Real and inverted
At focus F ₁	At infinity	Highly enlarged	Real and inverted
Between focus F ₁ and optical centre O	On the same side of the lens as the object	Enlarged	Virtual and erect
Concave Lens			
At infinity	At focus F ₁	Highly diminished, point-sized	Virtual and erect
Between infinity and optical centre O	Between focus F ₁ and optical centre O	Diminished	Virtual and erect

STRUCTURE OF HUMAN EYE

Our eye has a convex-lens held by the ciliary muscles. It is fitted into a spherical ball like structure having three

membranes. The innermost layer is retina. The portion of the lens to be exposed to light is regulated by iris, which also determines the eye colour. The image of the object is formed on the retina at the back of the lens. We perceive the image through optic nerve and brain.

The figure below shows the structure of human eye:

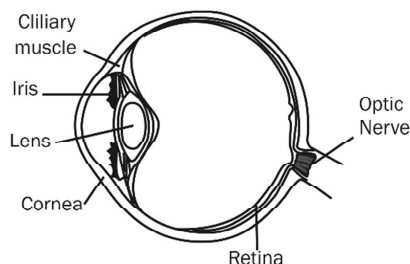


Figure 8: Structure of Eye

The impression of an image remains on the retina for about $\frac{1}{16}$ seconds. If a number of still images are flashed at our eyes at a fast rate, we see them in continuity as a movie. A normal eye can see nearby and distant objects clearly. The comfortable distance at which we can place a book to read is 25 cm. But this distance varies with age as our eyes become weak. If there is a problem with the vision, it can be corrected by the use of corrective lenses.

We should take care of our eyes by taking due precautions and eating a balanced diet rich in vitamins and minerals.

Some people are visually challenged. They have low vision or some of them are not able to see at all. Other senses of visually challenged persons are more sharply developed to improve their interaction with their surroundings. Even visually challenged persons can read and write by using Braille system, which is a tactual aid, i.e. which uses touch sensation.

The crab has small eyes but can look all around. Owls have a very good night vision, but they can't see much during the day. Owls and other nocturnal animals have abundance of rod cells (sensitive to light) in their retina and less number of cone cells (that perceive colour). Kites and eagles have sharp eye sights, but they can't see during the night.

Dispersion of Light

Light is made up of seven colours (VIBGYOR). When white light passes through a prism, it breaks into seven colours. Splitting of light into its constituent colours is known as dispersion.

MAGNETS

Magnets are used in daily-use objects like refrigerator, doors of almirahs, pin holders, pencil boxes, etc. Magnetic rocks found in nature (natural magnet) are called **magnetite**. These days, magnets are prepared from iron in different shapes. They are called **artificial magnets**. They attract objects made of iron, nickel and cobalt. These metals are called magnetic materials. If a material is not attracted by the magnet, then it is a non-magnetic material.

The power of attracting magnetic objects by a magnet is concentrated on its poles. The two poles of a magnet have been named as '**North pole**' and '**South pole**'. If a magnet is suspended freely with the help of a thread, it aligns itself in the **north-south direction**. This property of magnets is very useful as we use it for finding directions while flying an aeroplane or going to deep forests or sailing in the middle of a sea. A magnetic needle is mounted on a dial having directions mentioned on it. This instrument is called a **compass**.

Magnets have a magnetic field around them. Similar poles of two magnets **repel** and opposite poles **attract** each other. We can prepare a magnet from an iron bar by repeatedly moving a magnet along its sides. If magnets are dropped, heated or hammered, they lose their magnetic property. Magnets should be kept in pairs with their opposite poles on one side separated by a wooden piece, and two pieces of soft iron should be placed across their ends to protect their magnetic property.

Magnets should be kept away from cassettes, mobiles, television, music system, compact disks (CDs) and the computer because all these things also have magnets in them and tend to get demagnetised.

ELECTRICITY

Electricity is the most widely used source of energy in our households. Most of the appliances work by using

current supplied by the main line. There are many things like clock, torch, cameras, etc., that work on the electric cells. In an electric cell, the chemical energy is converted into electric energy. When chemical of the cell is used up, it stops working. An electric cell consists of a positive (+) and a negative terminal (-). When the cell is in use in an electric circuit, the current passes from one terminal to the circuit and back to the other terminal of the cell. Positive terminal of cell should never be directly joined to negative terminal of the cell as it rapidly consumes all the energy and the cell gets wasted.

The following figure shows the terminals of an electrical cell:

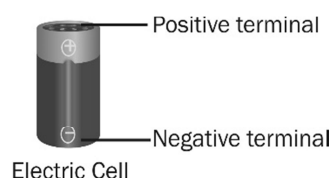


Figure 9: An Electric Cell

A single cell has the voltage of 1.5 volts. When a higher voltage is required, two or more cells are joined together. This is called a battery. In a battery, positive terminal of one cell is connected to the negative terminal of the second cell and so on. The domestic supply of electricity in India has a voltage of 220V.

Electric circuit is a closed path in which current flows out of the cell, passes through various conductors on the way and comes back to the other terminal of the cell. If the continuity is broken, the current stops moving.

The following figure shows the continuous flow of current:

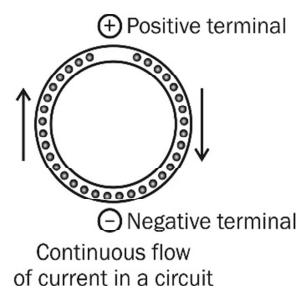


Figure 10: Flow of Current

An electric bulb may be joined in the circuit. The currents passing through the bulb heats its filament and it starts glowing giving out light. The bulb works as long as

filament is intact. If the filament is broken, the bulb does not work. We may control the circuit with the help of a switch. Different electric components may be depicted by symbols.

The figure below shows the components of an electric circuit:

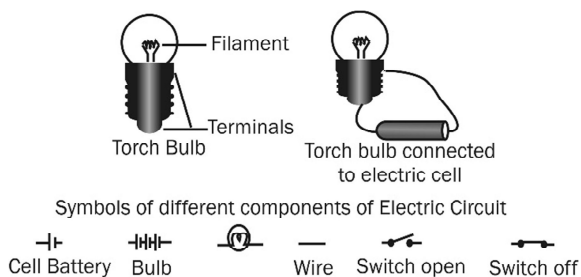


Figure 11: Different Components of an Electric Circuit

Conductors are the materials that allow electric current to pass through them. For example, metals and graphite. The materials that do not allow electric current to pass through them are called insulators. For example, rubber and wood.

When current passes through a conductor, it makes it hot. Filament of the bulb gets heated to such an extent that it starts glowing and becomes a source of light. These days, different types of bulbs are being used out of which CFL and LED are the most common. LED is even better than CFL as it is more efficient (consumes less energy) and does not contain mercury.

Wires of some metals melt quickly. They are useful for the purpose of circuit breakers, i.e. whenever there is a short circuit and more heat is produced, they melt and the circuit is broken. This saves from a bigger damage. When heating is desired (electric iron, heater), those metals are used that do not melt easily (copper, nichrome, tungsten).

A current carrying wire behaves like a magnet. We can make electromagnets by flowing current into a coil of insulated wire wrapped around a piece of iron. It becomes an electromagnet and shows magnetic properties as long as current flows through it. Electromagnets are widely used in various appliances (electric bell, toys, cranes, medical diagnostic machines).

Like heating effect and magnetic effect, current also has a chemical effect. Liquids also conduct electricity. Some

liquids are good conductors of electricity (tap water, salt water, lemon juice) and some are poor conductors (distilled water, honey). Liquids that conduct electricity are mostly the solutions of acids, bases or salts. An electric current passing through a conducting liquid results in a chemical reaction. They may break a substance into two new substances (Water is broken down to hydrogen and oxygen gases) or they may cause deposition of metal (by taking it out of its salt in the solution). Electroplating is the process of depositing a layer of any desired metal on another material, by means of electricity.

NATURAL PHENOMENON

The atmosphere around us is full of air. It is everywhere. An empty glass is actually full of air. We cannot see air, but we can feel it. The air contains nitrogen (78%); oxygen (21%); and 1% is made of carbon dioxide (0.04%), few other gases like argon, methane, ozone, water vapour and dust particles. Moving air is called wind.

Air around us exerts pressure. We don't feel this pressure as the air pressure inside our body is the same as that of the outside air. Increased wind speed reduces air pressure. Oxygen is essential for all living organisms. During respiration, plants and animals take in oxygen and give out carbon dioxide. Carbon dioxide of the air is used by green plants during the day to prepare food by the process of photosynthesis. Plants need water also for this process and release oxygen, which compensates for the oxygen used in respiration. Air is present in the soil and dissolved in water (good for water animals like fish). Air is required by birds and other flying objects. It helps in dispersal of seeds and in water cycle.

Air Pollution

The introduction of unwanted substances in air that cause harmful effects on both the living and the non-living is known as air pollution. Common air pollutants are burning of fuels like wood, coal, etc. automobile exhausts, factories, power plants, etc. Air pollution causes respiratory problems. Carbon monoxide, produced when coal, petrol or diesel is burnt in less oxygen, is a highly poisonous gas. It combines with

haemoglobin of the blood and oxygen supply to the body is stopped causing death. In winters, smoke and fog combine to form smog, which causes asthma, cough and wheezing in children and elderly people. Sulphur dioxide and nitrogen dioxide released into the air by industries are harmful gases and a major cause of acid rain. Chlorofluorocarbons coming from refrigerators, air conditioners and aerosol sprays damage the ozone layer and allow ultraviolet rays to enter our atmosphere and cause diseases like cancer. Increasing amount of carbon dioxide in the air does not allow heat waves to escape from our atmosphere, thus causing a rise in temperature. This is called 'green house effect'. Deforestation, overpopulation, industrialisation, etc., are all contributing to the green house effect, and it is resulting in global warming. Glaciers from high mountains have started melting and water level in the seas is slowly increasing. If this continues, many areas near the sea will be engulfed in water. We should use cleaner fuels and go for reforestation drives to minimise air pollution.

Air expands on heating and contracts on cooling. Warm air being lighter in weight rises up, while cooler air tends to sink towards the Earth's surface. Due to the rising of warm air, the air pressure at that place is reduced and the cooler air moves to that place. This is the basis of air current. Main cause of wind movements is the uneven heating of air on the Earth. Land breeze and sea breeze are formed due to uneven heating of air on land and water. Monsoon winds are also due to unequal heating of air on land and the oceans. Sometimes, the intensity of such phenomenon increases to dangerous limits, and disasters like thunderstorms and cyclones are created.

Thunderstorms

Storms accompanied by lightning are called thunderstorms. In such conditions, one should not take shelter under an isolated tree or under an umbrella with a metallic end.

A safe place to take shelter is a car or a bus.

Cyclones

High-speed winds (moving air) and air pressure difference are the causes of cyclones. Cyclones are usually disastrous and cause heavy losses to life and

property. With the help of advanced technologies like satellites and radars, it has become easier to monitor cyclones. The best way to protect ourselves from cyclone is self-help, so it is better to plan and be prepared in advance of an approaching cyclone.

Lightning

Some objects can be charged by rubbing them with other objects. There are two kinds of charges – positive charge and negative charge. Likely charged bodies (bodies having the same charge) repel each other and unlikely charged bodies (bodies having different charges) attract each other. The electrical charges produced by rubbing are called static charges.

When charges move, they constitute an electric current. An electroscope may be used to detect whether a body is charged or not. Earthing is the process in which charge from a charged object is transferred to the Earth.

The process of electric discharge between clouds and earth or between different clouds causes lightning. Lightning strike could harm life and property.

Lightning conductors can protect buildings from the effects of lightning.

During a thunderstorm, stay inside the house, or a car or bus with windows and doors of the vehicle shut. Open vehicles are not safe.

In a forest, shorter trees are safe to take shelter. In an open field, avoid contact with all trees, poles or other metal objects. Avoid contact with telephone cords, electrical wires and metal pipes. Use mobile phones and cordless phones; electrical appliances like computer, TV, etc., should be unplugged.

Earthquake

An earthquake is a sudden shaking or vibration of earth's surface. Disturbance deep inside earth's crust causes an earthquake. It is not possible to predict the occurrence of an earthquake.

Earthquakes tend to occur at the boundaries of earth's plates. These boundaries are known as fault zones. Richter scale is used to measure the destructive energy of an earthquake. The earthquake can cause severe damages to life and property if it measures 7 or more on

Richter scale. We should take necessary precautions to protect ourselves from earthquakes.

Stars and the Solar System

Since we can see only that part of the Moon which reflects the light of the Sun towards us, the phases of the Moon occur. Stars are celestial bodies that emit light of their own. Our Sun is also a star. It is convenient to express distances of stars in light years. The solar system consists of one star (Sun), eight planets, and a large number of asteroids, comets and meteors. The brightest planet in the night sky is Venus and the largest planet of the solar system is Jupiter.

Stars seem to move from east to west. Actually, they don't move, the planets (except Uranus and Venus) move

from west to east. Uranus and Venus move from east to west. From the Earth, the pole star appears to be stationary as it is situated close to the direction of the axis of rotation of the Earth. The groups of stars that appear to form recognisable shapes are constellations. Satellite is a body revolving around another body. Some planets have natural satellites; for example, natural satellite of the Earth is Moon.

The artificial satellites revolving around the Earth are much closer than the Moon.

They are used for weather forecasting, long distance communication and remote sensing.

PRACTICE QUESTIONS

Answer the following questions by selecting the most appropriate option.

- 1. Friction is a**
 - (1) Gravitational force
 - (2) Magnetic force
 - (3) Contact force
 - (4) Non-contact force
- 2. Which one of the following can be used to form a virtual and magnified image of an object?**
 - (1) Both convex mirror and convex lens
 - (2) Both concave mirror and convex lens
 - (3) Concave lens only
 - (4) Convex lens only
- 3. Which organ of our body vibrates to produce sound?**
 - (1) Vocal sacs
 - (2) Vocal cords
 - (3) Larynx
 - (4) Pharynx
- 4. The pressure in a fluid that is at rest**
 - (1) Acts only in vertical direction
 - (2) Acts in all directions
 - (3) Acts only in downward direction
 - (4) Acts only sideways
- 5. Buildings are protected from lightning by installing**
 - (1) Miniature circuit breaker
 - (2) Lightning conductor
 - (3) Electroscope
 - (4) Resistance
- 6. Which was the first commercial portable computer?**
 - (1) IBM 5000
 - (2) IBM 5100
 - (3) IBM 5110
 - (4) IBM 5120
- 7. The technology used in an electronic printer is called**
 - (1) Micro technology
 - (2) Micro millimetre
 - (3) Micro array
 - (4) Micro encapsulation
- 8. For a missile launched with a velocity less than the earth's escape velocity, the total energy is**
 - (1) Zero
 - (2) Negative
 - (3) Either positive or negative
 - (4) Positive
- 9. The amount of oxygen and carbon dioxide in the air is**
 - (1) 23%, 3%
 - (2) 21%, 4%
 - (3) 21%, 0.04%
 - (4) 23%, 0.4%
- 10. Which type of magnet is used in an electric bell?**
 - (1) Bar magnet
 - (2) Cylindrical magnet
 - (3) Electromagnet
 - (4) Button magnet
- 11. Impression of an image persists on the retina of human eye for about**
 - (1) 1 second
 - (2) $\frac{1}{2}$ second
 - (3) $\frac{1}{15}$ second
 - (4) $\frac{1}{25}$ second
- 12. Which instrument is used to measure wind speed?**
 - (1) Lux meter
 - (2) Geiger counter
 - (3) Anemometer
 - (4) Altimeter
- 13. A fuse wire is characterised by**
 - (1) Low resistance and high melting point
 - (2) High resistance and high melting point
 - (3) Low resistance and low melting point
 - (4) High resistance and low melting point
- 14. X-rays can be used**
 - (1) To detect defects in precious stones and diamonds.
 - (2) For cutting and welding of metals.
 - (3) To detect heart diseases.
 - (4) To detect gold under the earth.
- 15. The velocity of sound in moist air is more than in dry air because the moist air has**
 - (1) Less pressure than dry air
 - (2) Less density than dry air
 - (3) More pressure than dry air
 - (4) More density than dry air
- 16. The basic unit of speed is**
 - (1) km/min
 - (2) m/min
 - (3) km/s
 - (4) m/s
- 17. Seema walks 20 meters east, 10 meters south, 20 meters west and finally 10 meters north. How much distance has she covered and how much is the displacement?**
 - (1) Distance = 60 m, displacement = 60 m
 - (2) Distance = 60 m, displacement = 30 m
 - (3) Distance = 60 m, displacement = 0 m
 - (4) Distance = 0 m, displacement = 0 m
- 18. Sportsmen use shoes with spikes to**
 - (1) Increase friction
 - (2) Decrease friction
 - (3) Increase their height
 - (4) Improve their look

- 19. Rainbow has (Choose the incorrect statement)**
(1) Red light as its outermost colour towards sky
(2) Red light as its innermost colour towards earth
(3) Violet light as its innermost colour towards earth
(4) Its curvature is bent towards earth
- 20. A cyclist in a circular motion should lean**
(1) Forward
(2) Backward
(3) Sideways towards the centre
(4) Sideway away from the centre
- 21. The monitor of a computer is**
(1) An input device (2) An output device
(3) A storage device (4) A processing device
- 22. In which of the following cases of motion are the distance moved and the magnitude of displacement equal?**
(1) A car moving on a straight road
(2) A car moving in a circular path
(3) A pendulum oscillating to and fro
(4) The Earth revolving around the Sun
- 23. An air bubble inside water behaves like a**
(1) Concave lens (2) Convex lens
(3) Plano-convex lens (4) Concave mirror
- 24. If a person sitting in an open jeep moving at constant velocity throws a pebble vertically up into the air, then which of the following is correct?**
(1) The pebble will fall outside the jeep.
(2) The pebble will fall in the jeep ahead of the person.
(3) The pebble will fall in the jeep to the side of the person.
(4) The pebble will fall exactly in the hand that threw it up.
- 25. A ripe mango falls from the mango tree on the ground. Which force brought mango down on earth?**
(1) Contact force (2) Friction
(3) Pressure (4) Non-contact force
- 26. Which of the following is a typical semi-conductor?**
(1) Platinum (2) Germanium
(3) Mica (4) Quartz
- 27. Cathode rays are**
(1) Electromagnetic waves
(2) Radiations
(3) Stream of α -particles
(4) Stream of electrons
- 28. The door of the refrigerator left a little open closes by itself due to the**
(1) Electrostatic force (2) Gravitational force
(3) Magnetic force (4) Muscular force
- 29. Which of the following activities is due to non-contact force?**
(1) A bullock cart moving on the road
(2) A blacksmith beating hot iron with a hammer
(3) Raindrops falling on earth
(4) Flying birds coming down to sit on the tree
- 30. If the forces acting on a moving object are balanced, then the object will**
(1) Come to rest immediately
(2) Keep moving as it was
(3) Move at uniform acceleration
(4) Change its direction of motion
- 31. What type of friction is offered by a ball bearing?**
(1) Sliding friction (2) Static friction
(3) Rolling friction (4) Fluid friction
- 32. A fully loaded milk van running quite fast has to stop abruptly in the middle of the road. What do you expect would happen to the milk in the van?**
(1) It will splash out in the forward direction.
(2) It will splash out in the backward direction.
(3) It will jump upwards.
(4) Nothing will happen.
- 33. Fuse wire should have**
(1) High resistance, high melting point
(2) High resistance, low melting point
(3) Low resistance, high melting point
(4) Low resistance, low melting point
- 34. A moving cycle can be easily balanced. This can be explained by the law of conservation of**
(1) Angular momentum
(2) Linear momentum
(3) Rotational kinetic energy
(4) Translational potential energy
- 35. A charged comb attracts small pieces of paper. Which force is being exerted by the comb on the pieces of paper?**
(1) Magnetic force (2) Electrostatic force
(3) Muscular force (4) Gravitational force
- 36. Which characteristic of sound helps the doctor hear the sound of patients' heartbeat in stethoscope?**
(1) Total internal reflection
(2) Diffused reflection
(3) Multiple reflection
(4) Dispersion
- 37. LED and CFL are very commonly used as sources of light in homes. Which of the following statements is true?**
(1) CFL is better because LED contains toxic materials.
(2) LED is better because CFL contains toxic materials.

- (3) Both are equally good.
(4) Neither of them is good because both contain toxic materials.
- 38. Rays of light bounce back after they strike a mirror. This is called**
(1) Reflection of light
(2) Rectilinear propagation of light
(3) Refraction of light
(4) Dispersion
- 39. The image formed in a plane mirror is**
(i) Virtual
(ii) Inverted
(iii) Of the same size as the object
(iv) Laterally inverted
(v) Real
(1) v, iii, ii (2) i, iii, iv
(3) ii, iv, v (4) iii, i, ii
- 40. Rear view mirrors of cars, scooters, etc., are actually**
(1) Concave mirrors (2) Convex lenses
(3) Convex mirrors (4) Plane mirrors
- 41. Lunar eclipse can be seen only on the**
(1) New moon day
(2) Full moon day
(3) First Sunday of every month
(4) First day of the months as per Indian calendar
- 42. Which of the following is most shrill in nature?**
(1) Sound of drum
(2) Sound of cow
(3) Sound of beetle
(4) Sound of children
- 43. When the velocity of a body is doubled**
(1) Its momentum is doubled
(2) Its acceleration is doubled
(3) Its kinetic energy is doubled
(4) Its potential energy is doubled
- 44. A bag is dropped from an aeroplane flying horizontally at a constant speed. Neglecting air resistance, where will the aeroplane be when the bag reaches the ground?**
(1) Behind the bag
(2) Data is not sufficient
(3) Directly above the bag
(4) Ahead of the bag
- 45. The thickest pin in a three pin plug is**
(1) Live pin (2) Terminal pin
(3) Neutral pin (4) Earth pin
- 46. Radius of curvature of a concave mirror is always**
(1) Perpendicular to the mirror
(2) Forms an angle of 60° at its centre
(3) Parallel to the mirror
(4) Forms an angle of 90° at its centre
- 47. A mirror is forming real and inverted images of objects. What type of mirror is it?**
(1) Convex mirror (2) Concave mirror
(3) Plane mirror (4) Any of these
- 48. Which of the following does not use concave mirrors?**
(1) Solar heater
(2) Flash light
(3) Rear-view mirror in car
(4) Dentist
- 49. Which of the following metals is non-magnetic?**
(1) Nickel (2) Copper
(3) Cobalt (4) Iron
- 50. Which of the following is the law of inertia?**
(1) Newton's first law of motion
(2) Newton's second law of motion
(3) Law of conservation of momentum
(4) Newton's third law of motion
- 51. When two or more cells are joined together, they form a**
(1) Circuit (2) Battery
(3) Ammeter (4) Voltmeter
- 52. Which of the following gases does not contribute to acid rain?**
(1) Sulphur dioxide (2) Nitrogen dioxide
(3) Carbon dioxide (4) Nitrous oxide
- 53. Among the following quantities, which one has dimensions different from the remaining three?**
(1) Product of voltage and charge per unit volume
(2) Angular momentum per unit mass
(3) Energy per unit volume
(4) Force per unit area
- 54. Richter scale is a unit of measuring**
(1) Distance between the Earth and stars
(2) Intensity of a thunderstorm
(3) Intensity of an earthquake
(4) Air pressure
- 55. There are two planets in our solar system which rotate from east to west. These planets are**
(1) Uranus and Neptune
(2) Mercury and Uranus
(3) Venus and Uranus
(4) Mercury and Venus
- 56. Which one of the following is not a conductor of electricity?**
(1) Distilled water (2) Vinegar
(3) Lime juice (4) Salt water
- 57. We are not crushed under the weight of atmosphere because**
(1) The pressure inside our body is equal to the atmospheric pressure and cancels the pressure from outside.

- (2) The pressure inside our body is more than atmospheric pressure.
(3) The pressure inside our body is more than atmospheric pressure and cancels the pressure from outside.
(4) The pressure inside our body is less than atmospheric pressure.
- 58. Select the correct statement regarding rods and cones in the human eye.**
(1) Cones are sensitive to dim light.
(2) Cones are sensitive to bright light.
(3) Rods can sense colour.
(4) Rods are sensitive to bright light.
- 59. Light year is a unit of**
(1) Current (2) Distance
(3) Time (4) Light
- 60. The moderator used in a nuclear reactor is**
(1) Radium (2) Ordinary water
(3) Graphite (4) Uranium
- 61. If the pressure over a liquid increases, its boiling point**
(1) Decreases
(2) Increases
(3) Does not change
(4) First decreases and then increases
- 62. When electric current is passed through a metallic conductor, the amount of heat produced in the conductor depends on its**
(1) Material and length only
(2) Length and thickness only
(3) Material and thickness only
(4) Material, length and thickness
- 63. Lateral inversion takes place in**
(1) Plane mirror (2) Concave mirror
(3) Convex mirror (4) All types of mirrors
- 64. The ultrasound equipment used for investigating medical problems work at a frequency**
(1) Below 20 Hz
(2) Between 20 Hz and 200000 Hz
(3) Between 2000 Hz and 20000 Hz
(4) Above 20000 Hz
- 65. The least penetrating power ray is**
(1) α -Ray (2) γ -Ray
(3) X-ray (4) β -Ray
- 66. Electric current is measured using**
(1) Wattmeter (2) Ammeter
(3) Voltmeter (4) Anemometer
- 67. The antiparticle of a photon is**
(1) Positron (2) Anti-photon
(3) Photon (4) Antineutrino
- 68. 'Cryogenics' is the study of**
(1) Superconductors
(2) Production of fuels
(3) Low temperature
(4) High temperature
- 69. To prevent damage from lightning, lightning conductors are used on tall structures. The lightning conductor**
(1) Should be in the form of a vertical rod
(2) Can be of any shape
(3) Should be made of a good conductor like copper with sharp-pointed edges
(4) Should be made of a good conductor but can be of any shape
- 70. Infrared radiations are detected by**
(1) Nanometer (2) Photometer
(3) Spectrometer (4) Pyrometer

ANSWERS AND EXPLANATIONS

1. (3) The force responsible for changing the state of motion of objects in contact is called the force of friction. It always acts on all moving objects.
2. (4) A virtual image refers to an optical image that is formed by the superficial divergence of light rays from a point such as that formed by plane mirror.
Virtual images can be formed only in case of convex lens when the distance between the object and lens is less than the focal length of lens. In case of concave lens, only real images are formed.
3. (2) A pair of vocal cords inside the larynx vibrates when air passes through them, and sound is produced.
4. (2) Pressure in a fluid that is at rest acts in all directions and in an equal magnitude.
5. (2) A lightning conductor is a sharp metal rod fitted at the top of a building to save it from lightning strikes.
6. (2) IBM 5100 was the first portable computer that was made available commercially in 1975. It was developed at the IBM Palo Alto Scientific Center.
7. (1) Micro technology is used for compact and technical devices such as electronic ink-jet printers.
8. (2) When a missile is launched with a velocity less than the escape velocity of the earth, the sum of its kinetic energy and potential energy is negative.
9. (3) The percentages of gases in air is as follows: nitrogen (78%), oxygen (about 21%) and argon (almost 1%). Other molecules are present in very small quantities.
10. (3) An electromagnet is a coil of wire wound around an iron core. Electromagnets are used in electric bells.
11. (3) On the retina of the human eye, the impression of image persists for about $\frac{1}{15}$ or $\frac{1}{16}$ second.
12. (3) Anemometer is a measuring instrument used in meteorology to measure wind speed. The first anemometer was invented by Leon Battista Alberti in 1450.
13. (3) A fuse wire is characterised by low resistance and low melting point. This wire has low resistance so that the maximum amount of current can pass through it, while a low melting point ensures that the fuse wire melts when high current passes through it.
14. (4) X-rays can be used to detect gold in ore samples by the use of a technique known as gamma activation analysis, which scans mineral samples using high-energy x-rays. These high-energy x-rays are similar to those used to treat patients in hospitals.
15. (2) The velocity of sound in moist air is more than in dry air because moist air has less density than dry air as water vapour is lighter than dry air. The velocity of sound is inversely proportional to the density of the medium.
16. (4) Speed is distance travelled per unit time. The SI unit of speed is m/s or km/h.
17. (3) Distance covered by Seema is $20 + 10 + 20 + 10 = 60$ m.
- Since she has reached the place from where she started, so her displacement is zero.
18. (1) The force of friction between the shoes and the ground increases with the help of spikes, and this gives sportsmen a better grip while running.
19. (2) In a rainbow, red colour is on the outer part and violet is on the inner side. Rainbows are caused by the refraction phenomena.
20. (3) When a cyclist in a circular motion tends to move on a curved path, frictional forces come into play between the tyres and the road. Due to this friction force (centripetal force), the cyclist leans sideways towards the centre.
21. (2) A computer monitor is an output device that functions as an electronic visual display. Modern computer monitors use liquid crystal display (TFT-LCD) or a flat panel LED display while older monitors made use of cathode ray tubes.
22. (1) The distance travelled by a body is equal to the magnitude of displacement only when the body follows the shortest distance (travelling in a straight line) between its initial and final positions.
23. (1) An air bubble in water will behave as a concave lens (diverging lens). This can be observed by passing a ray of light through the air bubble. The light entering the bubble will spread out or diverge. In case of convex lens, the light rays converge or get together meeting at a single point.
24. (4) The horizontal component of velocity is same for both the

- jeep and the pebble, so they cover equal horizontal distances in any given interval of time.
25. (4) The mango was drawn to the Earth by the gravitational force, which is a non-contact force.
26. (2) Germanium is a lustrous, greyish-white metalloid which is a semi-conductor. It is similar to tin and silicon.
27. (4) Cathode rays are a stream of electrons that are discharged from the cathode of a high-vacuum tube.
28. (3) The door of the refrigerator has magnetic strip that creates force of attraction between the refrigerator and the door. So, the door automatically closes.
29. (3) Raindrops fall on the Earth due to Earth's gravitational force, which is non-contact in nature. In rest of the options, muscular force is being used, which is a contact force. Bullock moves due to muscular force of the bulls; blacksmith is using muscular force to beat the iron; birds use muscular force (wings attached to pectoral muscles) to fly.
30. (2) It will keep moving as it was. When balanced forces act on a body, it keeps on being in the same state of rest or motion (no force, no change).
31. (3) Ball bearing converts the sliding friction into rolling friction and facilitates the motion of wheels or machines.
32. (1) The milk will splash forward. This is due to inertia. When the van was moving, milk was also in the state of motion. When the van stopped suddenly, milk still in the state of motion splashed out in the forward direction.
33. (4) A fuse wire should have low resistance and a low melting point. Low resistance so that maximum amount of current can pass through it and a low melting point to ensure that the fuse wire melts when high current passes through it.
34. (1) In physics, angular momentum refers to the rotational analog of linear momentum. The law of conservation of angular momentum states that unless an external torque acts upon the angular momentum of an object, the angular momentum of the object remains constant.
35. (2) Electrostatic force develops in the comb when it is rubbed with a cloth.
36. (3) The sound waves keep on reflecting from one side of the tube to the other till they reach the ears of the doctor. The stethoscope was invented in France in 1816 by René Laennec.
37. (2) LED is energy-efficient and more environment-friendly than CFL because it does not contain mercury (toxic substance), which is found in CFL.
38. (1) Rectilinear propagation of light means light moving in a straight line. In refraction, light passes from one medium to another and in this process, it gets deflected. Dispersion is splitting of light into its constituent colours.
39. (2) A plane mirror forms a virtual, erect, of the same size as the object and laterally inverted image. A concave mirror forms a real and inverted image.
40. (3) Images formed by convex mirrors are erect, virtual and diminished in size, so they are used as rear-view mirrors of cars, scooters, etc.
41. (2) A lunar eclipse occurs when the moon directly passes behind the Earth into its shadow and this can happen only when the Earth, Moon and Sun are exactly aligned or are very close so that Earth is in the middle; therefore, lunar eclipse can occur only at the night of a full moon day.
42. (4) The sounds of drum, cow and beetle have low frequency as compared to the sound of children, which has a high frequency and so is very shrill in nature.
43. (1) Kinetic energy = $\frac{1}{2} \text{ mass} \times \text{velocity}^2$; and Momentum = mass \times velocity. So, if velocity is doubled, then its momentum also doubles and its kinetic energy becomes four times.
44. (3) The aeroplane will be directly above the bag when the bag reaches the ground because the horizontal component of the velocity of the bag is unaffected by the fall.
45. (4) The earth pin is bigger than the live and neutral pins in a three pin plug to prevent electric shock. Since the earth pin is bigger than the other two pins, it is the first to be connected and the last to be disconnected.
46. (1) Distance between centre of curvature and the pole (the point at which principal axis touches the mirror) is called radius of curvature. Radius of curvature of a concave mirror is always perpendicular to the mirror.
47. (2) Real and inverted images are formed only by concave mirrors. Convex mirror and

plane mirror always form virtual and erect images.

- 48.** (3) Rear-view mirror uses convex mirror so as to get a virtual and erect image of the vehicles coming behind. So, they don't use concave mirrors. All the rest-reflectors in solar heaters, flash lights and dentists-use concave mirrors.
- 49.** (2) Copper is a non-magnetic metal. Nickel, cobalt and iron are magnetic in nature, i.e. they get attracted towards a magnet.
- 50.** (1) Newton's first law of motion is also known as the law of inertia. An object at rest will remain at rest unless acted on by an unbalanced force. On the other hand, an object in motion continues in motion with the same speed and in the same direction unless acted upon by an unbalanced force.
- 51.** (2) When two or more cells are joined together, they form a battery. In a battery, the positive terminal of one cell is connected to the negative terminal of the second cell and so on.
- 52.** (3) Carbon dioxide produces a weak acid with water (carbonic acid) and so is not a cause of acid rain. Acid rain consists of nitric and sulphuric acids.
- 53.** (2) Angular momentum per unit mass has a different dimension than the other three options.
- 54.** (3) Richter scale was developed in 1935 by American seismologist Charles F. Richter, and it is used to measure the intensity of an earthquake.
- 55.** (3) Uranus and Venus are the only two planets in the solar system that perform clockwise rotation, i.e. they rotate from east to west, while rest of the planets rotate from west to east.
- 56.** (1) When people are in water, they often experience electric shock, so they believe that water is a good conductor of electricity. However, this is not true. Distilled water does not contain sufficient amount of ions as it is free from impurities that can conduct electricity. Due to presence of certain metallic impurities, normal water can sometimes conduct electricity.
- Electricity is conducted by vinegar and lime juice because they ionise. Salt water can also conduct electricity because of the presence of ions in the solution.
- 57.** (1) The weight of atmosphere does not crush our body because we possess an equal pressure inside our body. This internal pressure cancels out the external pressure of the atmosphere, and we don't feel any pressure on our head.
- 58.** (2) Cones and rods are two photoreceptors present in the eyes. Rod cells are sensitive to the dim light, while the cone cells are sensitive to the bright light. The colour sensitivity of the eyes is because of the cones.
- 59.** (2) A light year is a unit of distance that measures the distance travelled by light in one year.
- 60.** (2) Largely heavy water is used as a moderator in nuclear reactors; however, graphite is used as a moderator in some nuclear reactors as well. Moderator is used in reactors to reduce the speed of neutrons for the purpose of sustaining a nuclear chain reaction.
- 61.** (2) The temperature at which the pressure of the gas (air pressure) is equal to the vapour pressure of the liquid is known as the boiling point of that liquid. The boiling point of the liquid is directly influenced by the pressure over the liquid. If the external pressure is less than 1 atmosphere, then the boiling point of the liquid would be less than its normal boiling point. Similarly, if the pressure is more than 1 atmosphere, the boiling point of the liquid would be more than its normal boiling point.
- 62.** (4) The amount of heat produced by a metallic conductor on passing the electric current depends upon:
- material (less heat is produced by good conductors);
 - thickness (production of heat decreases with increase in the thickness);
 - length (production of heat increases with increase in the length).
- 63.** (4) Lateral inversion is the effect produced by a mirror in reversing an image from left to right, and it is produced by all types of mirrors.
- 64.** (4) The audible range of human ears is 20–20000 Hz, i.e. they can hear the sound waves that vibrate in between this range of frequency. Ultrasounds are the sound waves that have higher frequency than 20,000 Hz, i.e. higher than the audible range of human ear.
- 65.** (1) Alpha rays have the least penetrating power. In correct order of penetrating power of the different type of radiation is represented as: Alpha < Beta < Gamma < X.

66. (2) Ammeter is a measuring instrument which measures electric currents in a circuit. A unit of electric current is known as an ampere.
67. (3) Almost all particles have an associated antiparticle which possess the same mass but have opposite charge. The antiparticle of photon is photon itself because photon does not contain any charge and is not made up of sub particles. Positron is the antiparticle of electron and antineutrino is the antiparticle of neutrino.
68. (3) Cryogenics is the study of producing materials at very low temperatures of -150° Celsius. In cryogenics, Kelvin or Rankin temperature scales are used.
69. (4) The lightning conductor can be of any shape, such as pointed, hollow or rounded and should be made of good conductive metals such as copper or aluminium.
70. (4) Pyrometer is a thermometer, used to measure surface's temperature through remote-sensing. These pyrometers can also measure the temperature of cooler objects.

7

CHEMISTRY

MATERIALS

We see a number of objects around us made of different materials. Different materials have different characteristics and their use by us depends on our selection of the material of desired characteristics. Let's have a look at common characteristics of materials.

1. **Materials exist in three states: solids, liquids and gases.** Solids have definite shape and volume. Their particles are closely packed. They cannot move much as they have the least amount of energy. They cannot be compressed as there is almost no space in between the particles.

Liquids don't have a definite shape. They take the shape of the container. But they do have a definite volume. Particles of liquids have more energy in comparison to the particles of solids. They can move a little and are loosely packed. That's why liquids can be compressed to some extent.

Gases do not have a definite shape. Their volume is also not definite. It changes with the availability of space. The particles of gases have a high degree of energy. So, they can move about freely and can occupy as much space as available (burn an agarbatti and see how smoke moves all around the room). Gases are highly compressible.

2. **Materials may or may not dissolve in water.** There are some materials that dissolve in water. They are called soluble materials. Salt, sugar, potassium permanganate, copper sulphate, are all soluble substances. Some materials do not dissolve in water. They are called insoluble materials. Sand, stone, glass, wood are insoluble in water. The substance which dissolves in water is called **solute**, water is the **solvent**, and their mixture is called a **solution**. The amount of a substance dissolving in a unit volume of water at a fixed temperature is different for different substances.

Solubility of a substance increases with the increase in temperature. The amount of solute dissolving in a given quantity of solvent at a given temperature is fixed. If we add more solute, it will not dissolve. Such a solution which cannot dissolve any more solute is called **saturated solution**.

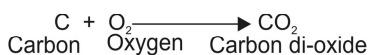
3. **Materials may change from time to time.** For example if we place a tray of water in the freezer, it changes to ice. Ice, when kept out of the freezer for some time again melts into water. So this is a reversible change. On the other hand if we place an egg in boiling water for a few minutes, it coagulates (hardens). On keeping the same egg in cold water we cannot get the same raw egg. This is an irreversible change.

If the change in physical properties of a material (colour, shape, state etc.) is not permanent, it is called as **physical change**. Most of the physical changes are reversible. For example, if we dissolve two spoons of salt in half cup of water, the salt vanishes in the solution. But if this solution is left in the open (in a plate) for a day, the water evaporates and salt appears again.

Changes that occur in a material to form one or more new materials and are irreversible are called chemical changes. For example when milk changes to curd, its properties change and we can't change it back to milk. It is a chemical change. Similarly burning of candle, rusting of iron are chemical changes.

4 Materials react among themselves in different ways to form new materials. These are called chemical reactions. Let's have a look at some kind of chemical reactions:

(i) **Combination reactions (two or more materials combine to form one material):** Burning of coal is a combination reaction. Here coal (carbon) reacts with oxygen to form carbon dioxide.



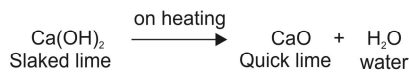
Heat is produced in this reaction and such a reaction is called **exothermic reaction** (reaction that produces energy in the term of heat or light). Another combination reaction which is also exothermic is that of calcium oxide (quick lime) with water.



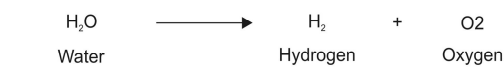
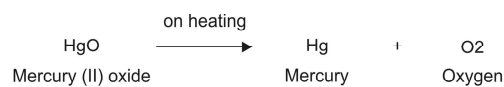
Cellular respiration is also an exothermic reaction in which glucose (formed after digestion of carbohydrates) burns in air to form carbon dioxide, water and energy.

Decomposition of dead and decaying organic matter by microbes is also an exothermic reaction.

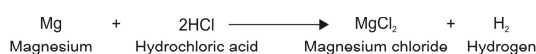
(ii) **Decomposition reaction (one material breaks down to form two or more materials):** On heating slaked lime it breaks into quick lime and water.



Other decomposition reactions are:



(iii) **Displacement reaction (a more reactive metal displaces a less reactive element from its salt):** Magnesium displaces hydrogen from its salt.



Similarly iron, zinc and lead are more reactive than copper. So they all displace copper from its salts.

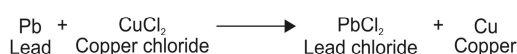
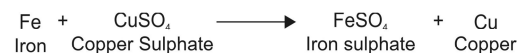
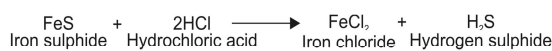


Table: Reactivity series of metals

Reactivity series of metals - most reactive to least reactive
Li, K, Sr, Na, Ca, Mg, Al, Zn, Cr, Fe, Cd, Co, Ni, Sn, Pb, H, Sb, As, Bi, Cu, Hg, Ag, Pd, Pt, Au

(iv) **Double displacement reactions (metals of two compounds change their positions to form two new salts):** Iron sulphide and hydrochloric acid (hydrogen chloride) react to form iron chloride and hydrogen sulphide.

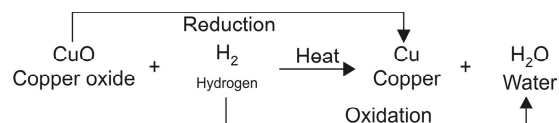


More examples of double displacement are :

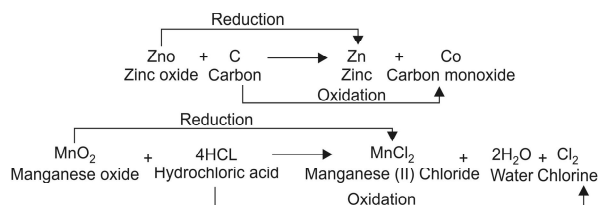


(v) Oxidation and reduction (oxidation is addition of oxygen or removal of hydrogen, reduction is removal of oxygen or addition of hydrogen) - when hydrogen gas is passed over heated copper oxide, we get copper and water. Here,

copper loses oxygen (reduced) and hydrogen gains oxygen (oxidised).



Other examples of oxidation and reduction are :



Rusting of iron and rancidity of fats/oils are also results of oxidation. Keeping things sealed, adding antioxidants or putting them in nitrogen gas prevents oxidation.

Sometimes different materials get mixed up. We need to separate the ingredients of the mixture in order to use its different components separately or to purify a substance by removing waste or harmful ingredients.

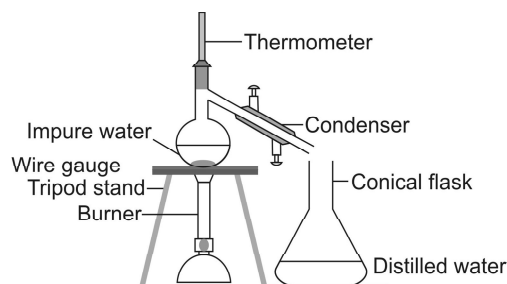
Different methods of separation of components of a mixture are:

- (i) **Handpicking:** Removing stones from pulses
- (ii) **Threshing:** Separating grains from husks by beating the stems with machines or a wooden stick
- (iii) **Winnowing:** Separating lighter components of the mixture from heavier ones by letting the mixture fall from a height, lighter ones thrown away by the wind
- (iv) **Sieving:** Particles of different sizes are separated through a sieve (tea from tea leaves)
- (v) **Sedimentation and decantation:** A mixture of insoluble components (liquid + heavier solid or two immiscible liquids) is left to settle (sedimentation), after the mixture settles, the upper lighter liquid layer slowly poured out (decantation)
- (vi) **Filtration:** Solid ingredients (generally smaller in size) in a liquid are allowed to pass through a filter paper having fine pores. The solid is left on the paper and the liquid is collected at the bottom in a container.
- (vii) **Evaporation:** The process in which a mixture in which one component vaporises when left in the

open by taking heat energy from the air and the sun and the other component is left behind is called evaporation. Salt is separated from sea water by this process.

- (viii) **Distillation:** Purifying a liquid (e.g. water) by first heating it so that it vapourises, then cooling to condense it again in a separate container is called distillation.

The process of distillation is shown in the figure below:



Distillation of water

ACIDS, BASES AND SALTS

There are a number of materials around us that are used as food and have sour taste. Lemon, tamarind, curd, unripe mango, all sour tasting foods have a chemical component in them called **acid**. Another set of materials that have bitter taste and soapy touch (baking soda, slacked lime or choona used by a panwadi). They have a chemical component in them called **base**. The examples given above are of weak acids and weak bases. There are a large number of strong acids and bases which are harmful even to touch. Sulphuric acid has high affinity for water. It is sometimes used as a dehydrating agent. Its reaction with water is highly exothermic. It is dangerous to pour water in concentrated sulphuric acid. In order to dilute the acid, it should be poured over water.

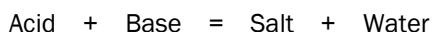
Identification of acids and bases is done with the help of 'indicators'. Indicators give different colours with acids and bases. Litmus (extracted from lichen), methyl orange, phenolphthalein are used in the labs. We can also use turmeric, china rose, black carrot as indicators.

Colour of different indicators with acids and bases are shown in the table below:

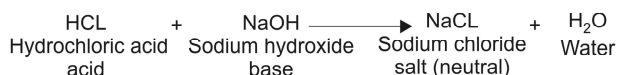
Table: Colour of Indicators with Acid and Base

Name of the Indicator	Colour with Acid	Colour with Base
Litmus (red or blue)	Red	Blue
Methyl orange	Red	Yellow
Phenolphthalein	Colourless	Pink
Turmeric	Yellow	Red
Black carrot juice	Blue	Reddish- purple
China rose	Dark pink	Green

Another category of materials is **salts**. They are neither acidic nor basic. They have no effect on the indicators. In fact when an acid reacts with a base, a salt is formed along with water.



This is also called a **neutralisation reaction** as acid and base neutralise each other's property and salt so formed is neutral in nature.



Neutralisation in Daily Life

Whenever we suffer from indigestion or acidity (remember hydrochloric acid is produced by our stomach) due to excess of acid, we have to take an antacid (base) like milk of magnesia or magnesium hydroxide $\text{Mg}(\text{OH})_2$. It neutralises the acid in our stomach and we feel relieved.

Similarly, an ant sting injects formic acid in our body and we need a base like baking soda or calamine lotion to neutralise it. The farmer adds slaked lime (choona) to the soil if it is acidic and in case it is base, he puts organic matter that releases acids and neutralises the effect of bases.

Acidic wastes of factories are neutralised by suitable bases before releasing them in water otherwise all the aquatic plants and animals will get killed.

Acid Rains

Harmful gases are released by several industries (carbon dioxide, sulphur dioxide and/or nitrogen dioxide) into the air. Whenever there is a rain, these gases dissolve in the rain drops to form acids like carbonic acid, sulphurous acid and nitric acid. These acids make the rain drops

acidic. Acid rain is harmful for plants and animals. It also damages buildings and historical monuments.

METALS AND NON-METALS

Elements are classified as metals and non-metals. Metals have certain distinctive features that separate them from non-metals.—

- They have 'metallic lustre'. All metals shine, i.e. have lustre. Examples: Copper, zinc, iron, gold, silver etc.
- They are 'malleable'. When beaten, metals get pressed into thin sheets. Gold is the most malleable of all metals.
- They are 'ductile'. They can be drawn into thin wires. Example: coil wire of tungsten in an electric bulb
- They are 'sonorous'. They produce ringing sound (bell, wind chimes)
- They are good conductors of heat and electricity. Therefore, food is cooked in metal utensils and wires are made of metals.

Metals are hard and solid at room temperature (except mercury which is liquid).

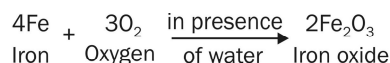
Non-metals, on the other hand, are soft and dull. They break when beaten. They are poor conductors of heat and electricity. They may be solid, liquid or gas at room temperature. Examples are Sulphur, Carbon, Phosphorus, Iodine, Chlorine, Oxygen, Nitrogen etc.

Chemical Properties of Metals and Non-metals

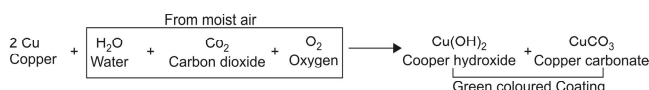
- With oxygen, metals react to form basic oxides and non-metals form acidic oxides.

Iron exposed to moist air reacts slowly with oxygen in the air (in the presence of water) to form iron oxide.

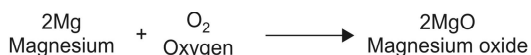
This process is called **rusting**.



The surface of copper vessel turns green in colour on long exposure to moist air. This is due to the formation of copper hydroxide (pale blue) and copper carbonate (green).

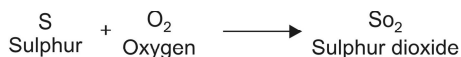


Magnesium burns in the air to form magnesium oxide.



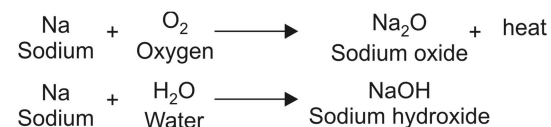
Solutions of metal oxides are basic in nature, i.e., they convert red litmus blue.

Non-metals also make oxides when they burn in air (oxygen). Sulphur burns to make sulphur dioxide. Carbon burns to make carbon dioxide.



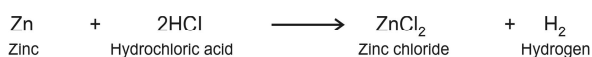
These oxides are acidic in nature. With water they form acids. They turn wet blue litmus to red colour.

- (ii) Metals react with water to form bases. Sodium is a highly reactive metal. It reacts spontaneously with air and water and lot of heat is generated (it catches fire when kept in the open). Therefore, sodium is always stored in kerosene.

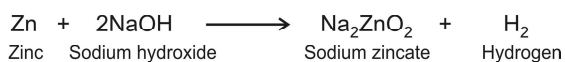


Non-metals do not react with water. However, phosphorus, that is a non-metal, is highly reactive (like sodium) and reacts with air if left in the open. Therefore, it has to be stored in water.

- (iii) Metals react with acids to produce hydrogen gas. Non-metals usually do not react with acids.



- (iv) With bases also, metals react to produce hydrogen gas.



- (v) In a displacement reaction, the substance which is more reactive replaces the less reactive one from its salt. Refer to the reactivity series.

Uses of Metals and Non-metals

Metals are used to make utensils, cans, (steel, tin, copper, aluminium), wires (copper, aluminium, tungsten), machines, instruments (stainless steel and several alloys), vehicles and jewellery (gold, silver). Non-metals

are used in making jewellery (diamonds), match boxes and fertilisers (phosphorus), as disinfectants (chlorine), as fungicides and for making fire crackers, detergents and paints (sulphur), and as antiseptics (iodine).

HEAT AND HEAT TRANSMISSION

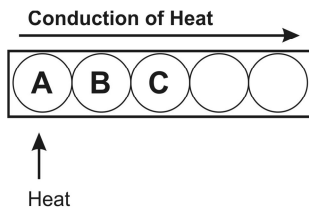
Heat is a form of energy. The amount of heat is measured by a thermometer. There are two types of thermometers: laboratory thermometer and clinical thermometer. Each thermometer has a bulb in which mercury is filled. It is attached to a very thin tube which is calibrated in °F (Fahrenheit) or °C (celcius). For laboratory thermometer, the calibration is from -10°C to 110°C. The least count (smallest measurable unit) is either 0.2°C or 0.1°C. It should be made to stand straight in the substance whose temperature is to be measured with its bulb dipped inside. Eyes should be at the level of the mercury in the tube.

Our normal body temperature is 37°C. Therefore the range of the clinical thermometer is from 35°C to 42°C. It should be washed properly in salt solution or any other suitable antiseptic solution before use. Clinical thermometer has a kink which prevents mercury to fall down after use for the doctor to observe. So it has to be shaken so that the mercury level comes at 35°C. It should be put under the tongue for at least one minute. Then, it should be taken out the temperature should be recorded by noting the point where mercury has stopped. Normally, the least count in a clinical thermometer is 0.1°C.

Transfer of Heat

If there are two bodies, one hot and the other cold, heat generally moves from the hot body to the cold body till both are at the same temperature. How the heat travels is different for different substances.

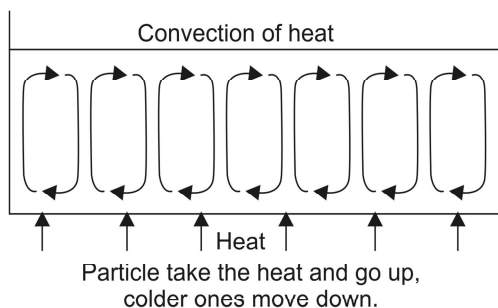
In solids, heat travels by conduction. It means that it follows 'pass it on' way the particles where heat energy is passed from one particle to other till all have the same amount of heat. As in the given figure, particle A receives the heat and passes on to B. B passes it on to C and so on. All **metals are good conductors** of heat. Conduction of heat in particles is shown in the figure below:



Conduction of Heat

But every solid substance is not a conductor. Some substances are not conductors. They are called **insulators**; e.g. wood, plastic, rubber etc.

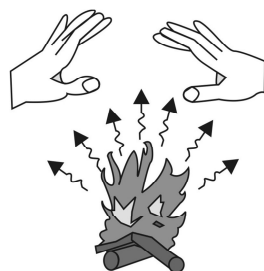
In liquids and gases, heat travels by convection. Each particle comes to take the heat, becomes lighter and moves up. The colder ones keep on moving down, get heated and move up. The following figure shows convection of heat:



Convection of Heat

Radiation occurs in objects that emit electromagnetic radiations. No medium is required for the heat to travel. Heat spreads to its surroundings.

The figure given below shows Radiation:



Radiation

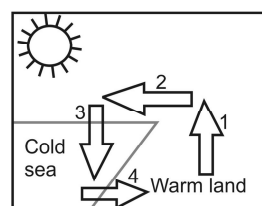
Black objects are good absorbers of heat whereas white objects are bad absorbers.

Formation of Sea Breeze and Land Breeze

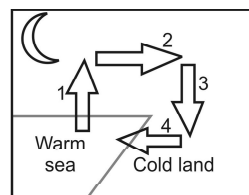
During day time, land gets hotter than the water in the sea. So, air on land gets heated (by convection) and moves up. This place is then occupied by the cold air from the sea. This way a cycle of air movement starts known as land breeze.

During night, land gets cooler faster than the water in the sea. So, the air touching the sea gets hotter, moves up and air from land moves towards the sea generating a sea breeze.

The figures given below shows sea breeze and land breeze:



Sea Breeze



Land Breeze

How woollen clothes give us warmth?

Wool is a poor conductor of heat. It does not allow body heat to escape. Air trapped in wool fibres also acts as an insulator. Two thin blankets joined together are warmer than one thick blanket as the air between two thin blankets also provides insulation.

COMBUSTION AND FLAME

Combustion is a chemical process in which a combustible substance reacts with oxygen to give heat. Sometimes light is also given off along with the heat (burning of candle). Substances that burn (are combustible) and release heat energy are called fuels. Fuel may be solid (coal), liquid (kerosene) or a gas (LPG).

There are three requirements for combustion to take place: air (oxygen), ignition temperature, and a combustible substance (fuel). The ignition temperature

of some substances is very low and so they easily catch fire. Such substances are called inflammable substances. Their combustion is called rapid combustion. Some materials catch fire by themselves like white phosphorus. Their combustion is called spontaneous combustion.

There are things that burn with a huge pressure and sound like a fire cracker. Such a combustion is called explosion.

In case of fire, we should look for all the options to extinguish it, i.e. cut off oxygen supply, lower the temperature (below ignition temperature) or remove the combustible substance. Water helps to lower the temperature but it is not suitable for electrical points. Carbon dioxide is the best option as it cuts the supply of oxygen and if stored in liquid form (in cylinders), it would reduce the temperature as well. Spraying of sodium bicarbonate (baking soda) or potassium bicarbonate also helps to extinguish fire.

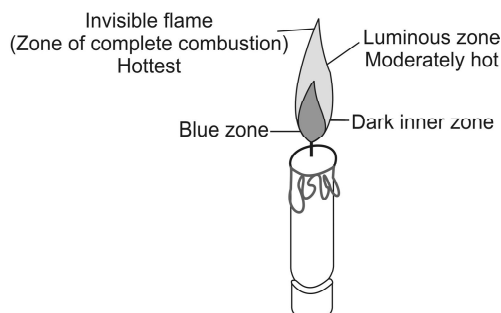
How a Match Stick gets Ignited?

The head of the match stick contains antimony trisulphide and potassium chlorate. The rubbing surface has powdered glass and red phosphorus. When stick is rubbed on the side of the box, some heat is generated due to friction.

It changes little red phosphorus into white phosphorus which reacts with potassium chlorate and ignites antimony trisulphide. The match stick catches fire.

Structure of a Flame

Flame is formed when particles of the combustible substance convert to gaseous form on getting heat and start burning. In candle, wax molecules turn into gaseous state and burn at the top. The molecules which are on the outside get plenty of oxygen and burn completely giving maximum heat. Inside this zone, particles don't get full supply of oxygen and burning is incomplete leaving carbon particles (as smoke). This zone gives moderate heat. The unburnt particles come down in the dark zone (zone of no combustion). At the bottom, some unburnt particles get oxygen and burn with a blue flame. The figure given below shows the zones in flame of a candle:



Flame of a Candle

A goldsmith needs to have maximum heat. So, he uses the outermost zone to melt the ornaments.

CALORIFIC VALUE OF FUEL

The amount of heat energy produced on complete combustion of 1 kg of a fuel is called its **calorific value**. The calorific value of a fuel is expressed in a unit is called kilo joule per kg (kJ/kg).

A good fuel is the one which has high calorific value, is readily available and cheap. It should and can be easily controlled. It should not leave behind harmful or undesirable residue.

Fuels and pollution

Almost all the fuels burn to release carbon dioxide gas. Increased amount of carbon dioxide in the environment is causing 'global warming'. This is responsible for melting of glaciers and increasing water level of the sea. As a result many islands and low lying areas near the sea shore are under the threat of being submerged. So we have to use fuel economically to minimise this problem.

Many Fuels (like wood, coal, petrol, and diesel) release unburnt carbon particles in the air that cause a number of respiratory problems in humans and animals. Sulphur dioxide and nitrogen oxides are also released on burning of diesel and coal. These are harmful for plants and animals and also cause acid rain.

Fuels like LPG (Liquofied Petroleum Gas) and CNG (Compressed Natural Gas) release less harmful gases in the air and so are better than other fuels.

Burning of coal in limited supply of air produces carbon monoxide gas which is very poisonous. Therefore it is dangerous to burn coal in a closed room.

Most of the fuels that we use for cooking, vehicles or industries come from coal and petroleum. We have them as our natural resources under the layers of earth or deep inside the seas. These two are called **fossil fuels** as they have been formed in nature from plants and animals that got buried down under the Earth or at the bottom of the sea ago millions of years. Conversion of dead vegetation into coal is called **carbonisation**. Formation of coal and petroleum is difficult and extremely time consuming but the way we are using them is highly alarming. We call them **Exhaustible Natural Resources** because we have only limited reserves of them.

Coal taken out of coal mines is processed in industries to get useful products such as coke, coal tar and coal gas. **Coke** is almost pure form of carbon. It is used in the manufacturing of steel and in the extraction of many metals. Coal tar is a black, thick liquid with an unpleasant smell. Several useful products are obtained from coal tar such as synthetic dyes, plastics, paints, perfumes, photographic materials, drugs, explosives, naphthalene balls, etc.

Petroleum and natural gas are also taken out of the deep layers of earth or from deep seas. Like coal, these fossil fuels were formed from dead sea animals over millions of years.

Petroleum (also called black gold) is a dark oily liquid with an unpleasant odour. Fractional distillation of petroleum in refineries yields many useful substances like petroleum gas, petrol, diesel, kerosene, lubricating oil, paraffin wax, bitumen etc. These are used as fuels, for the manufacture of detergents, fibres (polyester, nylon, acrylic, etc.), polythene and other man-made plastics.

Natural gas is a comparatively cleaner fuel and is compressed for use in kitchens and vehicles.

Hydrogen gas obtained from natural gas is used in the production of urea.

Petroleum Conservation Research Association (PCRA) spreads awareness regarding judicious use of petroleum products.

FABRICS

We wear different types of clothes. These cloths are prepared by weaving the threads made of yarn. Yarn in turn is made up of fibres. We use fibres of different types for making our clothes. They can be broadly classified as Natural fibres and Synthetic fibres. Natural fibres may be of plant origin (cotton, jute, linen) or of animal origin (wool, silk).

Synthetic fibres are produced by humans with raw materials ranging from petrochemicals to wood of plants. Common synthetic fibres are polyester, nylon and acrylic.

Cotton is obtained from cotton plant. The plants bear cotton balls which are handpicked. The seeds are then removed from these balls by combing. This process is called 'ginning'. Next step is spinning of fibres by machines (remember charkha and takli promoted by Mahatma Gandhi). After spinning, we get cotton yarn. It is dyed and weaved into cloth on handlooms or machines.

Jute and linen are obtained from the stems of their plants. The plant stems are cut, wetted and left in the open for their soft tissue to rot. Then the stems are beaten to remove the rotten parts and fibres so obtained are washed and dried. Yarns are then made out of these fibres and woven into cloth.

Wool is obtained from different breeds of sheep, goats, yak and even camel. The animals are reared well and are given good protein rich diet. During hot weather, their fleece (thick coat of wool fibres) along with the upper thin skin is removed. Removal of fleece is called **shearing**. After shearing, the fleece is thoroughly cleaned in water to remove dust and grease. This process is called **scouring**. Then comes **sorting**, in which fibres of different sizes are separated. Longer ones go for making sweaters. Shorter ones are used for making woollen cloth. Then these fibres are dyed, straightened, combed and rolled into yarns. Common breeds of sheep are Lohi, Rampur Bushair, Nali, Bakharwal, Marwari, and Patanwadi. Yak wool is produced in Ladakh. Wool is also obtained from goats (Angora wool from Angora goats, Pashmina from Kashmiri goat, etc.).

Silk is obtained from silk worms. Rearing silk worms to get silk is called **Sericulture**. Different types of silk worms produce different varieties of silk. Silk worms lay eggs. The eggs hatch into caterpillars. The caterpillars feed on the leaves of trees like mulberry, som or sualu. They grow in size and then change into pupa. The covering of silk fibres around it is called a cocoon. These cocoons are gathered and boiled in water to loosen the fibres. The fibres are then pulled into silk yarn with the help of machines. Making silk thread out of the fibres is called **reeling**. Common silk varieties are mulberry silk, tassar silk, eri silk, muga silk,

Synthetic fibres are made from chemicals largely derived from petroleum. They are infact polymers (a long chain of molecules). The most common synthetic fibres are rayon (artificial silk), nylon, polyester and acrylic. Synthetic fibres are less expensive, durable and easy to maintain. They dry up quickly and are mostly wrinkle proof. Rayon provides a cheap alternative to silk. Nylon is very strong and is used in making parachutes along with clothes. Polyesters and acrylics are used for making cloths.

PET and plastics are other commonly used synthetic fibres. Plastics are of two types : Flexible ones (can be bent easily) called 'thermoplastic' like polythene and PVC, and the rigid ones that break but not bend called 'thermosetting' like bakelite and melamine. For their special characteristics (like lightweight, cheap, strong, easy to handle, do not corrode, poor conductors of electricity, etc.), they are very convenient to use and have become the choicest material for making almost all usable items.

The only obstacle with plastics is that they are non-biodegradable, i.e. they do not decompose for years and pose a threat to the environment. They do not burn easily and when they burn, they release harmful gases thus polluting the air. So we have to use plastics cautiously considering the R principle, i.e. **Reduce, Reuse, Recycle** and **Recover**.

NATURAL RESOURCES

These are defined as the resources that come from nature, such as air, water, wind energy, etc.

Water

Water is a precious natural resource. It is essential for all living beings. There can be no life without it. There are various sources of water on earth, like river, lake, pond, etc. Though two third of the earth is water (oceans), this water is too salty and not fit for drinking. This water comes to us in drinkable form through water cycle (Water evaporates from the sea, condenses to form clouds, precipitates as rainfall or snowfall, and goes into the rivers, lakes, ponds, wells and soil. Rivers flow and ultimately take water to the oceans). Heavy rains sometimes raise the water levels in rivers to alarming levels and cause flooding of the neighbouring land causing disastrous effects. Too little of the rains brings acute shortage of water and it may cause droughts.

The amount of drinking water available on earth is hardly 2%. Out of this, a large amount is trapped in glaciers. That's too little for the growing needs of human population on earth. So, we should do our best to use water judiciously.

Water exists in three forms: solid (as snow and ice in the glaciers), liquid (in oceans, rivers, lakes) and vapour (in the air).

Water is supplied to us through a network of pipes. Groundwater is an important source of water but water table is at different depths at different places. Water from rains, rivers and lakes seeps in to the soil and reaches the water table. This is called infiltration and it recharges the ground water in aquifers. Aquifers are places below the water table where water is stored in between layers of hard rocks. We take out this water by boring hand pumps or tube wells. Normally water is recharged when rainwater seeps through the soil particles and reaches the water table. These days pucca roads and pavements have made it difficult for water to seep down. Water availability is not uniform in all parts of the world. There are many parts on our earth that face acute shortage of water. At several places, water shortage is due to its excessive exploitation by human beings. Growing population and corresponding increase in demand for water for irrigation and industrial use has caused an imbalance between demand and supply. To meet the growing demand, people are overexploiting the

ground water resources. There is wastage of a significant amount of water due to leakage in pipes and taps at different places.

Every individual should use water economically. Water should be harvested as was done in olden days (bawris and step wells). To meet the demand for irrigation of plants, water saving techniques like drip irrigation should be adopted. We can recycle water by treatment of waste water generated at different places. This will also help to reduce soil and water pollution.

We also get sludge (solid decomposed waste which is a good manure for plants) and biogas (which can be used as a useful fuel) from waste water treatment plants.

Water pollution means the contamination of water by certain substances that make it harmful for consumption. Major contaminants of water are: sewage, agricultural chemicals and industrial wastes. Water has to be purified to make it fit for drinking. This water is known as potable water. Water is a precious natural resource. We must learn to conserve it.

22 March is celebrated as the world water day.

Air

Air is found everywhere. We cannot see air, but we can feel it. It occupies space (see how a balloon is inflated when we blow air into it). Air is a mixture of gases: Nitrogen (78.8%), Oxygen (21%), and Carbon dioxide (0.04%). The rest of it is water vapour and a few other gases along with some dust particles. Air covers our earth like a blanket. This is called the atmosphere. Earth sustains life because of this atmosphere only in which oxygen is used for breathing by all living beings. It is also essential for burning. Carbon dioxide, used by green plants for photosynthesis.

When unwanted and harmful substances get mixed with air, they cause air pollution. Pollutants are harmful substances that contaminate air. Carbon monoxide, nitrogen oxides, carbon dioxide, methane and sulphur dioxide are the major pollutants of air. Increasing levels

of greenhouse gases like CO₂ are leading to global warming.

Weather

Weather of a place is the condition of the atmosphere on day-to-day basis in terms of sun shine, temperature, humidity, speed of the wind, rainfall, etc.

All changes in the weather are caused by the sun. The sun is the primary source of energy that causes changes in the weather. Energy absorbed and reflected by the earth's surface, oceans and the atmosphere play important roles in determining the weather at any place. Weather near the sea is different from that in a desert, or near a mountain.

When a weather pattern continues at a place for a long time, i.e. about 25 years or more, it is called the climate of that place.

The climatic conditions are different in different parts of the world.

Polar regions experience extremely cold conditions. This part of the earth remains covered with snow for most part of the year. For six months, they have days followed by nights for the next six months. The temperature dips to almost -37°C . Animals living in this region have to adapt to the severe cold conditions. Among the animals living there, the adaptive features of polar bear are worth mentioning. Its thick white fur helps it camouflage with the white snowy surroundings and make it difficult for the predators as well as the prey to notice it easily.

To stay warm, it has two thick layers of fur and a layer of fat under the skin. It locates its prey using its strong sense of smell. It can easily walk on ice with the help of its curved and sharp claws. Another well known polar animal is penguin. Penguins are very good swimmers and this is because they have streamlined bodies and webbed feet.

Birds living in the Polar Regions usually migrate to warmer regions (e.g. Siberian birds) to escape the severe winter conditions.

PRACTICE QUESTIONS

Answer the following questions by selecting the most appropriate option.

- 1. Which of the following statements is correct?**
 - (1) All metals are good conductors of electricity.
 - (2) All metals are solids at room temperature.
 - (3) All metals have a metallic lustre or shine.
 - (4) All metals react with air to form metal oxides.
- 2. When a copper plate is exposed to moist air for long, it acquires a dull green coating. The green material is**
 - (1) Copper sulphate
 - (2) A mixture of copper hydroxide and copper sulphate
 - (3) A mixture of copper carbonate and copper sulphate
 - (4) A mixture of copper carbonate and copper hydroxide
- 3. Water turns into steam through a process known as**
 - (1) Vapourisation
 - (2) Freezing
 - (3) Condensation
 - (4) Melting
- 4. Which of the following is a noble gas?**
 - (1) Nitrogen
 - (2) Oxygen
 - (3) Hydrogen
 - (4) Neon
- 5. Heavy metals got their name because compared to other atoms they have**
 - (1) Higher densities
 - (2) Higher atomic numbers
 - (3) Higher atomic radii
 - (4) Higher atomic masses
- 6. Photochemical smog results due to the reaction of**
 - (1) CO, O₂ and peroxyacetyl nitrate in the presence of sunlight
 - (2) CO, CO₂ and NO₂ at low temperature
 - (3) High concentration of NO₂, O₃ and CO in the evening
 - (4) NO₂, O₃ and peroxyacetyl nitrate in the presence of sunlight
- 7. Which of the following can be found as pollutants in the drinking water in some parts of India?**
 - (A) Arsenic
 - (B) Sorbitol
 - (C) Fluoride
 - (D) Formaldehyde
 - (E) Uranium

Select the correct answer using the code given below.

 - (1) A, B, C, D and E
 - (2) A and C
 - (3) B, D and E
 - (4) A, C and E
- 8. The ore of aluminium is**
 - (1) Chalco pyrites
 - (2) Bauxite
 - (3) Fluorspar
 - (4) Hematite
- 9. Most of the synthetic fibres catch fire easily. Which of the following is a fire resistant fibre?**
 - (1) PET
 - (2) Nylon
 - (3) Melamine
 - (4) Polyester
- 10. Select the group of poor conductors of heat from the following.**
 - (1) Air, water, plastic
 - (2) Wool, wood, iron
 - (3) Water, copper, wood
 - (4) Air, aluminium, wool
- 11. The most reactive non-metal is**
 - (1) Sulphur
 - (2) Phosphorus
 - (3) Carbon
 - (4) Iodine
- 12. The best way to conserve our water resources is**
 - (1) All of the options mentioned here
 - (2) Encouragement of natural regeneration of vegetation
 - (3) Sustainable water utilisation
 - (4) Rainwater harvesting
- 13. Granite and quartzite areas have a upstanding look because**
 - (1) They are not easily worn down
 - (2) These rocks are resistant to all kinds of erosion
 - (3) These rocks are not easily eroded
 - (4) They wear out faster
- 14. Spot the odd item of the following**
 - (1) Marble
 - (2) Limestone
 - (3) Sandstone
 - (4) Shale
- 15. The device used to convert solar energy into electricity is**
 - (1) Daniell cell
 - (2) Electrochemical cell
 - (3) Galvanic cell
 - (4) Photovoltaic cell
- 16. While diluting sulphuric acid, it is recommended that the acid should be added to water because**
 - (1) Acid has strong affinity for water
 - (2) Acid may break the glass container
 - (3) Dilution of acid is highly exothermic
 - (4) Dilution of acid is highly endothermic
- 17. When an iron nail is dipped in copper sulphate solution, the colour of copper sulphate solution fades and a brownish layer is deposited over the iron nail. This is an example of**
 - (1) Combination reaction
 - (2) Decomposition reaction
 - (3) Double displacement reaction
 - (4) Displacement and redox reactions

- 18. Which gas is liberated when an acid reacts with a metal?**
(1) Carbon dioxide (2) Oxygen
(3) Hydrogen (4) Chlorine
- 19. How does milk of magnesia provide relief to a person suffering from indigestion?**
(1) It helps to digest fats.
(2) It neutralises the alkaline effect of bile juice.
(3) It kills bacteria present in our alimentary canal.
(4) It neutralises the excess acid produced in our stomach.
- 20. Which chemical do goldsmiths use to dissolve gold?**
(1) Aqua regia (2) Aqua blue
(3) Aqua pure (4) Aqua magic
- 21. Which of the following is not an insulator?**
(1) Rubber (2) Wood
(3) Graphite (4) Bakelite
- 22. Which out of the following is not a petroleum product?**
(1) Kerosene (2) Polyester
(3) Rayon (4) Paraffin wax
- 23. The process of decomposing organic waste in the presence of air is termed as**
(1) Salvaging (2) Oxidation
(3) Pulverising (4) Incineration
- 24. Which of the following is the process of biological treatment of waste water?**
(1) Grit chamber (2) Screen chamber
(3) Sedimentation tank (4) Trickling filter
- 25. Nitrogen dioxide present in ambient air can be estimated by**
(1) Flame photometry
(2) Atomic absorption spectrophotometry
(3) High performance liquid chromatography
(4) Chemi-luminescence
- 26. Amalgam is an alloy in which the base metal is**
(1) Copper (2) Zinc
(3) Aluminium (4) Mercury
- 27. The physical method commonly used to purify sea water is**
(1) Evaporation (2) Sedimentation
(3) Filtration (4) Distillation
- 28. Which gas out of the following is responsible for global warming?**
(1) Carbon dioxide (2) Nitrogen
(3) Oxygen (4) Hydrogen
- 29. A log of wood does not catch fire when lighted through a match stick but a piece of paper easily catches fire with it. This is because**
(1) Wood is not a combustible material
(2) Wood has higher ignition temperature than paper
(3) Wood requires more oxygen to start burning than a piece of paper
(4) Wood is heavier than the paper
- 30. Which of the following substances shows spontaneous combustion?**
(1) Black coal (2) Red phosphorus
(3) Yellow sulphur (4) White phosphorus
- 31. The heaviest animal on earth lives in the**
(1) Mountains (2) Desert
(3) Oceans (4) Temperate forests
- 32. How does a polar bear manage to bear the extreme cold climate of polar region?**
(1) It has padded feet that help it wade through cold water.
(2) It stores food in its hump to be used in extremely cold conditions.
(3) It has a thick layer of fat under its skin.
(4) It has long and strong claws to dig out food covered by thick layer of snow.
- 33. Cyclones are monitored with the help of**
(1) Seismographs
(2) Satellites
(3) National Severe Storm Laboratory
(4) Anemometer
- 34. Formic acid can easily be identified by its**
(1) Pungent smell (2) Repelling smell
(3) Sweet smell (4) Bad smell
- 35. Acid rain is caused due to pollution of atmosphere by**
(1) Oxides of carbon and nitrogen
(2) Oxides of nitrogen and sulphur
(3) Oxides of nitrogen and phosphorous
(4) None of these
- 36. Fuse wire should have**
(1) High resistance, high melting point
(2) High resistance, low melting point
(3) Low resistance, high melting point
(4) Low resistance, low melting point
- 37. Batteries used in mobiles are**
(1) Primary batteries (2) Secondary batteries
(3) Electron batteries (4) None of these
- 38. The purity of 14 carat gold is**
(1) 58.4 per cent (2) 75.5 per cent
(3) 14.6 per cent (4) 30 per cent
- 39. The inner surfaces of food cans are coated with tin and not with zinc because**
(1) Zinc is costlier than tin
(2) Zinc is more reactive than tin
(3) Zinc has a higher melting point than tin
(4) Zinc is less reactive than tin

- 40. Metal which is highly reactive and is kept in kerosene oil is**
(1) Copper (2) Zinc
(3) Calcium (4) Sodium
- 41. Select from the following a set of three metals which are found in free state.**
(1) Aluminium, copper, silver
(2) Gold, iron, silver
(3) Copper, gold, iron
(4) Silver, gold, platinum
- 42. Apart from calcite, which other mineral is the main ingredient in limestone?**
(1) Aragonite (2) Jadeite
(3) Selenite (4) Magnesite
- 43. Which is the biggest source of water pollution?**
(1) Sewage
(2) Oil spills
(3) Industrial waste
(4) Burning of fossil fuels
- 44. Cyanide poisoning causes death in seconds because**
(1) It causes cardiac arrest
(2) It denatures enzymes of the heart
(3) It cause the lysis of red blood cells
(4) It breaks the electron transport chain
- 45. When a helium atom loses an electron, it becomes**
(1) An alpha particle
(2) A positive helium ion
(3) A negative helium ion
(4) A proton
- 46. The term brown air is used for**
(1) Sulphurous smog
(2) Acid fumes
(3) Photochemical smog
(4) Industrial smog
- 47. Most commonly used bleaching agent is**
(1) Sodium chloride (2) Chlorine
(3) Alcohol (4) Carbon dioxide
- 48. PET bottles and jars are commonly used for storing edible items. PET is a very familiar form of**
(1) Polyester (2) Acrylic
(3) Rayon (4) Polyamide
- 49. Aqueous solution of which of the following oxides will change the colour of blue litmus to red?**
(1) Copper oxide (2) Iron oxide
(3) Magnesium oxide (4) Sulphur dioxide
- 50. Litmus is a natural dye extracted from**
(1) Algae (2) Fungi
(3) Lichen (4) Bacteria
- 51. If your body temperature is 40°C, that means**
(1) You are perfectly healthy
(2) You are weak and cold
(3) You have mild fever
(4) You have high fever
- 52. What is the chemical name of laughing gas?**
(1) Methyl propyl ether (2) Halothane vapour
(3) Nitrous oxide (4) Methoxyflurane
- 53. Which of the following is a conductor?**
(1) Gold (2) Glass
(3) Rubber (4) Wood
- 54. Match the following.**
- | I | | II | |
|--------------------------------|--|----------------------------------|--|
| A. Ascorbic acid | | 1. Photosynthetic pigment | |
| B. Chlorophyll | | 2. Quencher | |
| C. Carotenoid | | 3. Enzyme | |
| D. Superoxide dismutase | | 4. Vitamin-C | |
- (1) A-4, B-1, C-2, D-3
(2) A-4, B-2, C-1, D-3
(3) A-4, B-1, C-3, D-2
(4) A-2, B-4, C-1, D-3
- 55. Hydrogen peroxide is an effective sterilising agent. Which one of the following product results when it readily loses active oxygen?**
(1) Water (2) Nascent Hydrogen
(3) Hydrogen (4) Ozone
- 56. Peroxyacetyl nitrate is a**
(1) Secondary pollutant (2) Vitamin
(3) Plant hormone (4) Acidic dye
- 57. The metal ion present in vitamin B 12 is**
(1) Nickel (2) Cobalt
(3) Iron (4) Zinc
- 58. Burns caused by steam are more severe than those caused by boiling water because**
(1) Temperature of steam is higher
(2) Steam has latent heat
(3) Steam pierces through the pores of body quickly
(4) Steam is the gaseous phase of water that engulfs the body quickly
- 59. Which is the sweetest sugar?**
(1) Glucose (2) Fructose
(3) Maltose (4) Lactose
- 60. Ultra purification of a metal is done by**
(1) Smelting (2) Leaching
(3) Slugging (4) Zone melting
- 61. Muddy water is treated with alum for purification. This process is termed as**
(1) Absorption (2) Adsorption
(3) Coagulation (4) Emulsification

- 62. The chemical name of 'Plaster of Paris' commonly used for setting broken bones is**
(1) Calcium Sulphate (2) Calcium carbonate
(3) Calcium chloride (4) Calcium nitrate
- 63. Compounds that are needed for enzymes to function properly are**
(1) Vitamins (2) Heavy metals
(3) Buffers (4) Steroids
- 64. Heavy water is**
(1) Rain water (2) Tritium oxide
(3) Deuterium oxide (4) Deuterium
- 65. Which of the following is the strongest base in aqueous solution?**
(1) Triethylamine (2) Ammonia
(3) Ethylamine (4) Diethylamine
- 66. The inert gas which is substituted for nitrogen in the air used by deep sea divers for breathing, is**
(1) Krypton (2) Argon
(3) Helium (4) Xenon
- 67. An acid having basicity one is**
(1) Disodium hydrogen phosphate
(2) Sodium phosphate
(3) Phosphoric acid
(4) Sodium dihydrogen phosphate
- 68. Which one of the following vegetable oils is used in the manufacture of paints?**
(1) Sunflower oil (2) Linseed oil
(3) Cottonseed oil (4) Palm oil
- 69. Acid rain is caused by the pollution of environment by**
(1) Ozone and Carbon dioxide
(2) Nitrous oxide and sulphur dioxide
(3) Carbon dioxide and Nitrogen
(4) Carbon monoxide and Carbon dioxide
- 70. Which of the following is not a gaseous air pollutant?**
(1) Hydrocarbons (2) Smoke
(3) Oxides of sulphur (4) Oxides of nitrogen
- 71. Which of the following is the main ingredient of the antacid marketed as milk of magnesia**
(1) $Mg(OH)_2$ (2) $MgCl_2$
(3) $MgCO_3$ (4) $MgSO_4$
- 72. The chemical name of quicklime is**
(1) Calcium chloride (2) Calcium carbonate
(3) Calcium hydroxide (4) Calcium oxide
- 73. Which of the following are used to prepare the main storage (starch) form of food in plants?**
(1) Carbon dioxide and nitrogen
(2) Carbon dioxide and water
(3) Carbon dioxide and oxygen
(4) Water and oxygen
- 74. Presence of excess fluorine in water causes**
(1) Tooth Decay (2) Respiratory disease
(3) Fluorosis (4) Dental Cavity
- 75. The solubility of iodine in water is increased if it is mixed with**
(1) Sodium hydroxide (2) Potassium iodide
(3) Alcohol (4) Chloroform
- 76. The compound which contains both ionic and covalent bonds is**
(1) CH_4 (2) H_2
(3) KCN (4) CO
- 77. Which of the following is not a carboxylic acid?**
(1) Formic acid (2) Citric acid
(3) Picric acid (4) Tartaric acid
- 78. The chemical name of 'oil of vitriol' is**
(1) Phosphoric acid (2) Nitric acid
(3) Sulphuric acid (4) Hydrochloric acid
- 79. Bhopal Gas Tragedy was caused by**
(1) Nitrogen (2) Oxygen
(3) Methyl Isocyanate (4) Cyanide
- 80. The example of a secondary pollutant is**
(1) CFC (Chloro fluoro carbon)
(2) PAN (Peroxyacetyl nitrate)
(3) CH_4 (Methane)
(4) Cl_2 (Chlorine)

ANSWERS AND EXPLANATIONS

1. (3) All metals have a metallic lustre is true but other characteristics are not true for all metals. Mercury is liquid and not a good conductor of electricity at room temperature. Noble metals like gold, silver and platinum are least reactive.
2. (4) The green material is a mixture of copper carbonate and copper hydroxide. On exposing copper plate to moist air, copper reacts with air to form copper carbonate and copper hydroxide.
- $$2 \text{Cu} + \text{H}_2\text{O} + \text{CO}_2 + \text{O}_2 \rightarrow \text{Cu}(\text{OH})_2 + \text{CuCO}_3$$
3. (1) Water turns into steam and undergoes a phase change known as vapourisation. Vapourisation occurs when a liquid is heated to its boiling point.
4. (4) Neon is a noble gas. It is colourless, odourless and has a low chemical reactivity. It has a distinct reddish-orange hue and is used in fluorescent lights.
5. (2) Heavy metals are called so due to their high atomic numbers. For example; silver, gold, platinum, cobalt, zinc, iron, copper and tin are all heavy metals. Atomic radius, mass and density are directly proportional to the atomic number.
6. (4) Photochemical smog results due to the reaction of primary and secondary pollutants such as nitrogen oxide (NO_2), ozone (O_3) and peroxyacetyl nitrate in the presence of sunlight.
7. (4) Arsenic, fluoride and uranium are found in drinking water in some regions of India. In 2012, high levels of arsenic, fluoride and uranium along with mercury and other heavy metals were found in the Malwa belt of Punjab.
8. (2) The primary ore of aluminium is bauxite. Aluminium is popular for its corrosion-resistant properties.
9. (3) Melamine is a fire resistant fibre. It is used to make fire resistant fibres (used to make dresses of fire fighters). PET, nylon and polyester catch fire very easily.
10. (1) A poor conductor of heat is a substance that does not have capacity to conduct or transfer heat. Examples: Air, plastic water, wool, wood, etc.
- Metals like copper, iron, aluminium, are very good conductors of heat.
11. (2) Phosphorus is highly reactive. When kept in the open, it immediately reacts with air and catches fire. Therefore it has to be kept in water.
12. (1) The best way to conserve water resources is through sustainable utilisation of water, spurring natural regeneration and rainwater harvesting.
13. (2) Granite and quartzite areas have an upstanding look because these rocks are resistant to all form of erosion due to high mechanical strength of the rocks. These rocks are used in buildings, bridges, monuments, countertops, tile floors and railway ballast.
14. (1) Marble is the odd one out as it is a metamorphic rock while limestone, sandstone and shale are sedimentary rocks.
15. (4) A photovoltaic cell is used to convert solar energy to electricity. The photons of light from the sun excite the electrons of silicon in a photovoltaic cell. The excited electrons start flowing, this creating electricity.
16. (3) When we dilute sulphuric acid, it is always recommended that we should avoid adding water to acid and rather add acid to water in small amounts. If we add water to acid then the acid would boil violently and splash out of the container. It is dangerous as the acid can harm by burning the clothes or skin.
17. (4) The reaction that occurs on dipping an iron nail in copper sulphate solution is as follows:
- $$\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$$
- As iron is more reactive than copper; thus, it will displace the copper from the copper sulphate solution and form iron sulphate giving the solution a fade appearance. The copper metal gets deposited over the iron nail giving it a brownish color. Hence, it is a displacement reaction.
- In this reaction, iron gains oxygen (oxidation reaction) from copper sulphate solution (oxidizing agent) while copper sulphate loses oxygen (reduction reaction) supplying it to iron (reducing agent). Hence, it is also a redox reaction.
18. (3) Acids react with metals to produce salt and hydrogen.
19. (4) Indigestion is caused by the excess of hydrochloric acid produced in our stomach when we eat spicy food or too much food. Milk of magnesia (magnesium hydroxide) is a

- base which neutralises the acid in the body and gives us relief.
- 20.** (1) Aqua regia is a mixture of 1 part concentrated nitric acid and 3 parts concentrated hydrochloric acid. Gold dissolves in this mixture. Goldsmiths use it to get pure gold extracted. They also use it for polishing gold ornaments. But in the process some amount of gold is lost. Other options are only the brands of water as 'aqua' means water.
- 21.** (3) Graphite is a non-metal (a form of carbon) but unlike most non-metals, it is a good conductor of heat and electricity. Rubber, wood and Bakelite are all insulators.
- 22.** (3) Rayon is not a petroleum product. It is made from wood. All the rest are petroleum products.
- 23.** (4) Incineration refers to the waste treatment process that combusts the organic substances present in waste materials. Incineration is also known as 'thermal treatment'.
- 24.** (3) A sedimentation tank is a tank wherein the suspended solids are removed from water by using gravity.
- 25.** (2) Atomic absorption spectrophotometry or Atomic absorption spectroscopy (AAS) is a spectro-analytical procedure that is used for defining the quantitative value of chemical elements through assimilation of optical radiation by free atoms in the gaseous state.
- 26.** (4) Amalgam is an alloy with base metal mercury which is combined with other metals. Silver-mercury amalgam is used by dentists while gold-mercury amalgam is used for the extraction of gold from ore.
- 27.** (4) Distillation is the process through which a mixture made of two or more liquids can be separated from each other by heating liquids to their boiling points. It is used for purifying sea water.
- 28.** (1) Carbon dioxide traps energy from the Sun and does not allow it to go back to the space. This results in warming up of the atmosphere around us. It is called the greenhouse effect and is the major cause of global warming.
- 29.** (2) Things burn only after they reach their ignition temperature. Wood has higher ignition temperature as compared to paper. So it needs to be heated first to reach its ignition temperature. This is usually done by spraying a little kerosene oil over it or putting some papers under the wood. Kerosene and paper both have very low ignition temperatures so they burn easily with a match stick. Their burning heats the wood up to its ignition temperature and it also starts burning after that.
- 30.** (4) White phosphorus has a very low ignition temperature. The normal room temperature is much higher than its ignition temperature. So it starts burning by itself at room temperature only. This type of combustion is called 'spontaneous combustion'.
- 31.** (3) The heaviest animal on earth is blue whale and it lives in oceans. It has lungs to breath but it can't live on land due to its weight. In water, its weight is reduced by the buoyant force of water. If it is brought on land, its organs will get crushed due to its own weight.
- 32.** (3) Polar bear has fat below its skin which acts like an insulator and does not allow its body heat to come out. Its body is covered with a thick white fur. Fur helps to keep it warm and its white colour helps it to hide in the white snowy background. A keen sense of smell helps it to smell its prey as well as the predator.
- 33.** (2) Satellites keep monitoring the coastline and also the formation of cyclones, thunderstorms, etc. and provide us information about an incoming disaster. This helps in warning the people and evacuating them from danger zones well in time.
- 34.** (1) Formic acid is a colourless liquid which can be easily recognised due to its highly pungent odour. It is also known as methanoic acid.
- 35.** (2) Acid rain occurs due to emissions of sulfur dioxide and nitrogen oxide. These two chemical compounds combine and react together with the water molecules present in the atmosphere to form acids.
- 36.** (4) A fuse wire should have low resistance and a low melting point. Low resistance so that maximum amount of current can pass through it and a low melting point to ensure that the fuse wire melts when high current passes through it.
- 37.** (2) Secondary batteries, also known as rechargeable batteries, are used in mobile phones. These batteries are cost-efficient in nature and less expensive than individual batteries.
- 38.** (1) 24 carat gold is pure gold; so, 14 carat gold is $\frac{14}{24} = 58.4$ per cent pure.

39. (2) The more reactive elements are generally not used for coating the food storing utensils because they can easily react on coming in contact with air. Tin, being less reactive than zinc and iron, is used for coating the iron cans to prevent corrosion.
40. (4) Sodium reacts vigorously with air and water and a lot of heat is produced. To save it from reacting with air or water, it is stored in kerosene oil.
41. (4) Free state refers to the native state of the metals, i.e. metals are present in their metallic form very few metals like gold, silver, copper & platinum are found in their free state. Copper and silver are also occasionally found in their free state.
42. (1) Limestone is a sedimentary rock composed of two different crystal forms of calcium carbonate, aragonite and calcite. Aragonite is formed by biological processes such as precipitation from marine and freshwater environment.
43. (3) Industrial waste causes the highest amount of water pollution. It comprises a number of toxic chemicals and pollutants such as lead, mercury, sulphur, asbestos, nitrates, etc.
44. (1) Cyanide poisoning causes death in seconds because it induces cardiac arrest. Some symptoms of cyanide poisoning are dizziness, increased heart rate, shortness of breath, headache and vomiting.
45. (2) When a helium atom loses an electron, it becomes a positive helium ion by getting positive charge as the number of protons in the helium atom becomes greater than the number of electrons.
46. (3) The term brown air is used for photochemical smog which is a mixture of smoke and fog. Due to the reaction of nitrogen oxide and volatile organic compounds with sunlight, a brown mist is created.
47. (2) Chlorine is the most commonly used bleaching agent. It is used as a base for some common bleaches such as calcium hypochlorite and sodium hypochlorite.
48. (1) PET (polyethylene terephthalate) is a polyester, commonly used for making clothing fibres, food and liquid containers. It is generally referred to as polyester (common name of PET). Acrylic and rayon are artificial fibres whereas polyamide is a heteropolymer which naturally occurs in wool and silk.
49. (4) Sulphur dioxide gas is an acidic oxide. It dissolves in water to form sulphuric acid. Sulphur dioxide changes the colour of moist litmus paper to red. (blue litmus will change to red, red colour will remain red). Sulphur dioxide is the main air pollutant that causes acid rain.
50. (3) Litmus is extracted from a lichen. Its original colour is purple. It gives red colour in acidic medium and blue colour in basic medium.
51. (4) The normal body temperature is 37°C. A temperature of 40°C suggests very high fever.
52. (3) Laughing gas or nitrous oxide is a colourless, odourless and non-flammable gas at room temperature, with a slightly sweet taste. It is used as an anaesthetic in surgery and analgesic in dentistry.
53. (1) Gold, being a metal, is a good conductor of electricity, through which electric current can flow without much resistance.
54. (1) Ascorbic acid is also known as Vitamin C, chlorophyll is a photosynthetic pigment, carotenoid is a quencher while superoxide dismutase is an enzyme.
55. (1) When hydrogen peroxide readily loses oxygen, it decomposes to form water. It is a colourless, viscous liquid which is used as a bleaching agent and disinfectant.
56. (1) Peroxyacetyl nitrate is a secondary pollutant found in photochemical smog.
57. (2) The metal ion present in Vitamin B12 is cobalt. It is a water soluble vitamin that is essential for the functioning of the brain and the nervous system.
58. (2) Energy required for phase change (process involved in water to steam conversion) is always more than that of temperature change (process involved in boiling water). Energy required for the phase change is called latent heat. Burns caused by steam are more severe than those caused by boiling water is because of release of latent heat, which is more than that of boiling water.
59. (2) Fructose, also known as fruit sugar, refers to a simple ketonic monosaccharide which, when combined with glucose, forms the disaccharide sucrose. Fructose is the sweetest among all types of sugar. It is found in honey, root vegetables, berries and flowers.
60. (4) Zone melting refers to the process of melting a small part of a crystal and subsequently moving this molten zone along

the crystal. In this process, the impurities in the zone are easily melted leaving behind pure metal.

- 61.** (3) Alum is added to water to destabilise and separate the fine particles suspended in water. This process is used to purify muddy water and is known as coagulation.
- 62.** (1) Calcium sulphate (CaSO_4), also known as the Plaster of Paris, is used for setting broken bones since it is not easily soluble in water and hardens upon hydration.
- 63.** (1) Compounds that are needed for enzymes to function properly are known as vitamins. Vitamins form major parts of enzymes. Enzymes are necessary for digestion of food.
- 64.** (3) Heavy water, also known as deuterium oxide, contains heavy hydrogen which is composed of a hydrogen isotope whose mass is twice the weight of ordinary hydrogen.
- 65.** (4) Diethylamine $[(\text{CH}_3)_2\text{NH}]$ is the strongest base in aqueous solution.
- 66.** (3) In deep sea diving, divers use a mixture of three gases namely, oxygen, nitrogen and helium. A mixture of helium and oxygen is known as Heliox, which has 0% nitrogen content and is used as a breathing gas by deep sea divers.
- 67.** (4) Monosodium phosphate or sodium dihydrogen phosphate has the basicity of one. The basicity of an acid is the number of hydrogen ions, which can be produced by one molecule of the acid.
- 68.** (2) Linseed oil is used for manufacturing paints as it acts as a binding agent for pigments in oil paints.
- 69.** (2) Acid rain occurs due to emissions of sulfur dioxide and nitrogen oxide. These two chemical compounds combine and react together with the water molecules present in the atmosphere to form acids.
- 70.** (1) Sulfur dioxide (SO_2), carbon monoxide (CO) and nitrogen oxides (NOx) are major gaseous pollutants. Hydrocarbons (coal, oil, and natural gas etc.) are not gaseous air pollutants.
- 71.** (1) $\text{Mg}(\text{OH})_2$ or magnesium hydroxide is the main ingredient of milk of magnesia. It has a white milk-like appearance when it is suspended and has low solubility in water.
- 72.** (4) Quicklime or calcium oxide (CaO) is a white alkaline chemical compound which is used for several purposes such as producing aerated concrete blocks, glass, calcium aluminate cement, etc.
- 73.** (2) Plants use carbon dioxide and water to make a sugar called glucose. The glucose is converted into starch and stored by the plants.
- 74.** (3) Fluorosis is caused by the presence of excess fluoride in water. Fluorosis refers to the hypomineralisation of tooth enamel which causes tooth decolouration.
- 75.** (2) Potassium iodide is used to increase iodine's solubility in water by formation of triiodide ions.
- 76.** (3) Potassium cyanide is a colourless crystalline salt which can get dissolved in water easily. It has a similar appearance to sugar and its chemical formula is KCN. KCN has ionic bond between K^+ and CN^- ions. The C and N in CN^- ion are bonded by covalent sigma and pi bonds.
- 77.** (3) Picric acid is a highly nitrated organic compound and acidic phenol. It is one of the most acidic phenols and has a bitter taste.
- 78.** (3) Sulphuric acid, also known as 'oil of vitriol', is an extremely corrosive mineral acid that causes chemical burns on contact. It is used for various purposes, such as cleaning agent, oil refining and wastewater processing.
- 79.** (3) The Bhopal Gas Tragedy was caused by the leakage of methyl isocyanate on the night of 2 December 1984. Around 500,000 people were affected by the incident.
- 80.** (2) A secondary pollutant is not directly emitted in the environment but rather synthesised in the environment through chemical reactions. Peroxyacetyl nitrate is a secondary pollutant commonly found in photochemical smog.

8

COMPUTER KNOWLEDGE

INTRODUCTION

The term computer is derived from the word 'compute'. In simple words, a computer is an electronic device, which receives input from a user in the form of data, such as text, images, and numbers. After receiving the data, the computer waits for the user's instructions to start processing the data. On receiving the instructions, the data is processed by the computer to generate some output, which is displayed to the user. In other words, a computer consists of various hardware and software that work together to receive instructions from the user to generate the required output. Therefore, broadly speaking, a computer performs four tasks: input, processing, output, and storage. The term input means sending the data and instructions to the computer; the term processing means the work done by the computer with the help of hardware and software to produce the desired results; the term output means the result displayed by the computer; and the term storage means the location where the result is saved in the computer or an external storage device, such as pen drive.

VARIOUS TYPES OF COMPUTERS

Computers come in various shapes and sizes. A computer can be as small as your palm; on the other hand, it can occupy several rooms of a building. The computer that you use at your home is commonly known as Personal Computer (PC). Besides shape and size, computers also vary from each other in terms of speed to process the data.

Personal Computer

Today, PCs are generally categorized in a variety of ways. One of the most common ways of categorization is according to their shape and size. Most PCs come in one of the two shapes: desktops and towers. In desktop-based PCs, the System Unit is shaped similar to a rectangular box, which is wider than its height, with the monitor placed on top of the System Unit. On the other hand, the System Unit in tower-based PCs is taller than its width. Desktop-based PCs are less in demand as they are preferred in offices or places where space is less. In contrast, tower-based PCs are quite popular because their hardware is easy to replace and upgrade.

Laptop Computer

Laptops are portable computers that are integrated with display screen, keyboard, trackball, processor, and memory. Laptop computers are also known as notebooks. Entire machinery of laptop computer runs on rechargeable-battery. You can carry a laptop computer anywhere; and therefore, you do not have to stick at one place for working on computer. Laptops are expensive than PCs and they are generally used by users who travel frequently.

Tablet PC with Stylus

For years, computer manufacturers have tried to popularize new data transfer techniques such as handwriting recognition, voice command, and fingerprint authentication. After years of research, Microsoft introduced Tablet PC, which recognizes and understands words written by the user and hosts new features, such as portability, Stylus, and hand writing recognition software. With its electromagnetic pen (also known as Stylus), touch screen, and software, which recognizes letters written on a screen, Microsoft expects that Tablet PCs will replace notepads in the 21st century. The pen can act similar to a mouse when moving over a Tablet PC. When the pen touches the screen, it acts similar to an ink pen, and the user can write directly on the screen.

Mainframe Computer

Mainframe is an industry term for large computers, typically manufactured by a large company, such as International Business Machines (IBM), for commercial applications and other large-scale computing purposes. Historically, a mainframe is associated with centralized computing where different other small computers could simultaneously access the mainframe computer.

Mainframe computers are the large-size computers, which occupy a large air-conditioned room and main memory size of up to 128 Megabyte (MB). As all its peripherals are mounted in large cabinet type of frames, these computers are also known as Big Iron. Such a computer system can be used by 128 users simultaneously in the time-sharing mode, where 128 mini computers can concurrently access the mainframe computer. All the first to third generation computers, which work with the speed of 5 to 100 million

instructions per second, fall under this group. IBM's 308x-580 series, IBM-3090, 4300, 4381, DEC 1090, 10, 20, Cyber's 170, ICL's Series 9, Honeywell's DPS 88/860, Burroughs' 7800, UNIVAC's 1100/60, and ACOS' 100 are the popular mainframe computers.

Supercomputer

By definition, supercomputer refers to a computer having main memory of 256 MBs that works on vector architecture (a hardware and software design of computer which outline the working mechanism of the computer) with 64 bit words and performance peak time in the range of 500 million floating point operations/second (Flops). This operating speed can be compared with the speed of early operating systems, such as ENIAC and Colossus that works at the speed of 100 Flops only.

Supercomputers are the largest, fastest, and most expensive computers currently made. They process data at speeds exceeding 400,000,000 to 600,000,000 operations per second. For example, the supercomputer CRay-2 operates at the speed of 2 billion Flops. CRay-2 can perform calculations in one minute as compared to a PC, which would perform the same calculations in three weeks.

COMPUTER HARDWARE

Hardware refers to the physical parts of a computer. In computer terminology, there are two broad categories of hardware devices – Input Devices and Output Devices. Any device that lets you enter data or instructions is known as Input Device. Common examples of Input Devices are keyboard, mouse, and joystick. On the other hand, any hardware device that displays results is known as Output Device. Common examples of Output Devices are monitor and printer.

Keyboard

The keyboard looks similar to a typewriter. A numeric keypad is located to the right of the keyboard. Numeric keys have the same placement as a 10-key calculator, which allow the operator to enter numbers rapidly. The keyboard is also known as QWERTY keyboard. The name QWERTY for the typewriter keyboard comes from the first six letters in the top-left alphabet row (the one just below

the numbers); and therefore, called the Universal keyboard.

A brief description of various keys present on the keyboard is given as follows:

- **Typewriter keys:** Refer to the normal keys on the keyboard. They include letters, numbers, and punctuation symbols. The typewriter keys are used for typing and designing.
- **Function keys:** Refer to the keys labeled F1 to F12, which are located at the top of the keyboard. The functions they perform depend on the software that you use.
- **Cursor Control keys:** Refer to the Left, Right, Up, and Down arrow keys. These keys enable you to move the cursor to the left, right, up, or down in the screen – one line or one character at a time.
- **Numeric keys:** Refer to the numeric keys, which are located just below the function keys, along with the special characters printed on the topside. In addition, the right-hand side of the keyboard contains the numeric key pad, comprising calculator-like keys. Some of these keys have double functions. The switchover between the two functions of a numeric key pad is controlled by the key marked NUM LOCK. For example, the key marked 7 works as a Home key only when the NUM LOCK key is OFF. When the NUM LOCK key is ON (indicated by the green light on top of the keyboard), the keys marked 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 function as numeric keys, and on pressing any one of them, a number is displayed on the screen.
- **Page Up and Page Down keys:** Refer to the keys that are used to scroll up or down in pages or documents.
- **Home and End keys:** Refer to the keys that take the cursor to the top and end of the document, line, or window.
- **Caps Lock key:** Sets an input mode where the typed letters are uppercase by default. Normally, an alphabet is typed in the lower case. If you press the Caps Lock key once (that is, when the LED status indicator of Caps Lock is lit), any letter you type will appear in the uppercase (capital). This effect can be

reversed by simply pressing the Caps Lock once again.

- **Shift key:** Allows a user to type a single capital letter. Holding the Shift key down and then pressing a letter key creates an upper case letter. However, if the Caps Lock is ON, then this effect is reversed. If there are two symbols or characters on a key, holding down of the Shift key causes the upper symbol on the key to appear. The upper symbols are ~ ! @ # \$ % ^ & * () _ + | : { } “ : < > ?.
- **Ctrl (Control) and Alt (Alternate) keys:** Refer to the keys that are often used in combination with other keys to carry out special actions. For example, pressing the Ctrl and C keys simultaneously aborts the current task or command from being executed in MS-DOS and returns to DOS prompt. In addition, by pressing the Ctrl, Alt, and Delete keys simultaneously, the machine automatically restarts.
- **Enter key:** Allows you to move the cursor to the beginning of the next line. It also returns the control to whatever program or task is currently running; and therefore, it is also referred to as the Return key. The Enter key is mainly used for two purposes – executing a task and sending instructions back to the computer.
- **Tab key:** Allows you to move the cursor along a line to a preset point. It lets you indent paragraphs and line-up columns, text, or numbers. In some software, the Tab key helps you to move from one option to another in a menu.
- **Esc (Escape) key:** Allows you to cancel or ignore the entry or command that you have just entered.
- **Delete key:** Allows you to erase a space or character (one space/character at a time) that is placed to the right side of the blinking cursor.
- **Backspace key:** Allows you to erase the character to the left side of the blinking cursor.

Mouse

Mouse is a hand-held device that allows you to control your computer without typing the instructions from the keyboard. The user places the palm of the hand over the mouse; moves it across a mouse pad and as a result, pointer moves on the screen. You can select icons, open

programs, and select commands present in a program by moving the pointer.

A mouse has a primary button (left button), a secondary button (right button), and a wheel. The primary button is used to carry out majority of tasks; whereas, secondary button is used in special cases, such as opening shortcut menus. You can select icons and commands by positioning the tip of the arrow over the desired choice and clicking the mouse button. A small wheel between the mouse buttons let you scroll documents and Web pages. To scroll down, roll the wheel backward (towards you) and to scroll up, roll the wheel forward (away from you).

Some mouse devices are wireless, which means that they are not physically connected to the computer. Instead, they rely on infrared or radio waves to communicate with the computer. Cordless mouse devices are more expensive than both serial and bus mouse devices, but they do eliminate the cord, which can sometimes get in the way.

Monitor

The monitor of a PC works similar to a television screen. It displays text characters and graphics in colors or shades of grey. The monitor is sometimes also known as screen, display, or a Cathode Ray Tube (CRT). Anything typed on the keyboard is displayed on the monitor. In addition, when a program is executed, the results are displayed on the monitor. However, the results on the monitor are shown only temporarily and are not permanent unless they are saved in the hard disk.

At present, two types of monitors are available in the market – CRT and Liquid Color Display (LCD) monitors. LCD monitors are quite popular these days because of their better display, good performance, and slim and wide screen.

Printer

A device that prints images (numbers, alphabets, or graphs) on paper is known as printer. After creating a document on the computer, you can send it to the printer for printing its hard copy, which is generally called a printout. The speed of a printer is rated by either Pages Per Minute (PPM) or Characters Per Second (CPS). You

can take the printouts in either full colors or black color. Printers, which can print in full colors, are expensive. Different types of printer are given as follows:

- **Dot Matrix printer:** Refers to a printer that uses pins and ink soaked ribbon. A dot matrix printer makes use of pins instead of hammer. The pins strike an ink ribbon. As each pin hit the ink ribbon, a dot appears on the paper, and combinations of dots form characters and illustrations. A dot matrix printer can print 1 to 18 pages in one minute. The role of dot-matrix printer is now restricted upto printing invoices and bills.
- **Inkjet printer:** Refers to a printer that sprays ink on a sheet of paper. The printer sprays little droplets of color in a pattern on the paper at a very fast speed. These tiny droplets form the character or image on the paper. Ink-jet printers produce high-quality text and graphics. An inkjet printer can print 4 to 6 pages in one minute. Nowadays, Inkjet printers can also produce photostat copy of any image or document. Due to their low price and affordability, the inkjet printers are popular in homes.
- **Laser printer:** Refers to a type of printer, which uses a laser beam and rolling drum to produce a high quality printout. At the time of printing, the laser beam creates a pattern of images and letters on the rolling drum. The pattern of images or letters is known as image of the document. After the image of the document is formed, the printer spreads black powder (known as toner) on drum. The paper coming from the tray of the printer passes through the rolling drum and an image of the document appears on the paper. Before the paper comes out of laser printer, it passes through a set of heated rollers (known as fuser) which firmly pastes the powder on the paper. Finally, you get the printout in the out-bin of the printer.
- **WorkCenter Printer:** Refers to a printer that is new in the field of laser printing technology. It is the multifunctional printer, which provides complete ease to the user. With the help of the WorkCenter printer, you can print, fax, e-mail, and scan a document simultaneously. The WorkCenter printer is quite large as it contains numerous features.

Speakers

Nowadays, every computer comes with a set of two speakers. While buying a speaker, you can ensure that it has a built-in amplifier and it is magnetically shielded so that it does not interfere with the picture quality of the monitor.

SCANNER

Scanner is a device that can transfer typed or handwritten texts, graphs, diagrams, and photographs to the computer. Instead of making a duplicate copy on paper of the required data or photograph, scanner stores them in the memory of the computer. Scanners can be used in storing photographs and important documents in their original forms. They may also be used to take enormous text material that otherwise would be very tedious to type manually.

SYSTEM UNIT

System Unit is the most important part of a computer system and it resembles the shape of a rectangular box. On a System Unit, you find some buttons and disk drives at the front side and sockets of different shapes and sizes at the backside. All devices, such as keyboard, mouse, monitor, printer, and speakers, are all linked to the System Unit through cables, which are plugged into the backside of the System Unit. The core devices of computer system are kept safely inside the System Unit. The core devices include motherboard, Central Processing Unit (CPU), Basic Input/Output Software (BIOS), Random Access Memory (RAM), hard disk, and power supply box.

Front Side of the System Unit

The various components seen in the front part of a System Unit are given as follows:

- **Power switch:** The power on/off switch is used to turn on or off the power to the PC.
- **Reset button:** This button helps you to restart your computer without disconnecting the power supply.
- **Lights:** The front panel of the System Unit may display a variety of colored indicator lights. These lights are used to indicate whether the hard disk, the

floppy disk, or the Compact Disc-Read Only Memory (CD-ROM) is being read or written.

- **DVD/CD Combo Drive:** A simple combo drive allows you to save data on Compact Disk (CD) and access the data in a Digital Video Disk (DVD), but it does not let you save any data on DVD. For saving data on DVD, you need an enhanced version of combo drive, which includes functionality to save data on DVD.

Backside of the System Unit

The backside of the System Unit contains various connection points of different shapes. These connection points are known as Ports. Generally, PCs have three types of ports: Parallel, Serial, and Universal Serial Bus (USB).

- **Serial port:** Refers to a general-purpose port that can be used for almost any type of device, including modems, mouse, and keyboard. Most PCs are fitted with two serial ports.
- **Parallel port:** Refers to a port, which is used to connect a printer to the computer. Very often, it is referred to as the printer port.
- **USB port:** Refers to a plug-and-play port. You can attach devices, such as audio players, joysticks, keyboards, telephones, scanners, and printers. With USB, a new device can be added to your computer without adding additional hardware or even having to turn the computer off. A single USB port can be used to connect up to 127 peripheral devices.
- **Power socket:** Refers to a socket, which supplies the electricity to a computer. A power cable is plugged into the power socket, which carries the power from the electrical outlet to the System Unit and from the System Unit to your monitor.
- **Fan:** Refers to an exhaust fan located at the backside of a System Unit. When you are working on a computer, its machinery produces lot of heat. If this heat does not move out from the System Unit, it can cause havoc to the computer machinery. The fan stops this from happening. As soon as you switch on the computer, the fan starts to rotate and throws out the heat from the System Unit. The fan keeps on rotating by the time you do not switch off the computer.

Inside the System Unit

The System Unit of your computer is a complex machine. It contains several devices and chains of colored electronic wires running from one end to another. If you look inside the System Unit, you will find green boards with circuit paths and soldering joints. These boards play essential role in running your computer.

Motherboard

A motherboard is the physical arrangement in a computer that contains the computer's basic circuitry and components. On a typical motherboard, the circuitry is imprinted or affixed to the surface of a firm planar surface and usually manufactured in a single step. The motherboard contains the connectors for attaching additional boards. Typically, the motherboard contains the controllers for all standard devices, such as the display screen, keyboard, and disk drive. Collectively, all chips that reside on the motherboard are known as the motherboard's chipset. The motherboard is also called a Printed Circuit Board (PCB). As technology advances, motherboards now come with dual processors capability, which means that two processors can work simultaneously and deliver results at an amazing speed.

Central Processing Unit

The CPU is the brain of a computer. It looks similar to a small chip and it is placed on the motherboard. The power of a CPU lies in its ability to process data rapidly and flawlessly. The speed of the CPU is measured in MegaHertz (MHz). Over the years, there has been a gradual improvement in the speed of a computer. Intel, which is one of the biggest software companies in the world, has manufactured Core series of processors. The Core series of processors are successors of Pentium IV series processors. As of June 2017, the lineup of Core processors included the [Intel Core i9](#), [Intel Core i7](#), [Intel Core i5](#), and [Intel Core i3](#), along with the Y - Series Intel Core CPUs. Apart from the Core series, other processors include Intel Pentium, Celeron, and AMD.

Two typical components of a CPU are given as follows:

- **The Arithmetic Logic Unit (ALU):** Performs the arithmetic and logical operations
- **The control unit:** Extracts instructions from memory, decodes, and executes them. To perform the arithmetic or logical operation, the control unit takes the help of ALU.

Basic Input Output Software

BIOS is built-in software, which keeps track of all devices attached to the computer and provides inter-communication channel between listed devices. These listed devices include keyboard, monitor, disk drives, and a number of other miscellaneous devices. Older computers contained read-only BIOS that could not be altered. This means that new components could not be added to the computer because the BIOS would not know how to communicate with them. This limited the user's ability to upgrade their computers; therefore, flash BIOS was introduced. Nowadays, when a new component is installed in the computer, the flash BIOS can be electronically upgraded so that it can recognize and communicate with the new devices.

The BIOS is typically placed in a ROM chip that comes with the computer (it is often called a ROM BIOS). This ensures that the BIOS will always be available and will not be damaged by disk failures. BIOS also makes it possible for a computer to boot itself.

Memory

Every computer system has a certain amount of storage capacity for running programs and storing data. Such storage capacity of computer is known as memory. When computers refer to memory or storage, they refer to terms using the following forms of measurement:

- 8 bits (characters) = 1 byte
- 1024 bytes = 1 Kilobyte (KB)
- 1024 Kilobytes = 1 MB
- 1024 MBs = 1 Gigabyte (GB)

Based upon the purpose and function, memory is divided into two categories – Primary memory and Secondary memory. The Primary memory is directly used by the CPU for executing instructions. The example of Primary memory is RAM. On the other hand, the Secondary memory is used for storing and retrieving data. The example of Secondary memory is hard disk. Let's learn about Primary and Secondary memories in detail.

Primary Memory

Every computer has internal storage device, which is directly accessible to the CPU. Such temporary internal storage device is known as Primary memory of computer, which is also referred to as RAM. It is a rectangular chip, which works closely with CPU. The CPU reads the

instructions stored into RAM and executes them. Any data actively operated on is also stored in the RAM.

RAM is much faster to read from and write to than the other kinds of storage devices, such as hard disk, floppy disk, and DVD. However, the data in RAM stays as long as your computer is running. When you turn the computer off, RAM loses its data. When you turn on your computer again, the operating system and other files are once again loaded into RAM. In order words, RAM is a volatile memory. RAM chips are available in the memory sizes of 512 MB, 1 GB, 2 GB etc.

The two types of RAM are Static RAM (SRAM) and Dynamic RAM (DRAM). DRAM needs to be refreshed thousands of times per second. SRAM does not need to be refreshed, which makes it faster; but it is also more expensive than DRAM. Both types of RAM are volatile, which means that they lose their contents when the power is turned off.

Secondary Memory

Any internal or external storage device used by the user for storing data and programs is known as Secondary memory of the computer. The Secondary memory differs from the Primary memory in that it is not directly accessible by the CPU. In addition, Secondary memory devices do not lose the data when the computer is turned off; therefore, it is a non-volatile memory. In modern computers, hard disks are generally used as secondary storage. The hard disk is a device, which stores all programs and data in the computer. Therefore, the hard disk is referred to as the memory bank of a computer. The hard disk is placed inside the System Unit and connected to the motherboard for functioning. Nowadays, the capacity of the hard disk is measured in GBs. Earlier the memory capacity of computers was limited to few MBs. However, today, PCs having hard disks of capacities such as 250 GB, 500 GB or 1 TB are popular. Larger the hard disk capacity, more the amount of software programs and information that can be stored in it.

Note: The description of important components of hard disk is listed as follows:

- **The Platters:** These are the actual disks inside the drive that store the data. Most drives have at least

two platters; and larger the storage capacity of the drive, the more platters there are. Each platter can store data on each side, so a drive with two platters has four sides to store data.

- **The Spindle and Spindle Motor:** The platters in a drive are separated by disk spacers and are clamped to a rotating spindle that turns all the platters in unison. The spindle motor is built right into the spindle or mounted directly below it, and spins the platters at a constant set rate ranging from 3,600 to 7,200 Rotation Per Minute (RPM).
- **The Read/Write Heads:** The read/write heads read and write data to the platters. There is typically one head per platter side, and each head is attached to a single actuator shaft so that all the heads move in unison. When one head is over a track, all the other heads are at the same location over their respective surfaces. Typically, only one of the heads is active at a time, that is, you can either read or write the data at a time. The space between the platter and the head is so minute that even one dust particle or a fingerprint could disable the spin.
- **The Head Actuator:** All the heads are attached to a single head actuator or actuator arm that moves the heads around the platters.

Besides hard disk, following are some external storage devices that can also be treated as Secondary memory of computer:

- **CD/DVD:** Unlike floppy and hard disks, which use electromagnetism to encode data, optical disk drive uses a laser beam to read and write data. Optical disks have very large storage capacity, but they are not as fast as hard disks. In addition, the inexpensive optical disk drives are read-only. However, with the advancement in technology, read/write CD and DVD are now available in the market.
- **Blu-ray Disc:** A Blu-ray Disc (also known as Blu-ray or BD) is an optical disc storage media format. Blu-ray disc is primarily used to store high-resolution videos and pictures and large volume of data. The disc has the same dimensions as a standard DVD or CD. The name Blu-ray Disc is derived from the blue-violet laser used to read and write this type of disc. A

Blu-ray Disc can store data more than the DVD. A dual layer Blu-ray Disc can store data of 50 GB, almost six times the capacity of a dual layer DVD.

- **USB Flash Drive:** USB flash drive (also called data or memory stick) is a type of flash memory data storage device integrated with a USB connector. USB flash drive is typically small, lightweight, removable, and rewritable. USB flash drives offer potential advantages over other portable storage devices, particularly the floppy disk. They are more compact, faster, hold more data, are more reliable due to their lack of moving parts, and have a more durable design. Additionally, it has become increasingly common for computers to ship without floppy disk drives. USB ports, on the other hand, appear on almost every current mainstream PC and laptop. These types of drives use the USB mass storage standard, supported natively by modern operating systems such as Windows, Mac OS X, Linux, and other Unix-like systems. Flash drives are active only when plugged into a USB connection and draw all necessary power from the supply provided by that connection. These drives will not work unless plugged directly into a host controller (that is, the ports found on the computer itself) or a self-powered hub.

Other Hardware Devices

Computer system comes with hardware devices that you can use to communicate with your friends over the Internet. Besides conversing with your friends, you can use communication devices to access various educational and entertainment resources available on the Internet. Some devices come in-built within the computer, while others can easily be attached to your computer.

Modem

The modem is technically called the *Modulator-Demodulator*. It is an electronic device, which helps transmit programs and data locally or around the world through the telephone lines. The main function of a modem is to transform digital signals into analog signals and vice versa. With a modem, you can subscribe to a growing number of online and bulletin board services or

communicate with other computers located elsewhere, which have modems attached to them. A modem may be a card mounted inside the PC (an internal modem), or it may be a separate piece of equipment that connects to the serial port of the PC through a cable (an external modem). Telephone lines then connect the modem to the telephone service. Modems incorporate a diverse range of features such as electronic mail, banking, travel, and reservations. Some modems contain software that allows documents or files created on your computer to be sent to fax machines.

Web Camera

A Web camera is a video camera, which is usually attached directly to a computer. Web cameras can be easily used by connecting them through a USB port and installing software, which comes along with the Web camera. The software installed on your PC for the Web camera allows you to take a frame of an image periodically, and send it to another user connected with your computer through the Internet. It is necessary that the other user connected to your computer must have a Web camera; otherwise, the other user will not be able to see the images. Nowadays, Web camera is very popular while chatting on the Internet.

Headphone and Mike

If you like the computer environment to be quiet, you must purchase a good quality headphone. It also ensures that while doing multimedia tasks on computer, only you will hear the resultant sound. Nowadays, mike also comes with headphone. You can use headphone and mike for voice based chatting and making phone calls over the Internet. With a headphone, you can hear the voice and speak to your friend using the mike simultaneously.

COMPUTER SOFTWARE

Software of a computer works as a brain of a computer. It can be defined as the set of programs necessary to carry out operations for a specified job. Computer programs are step-by-step instructions that tell the computer how to carry out operations for a specific job. Software can be divided into two groups: System and Application.

System Software

This consists of all the programs, languages, and documentation supplied by the manufacturer of the computer. This type of software is required to use the computer efficiently and conveniently. These programs allow the application developer to write and develop their own programs. Examples of system software are Operating Systems (Windows XP, Windows Vista, and Windows 7) and Drivers (Sound card driver and Display Driver).

Application Software

It is impossible to imagine the survival of the modern world without computers. Whether it is a small super market or a large business house, computers are used everywhere. We depend on computers for everything from paying electricity bills to withdrawing money from a bank. Following are various types of programs used to manage different types of information:

- **Word Processing Program:** Enables the PC to function similar to a sophisticated typewriter. This software allows you to type a letter or report, and change words or move blocks of text with ease. Further, word processing programs also count your words and even check spellings. Amongst the various word processing programs, Microsoft Word 2010 and Microsoft Word 2007 are the most popular ones.
- **Spreadsheet Program:** Refers to a program that is meant for those who need to do a lot of calculation or financial planning. A spreadsheet is made up of cells arranged in a grid. Each cell can contain a number, text, or formula. Sometimes a spreadsheet program may include charting tools that allow you to plot the values stored in rows or columns as a graph or chart. Microsoft Excel is so far the most popular spreadsheet program with computer users.
- **Database Program:** Refers to a program that is useful for storing, sorting, and retrieving large amount of data. Invoices or orders, which may be in large numbers, can be managed better by using a

database program. Database software allows you to add new information, search through previously stored data, and take the printout of records. An organization, for example, might require a database about its various products, suppliers, employees, and customers. Doctors, on the other hand, may need to maintain databases about patients and their individual medical histories. Today, the most widely used database program is Microsoft Access.

- **Presentation Program:** Enables you to represent information in a number of attractive formats. These programs are very useful for people who need to prepare reports and proposals very frequently. The most commonly used presentation program is Microsoft PowerPoint.
- **Browser:** Refers to a software application used to locate and display Web pages. The two most popular browsers are Netscape Navigator and Microsoft Internet Explorer. Both of these are graphical browsers, that is, they can display graphics as well as text. In addition, most modern browsers can present multimedia information, including sound and video, though they require plug-ins for some formats. Another type of browser is Opera.
- **Personal Information Manager (PIM):** Refers to a type of software application designed to help users organize information, such as e-mails, reminders, lists, and dates, and to link these information together in useful ways. Many PIMs, such as Outlook that comes with the MS Office package, include calendar, scheduling, and calculator programs. Using Outlook, you can easily organize the contacts, phone numbers, set a reminder for a meeting or task.
- **Multimedia Software:** Allows a user to easily create animations and modify them using such programs. Using these programs, you can create 3D objects, move objects on a definite or a random path, and animate objects in a number of ways. Some of the examples of the multimedia programs are Flash, Director, Maya, and Sound Forge.

PRACTICE QUESTIONS

Answer the following questions by selecting the most appropriate option.

- 1. Windows Explorer is also known as**
(1) USB (2) File manager
(3) Web browser (4) Internet server
- 2. Which of the following shortcut keys is used to copy formatting?**
(1) Ctrl+C (2) Shift+C
(3) Ctrl+Shift+C (4) Alt+C
- 3. Which of the following peripheral devices is used to play computer games?**
(1) Light pen (2) Joystick
(3) Track ball (4) Digitiser
- 4. Which of the following devices is similar to a DVD-RAM, except that it has more storage capacity?**
(1) CD-RW (2) Solid State Drive
(3) CD-R (4) Blu-ray Disk
- 5. Integrated circuit is:**
(1) called a microelectronic circuit
(2) a collection of transistors only
(3) a large circuit
(4) a collection of capacitors and resistors only
- 6. Which of the following components of the motherboard controls data flow between a processor, RAM and cache, system buses and peripheral devices?**
(1) BIOS (2) Chipset
(3) Clock generator (4) Voltage regulator
- 7. Which of the following is not a computer language?**
(1) High-level language
(2) Machine language
(3) Low-level language
(4) Medium-level language
- 8. Which of the following is generally used for selecting or highlighting?**
(1) Icon (2) Keyboard
(3) Mouse (4) Floppy Disk
- 9. Which of the following is an example of system software?**
(1) Windows (2) Solaris
(3) Mac (4) All of these
- 10. In MS Word, _____ is a predefined decorative text that you can add to a document.**
(1) ClipArt (2) SmartArt
(3) Charts (4) WordArt
- 11. Which of the following is a portable computer?**
(1) Supercomputer (2) Mini computer
(3) Desktop (4) PDA
- 12. BIOS in a computer system refers to:**
(1) Bipolar Input/Output System
(2) Basic Input/Output System
(3) Basic Interactive Output System
(4) Basic Instruction Organised System
- 13. Which of the following techniques can be used to store a large number of files in a small amount of storage space?**
(1) File adjustment
(2) File copying
(3) File compatibility
(4) File compression
- 14. What is the name of the program that controls computer?**
(1) Operating system
(2) An application program
(3) A browser
(4) File Manager
- 15. What does the CTRL+A shortcut keys combination allow you to do in MS-Word?**
(1) Bold highlighted selection
(2) Open the print window
(3) Select all contents of the page
(4) Copy selected area
- 16. What does URL stand for?**
(1) Uniform Reverse Location
(2) Universal Resolution Location
(3) Universal Resource Locator
(4) Uniform Resource Locator
- 17. To view information on the Web, you must have a**
(1) Cable modem
(2) Web browser
(3) Domain name server
(4) Hypertext viewer
- 18. HTML stands for:**
(1) Hypertext Markup Language
(2) Hyper Manual Language
(3) High Textual Manual Language
(4) High Text Mark Language
- 19. C++ is a:**
(1) High level language
(2) Compiler
(3) Hardware device driver
(4) Programming mid-level language
- 20. Windows XP is a:**
(1) Multiprogramming operating system
(2) RTOS
(3) Multiprocessing operating system
(4) Batch operating system

- 21. What is the full form of FTP?**
(1) File Translate Protocol
(2) File Typing Protocol
(3) File Transit Protocol
(4) File Transfer Protocol
- 22. Which among the following is not a Web browser?**
(1) Internet Explorer (2) Netscape Navigator
(3) Microsoft Edge (4) Windows Explorer
- 23. A _____ is used to read handwritten or printed text to make a digital image that is stored in memory.**
(1) Printer (2) Laser beam
(3) Scanner (4) Touchpad
- 24. Specialised programs that assist users in locating information on the Web are called**
(1) Information engines (2) Locator engines
(3) Web browsers (4) Search engines
- 25. A general purpose application software that helps you to organise information is called:**
(1) Word processing
(2) Database program
(3) Desktop publishing software
(4) Personal Information Manager
- 26. Two files can be given the same name if**
(1) they have different file name extensions.
(2) they are located in two different folders.
(3) they are located in the Documents folder.
(4) both (1) and (2)
- 27. Which of the following statements is not true about cache memory?**
(1) Cache memory is a form of Read Only Memory (ROM).
(2) It is directly associated with the microprocessor.
(3) Cache memory can be accessed much faster by a microprocessor in comparison to a RAM.
(4) Cache memory is sometimes called CPU memory.
- 28. How many bits are equivalent to one nibble?**
(1) 2 bits (2) 4 bits
(3) 6 bits (4) 8 bits
- 29. Which of the following is the fastest memory?**
(1) Hard disk (2) Cache memory
(3) DVD ROM (4) Floppy disk
- 30. Which of the following is not an application software?**
(1) MS Word (2) Adobe Photoshop
(3) MS Excel (4) None of these
- 31. Which of the following categories of software allows you to do mathematical or financial calculations?**
(1) Word processing program
(2) Spread sheet program
(3) Presentation program
(4) Database program
- 32. Web pages are created by using**
(1) MTP (2) HTML
(3) Usenet (4) internet
- 33. Whatever we type, submit or transmit to a computer system is called _____.**
(1) input (2) output
(3) data (4) memory
- 34. An input device that utilises a light-sensitive detector to select objects on a display screen is known as _____.**
(1) Optical scanner (2) Touchscreen
(3) Light pen (4) Mouse
- 35. Which of the following is a small microprocessor-based computer designed to be used by one person at a time?**
(1) Netbook (2) Supercomputer
(3) All-in-one (4) Personal computer
- 36. Which of the following is a translator program used in assembly language?**
(1) Compiler (2) Interpreter
(3) Translation (4) Assembler
- 37. Which of the following is created for performing particular tasks in a computer system?**
(1) System software
(2) Application software
(3) Utility programs
(4) Operating system
- 38. Which of the following key combinations is used to apply justified alignment of text in a Word document?**
(1) Ctrl + C (2) Ctrl + V
(3) Alt + Shift + J (4) Ctrl + J
- 39. A handheld device that allows you to control your computer without having to type instructions from a keyboard is**
(1) tablet (2) PDA
(3) mouse (4) mike
- 40. The _____ memory is closely related to the processor.**
(1) ain (2) secondary
(3) disk (4) internal
- 41. Hard disc drives are considered as _____ storage.**
(1) flash (2) temporary
(3) worthless (4) non-volatile
- 42. Which one of the following computers is the fastest, biggest and most expensive?**
(1) Supercomputer (2) Laptop
(3) Personal Computer (4) Notebook

- 43. Which of the following shortcut keys represent the correct sequence for Copy, Paste and Cut commands?**
- (1) Ctrl + V; Ctrl + C; Ctrl + X
 - (2) Ctrl + C; Ctrl + V; Ctrl + X
 - (3) Ctrl + X; Ctrl + C; Ctrl + V
 - (4) Ctrl + C; Ctrl + X; Ctrl + V
- 44. What is a PowerPoint presentation?**
- (1) It is a collection of images.
 - (2) It is a series of slides.
 - (3) It is a collection of animations.
 - (4) It is a collection of transitions.
- 45. Which of the following devices is used to connect your computer to the Internet?**
- (1) Processor
 - (2) Motherboard
 - (3) USB Drive
 - (4) Modem
- 46. An operating system that allows only one user to work on a computer at a time is known as**
- (1) single-user operating system
 - (2) multi-user operating system
 - (3) single-tasking operating system
 - (4) multi-tasking operating system
- 47. Which of the following statements is true about a firewall?**
- (1) It is software.
 - (2) It is a hardware device.
 - (3) It can be hardware or software or a combination of both.
 - (4) It joins two networks together.
- 48. Which of the following is the activity of purchasing items and products from different websites on the Internet and using online modes, such as credit cards and debit cards, to make the payments?**
- (1) E-banking
 - (2) Online shopping
 - (3) Online reservation
 - (4) M-reservation
- 49. Which of the following manages computer resources?**
- (1) ALU
 - (2) Bus
 - (3) Control processing unit
 - (4) I/O unit
- 50. Which part of the computer system is responsible for calculating and comparing tasks?**
- (1) Disk unit
 - (2) Control unit
 - (3) ALU
 - (4) Modem

ANSWERS AND EXPLANATIONS

1. (2) Windows Explorer is also known as file manager. It is one of the most essential components of Windows operating system to manage files and folders on your computer.
2. (3) The Ctrl+Shift+C key combination allows you to copy the formatting of a selected text. You can also click the Format Painter button to copy formatting.
3. (2) A joystick is a handheld device that is used to control the movement of cursor or other graphic elements of video games.
4. (1) CD-RW and DVD-RAM are optical storage devices. Both these devices can be used for running programs from the discs, copying files, rewriting and deleting files from the discs. However, DVD-RAM has more storage capacity than CD-RW.
5. (1) Integrated circuit is also known as a microelectronic circuit or chip that is small circuit containing active devices including transistors and diodes, and passive devices including capacitors and resistors.
6. (2) A motherboard chipset controls data flow between a processor, RAM and cache, system buses, and peripheral devices. Motherboards consist of two distinct chipsets namely Northbridge and Southbridge. The Northbridge chipset examines the communication and throughput speed between a processor, memory, and graphic card. The Southbridge chipset examines serial and parallel ports, USB support, and power management functions.
7. (4) In a computer system, there are only three types of languages to perform different types of work on the computer, which are high-level, low-level, and machine languages.
8. (1) Generally, we can use mouse for selecting or highlighting object.
9. (4) Windows, Solaris, Mac and Android are examples of operating system that comes under the category of system software.
10. (4) WordArt includes predefined and predecorated text that can be added to a document for enhancing its appearance. You can also customise the font size and font colour of the WordArt.
11. (4) A PDA is a lightweight and handheld computer with communication capabilities. It is primarily used as a personal organiser. Thus, PDA is a portable computer.
12. (2) BIOS in the computer system refers to Basic Input/Output System. It refers to a computer program used at the time of startup.
13. (4) File compression is the technique used to store the large file in a small storage space. It compresses the content of the file in such a way that there is no harm done on the file content and quality.
14. (1) Operating system is the system software used to give commands and instructions to a computer system. Moreover, it controls the functions of the computer system (hardware and software).
15. (3) The CTRL+A shortcut keys combination is used to select the entire content of the word document.
16. (4) URL denotes a unique identifier to files, services or websites present on the World Wide Web (WWW).
17. (2) To view information on the Web, you must have a Web browser installed on your computer. A Web browser is a software program that helps to access the websites and Web pages by using their uniform resource locaters (URLs) on the computer.
18. (1) Hypertext Markup Language (HTML) refers to a markup language commonly used for creating Web pages and Web applications.
19. (1) C++ is an object oriented high level language. It is a successor of C language.
20. (3) Multiprocessing operating system executes multiple programs simultaneously on a computer that has several CPUs, such as mainframes and supercomputers. Some examples of multiprocessing operating systems are Linux, UNIX, Windows 2000, Windows XP, Windows 7, Windows 8 and Mac.
21. (4) FTP stands for File Transfer Protocol. It is an application layer protocol used to exchange files between computers over a TCP/IP network.
22. (4) Windows Explorer is a file manager in Windows operating system.
23. (3) A scanner is an input device that scans images, printed text, or an object and converts it into a digital image.
24. (4) Search engine is a software program used to find information from the Internet on the basis of the keyword or keyword phrase entered into the search box.

25. (4) Personal Information Manager (PIM) helps you to organise information. One of the most commonly used PIM is MS Outlook.
26. (4) Two files can be given the same name either when they are located at two different locations/folders or their file name extension is different.
27. (1) Cache memory is a form of Random Access Memory (RAM) that is directly associated with the microprocessor.
28. (2) One nibble is equivalent to 4 bits. It is also known as half byte.
29. (2) Cache memory is a form of RAM that is directly associated with the microprocessor. A microprocessor can access cache memory more quickly than a regular RAM. Hard disk, DVD ROM and floppy disk are secondary memory devices and are much slower than cache memory.
30. (4) The software that defines a set of programs to perform some specific operations is known as application software. MS Word is a word processing application. MS Excel is a spreadsheet application. Adobe Photoshop and Adobe Flash are multimedia applications designed by Adobe Inc.
31. (2) A spread sheet program allows users to perform mathematical or financial calculations. An example of a spread sheet program is MS Excel.
32. (2) Hyper Text Mark-up Language (HTML) is used to create Web pages.
33. (1) Input is the raw data or information that is sent to a computer for processing to generate output.
34. (3) A light pen is a pointing device that uses a photoelectric (light-sensitive) cell to indicate a position on the display screen.
35. (4) Personal computers (PCs) are designed for a single user. They come with built-in memory and a small microprocessor.
36. (4) An assembler translates a program written in an assembly language into machine language.
37. (2) Application software is a computer program built to execute or allow the execution of special tasks on a computer. For example, Word allows you to create specialised documents including newsletters, memos, etc. instead of creating a database. For creating a database, a specialised database application is available including MS Access, Oracle, etc.
38. (4) Ctrl+ J key combination is used for justifying the text in a Word document.
39. (3) A mouse is a handheld device that allows you to control your computer without typing instructions from the keyboard. By using a mouse, you can select icons, open programs and select commands present in a program by moving the pointer.
40. (1) The main memory is closely related to the processor. Therefore, the data available in the main memory is processed much faster than those in the secondary memory.
41. (4) Hard disc drives are non-volatile storage devices as the data saved on these are not lost when the power is turned off.
42. (1) Supercomputers are the most powerful and expensive computers. These have the ability to process trillions of instructions per second.
43. (2) To copy a text or an object, you need to use the Ctrl + C keys. To paste the copied or cut text or object, you need to press the Ctrl + V keys. To cut a text or an object, you need to press the Ctrl + X keys.
44. (2) A PowerPoint presentation is typically an arrangement of slides containing text, graphics or other media.
45. (4) Modem is a networking device used to send and receive data over the Internet.
46. (1) A single-user operating system allows only one user to work on a computer at a time. An example of a single user operating system is MS-DOS.
47. (3) A firewall is a security device that can be implemented as hardware or software or combination of both. It is used to provide security to the computer network by filtering incoming and outgoing network traffic.
48. (2) The activity of purchasing items from different websites on the Internet is known as online shopping.
49. (3) In a computer system, central processing unit (CPU) has three chief components: ALU, control unit and I/O unit. CPU is the brain of a computer, which helps to process data and provide the result. Control unit is the one that manages computer resources.
50. (3) All calculations and logical work in the computer system is done by ALU, i.e., arithmetic logic unit.

9

GENERAL KNOWLEDGE**Famous Temples**

The following table depicts the famous temples in India:

Temple Name	Place
Kashi Vishwanath	Varanasi, Uttar Pradesh
Lord Jagannath Temple	Puri, Odisha
Venkateshwara Tirupati Balaji	Andhra Pradesh
Vaishno Devi Temple	Jammu and Kashmir
Somnath Temple	Gujarat
Kamakhya Temple	Assam
Mahabodhi Temple	Bihar
Siddhivinayak Temple	Maharashtra
Ramnathaswamy Temple (Rameshwaram)	Tamil Nadu
Shirdi Sai Baba Temple	Maharashtra

Tribes in India

The following table shows tribes living in different states/UTs in India:

States/UTs	Tribes
Andhra Pradesh	Chenchus, Gonds
Arunachal Pradesh	Abors, Aptanis
Assam	Khasis, Mikirs
Jharkhand	Gonds, Mundas, Oarons, Santals
Chhattisgarh	Gonds, Helbis, Kamars, Oraons
Gujarat	Bhils
Himachal Pradesh	Bhot, Gaddis, Gujjars
Kerala	Uralis
Madhya Pradesh	Baiga, Bhils, Gonds,

States/UTs	Tribes
Maharashtra	Bhils, Warlis
Manipur	Kuki
Meghalaya	Garos, Khasis
Mizoram	Lushais
Nagaland	Nagas
Orissa	Chenchus, Gonds, Mundas, Oraons, Santals
Rajasthan	Bhils
Sikkim	Lepchas
Tamil Nadu	Badagas, Kotas and Todas (Nilgiri region)
Tripura	Chakma
Uttarakhand	Bhotias
Uttar Pradesh	Khas (Jaunsar-Babar region)
West Bengal	Mundas, Oraons, Santals (Birbhum region in W.B.)
Andaman and Nicobar Islands	Jarawas, Onges, Sentinelese, Shompens

Tribal Festivals in India

The following table shows the major tribal festivals and events in India:

S. No.	Festival Name	State
1.	Thaipuism Festival	Tamil Nadu
2.	Jallikattu	Tamil Nadu
3.	Thimithi	Tamil Nadu
4.	Kila Raipur Rural Olympics	Punjab
5.	Puli Kali	Kerala
6.	Nag Panchami	All over India
7.	Madai Festival	Chhattisgarh
8.	Bhagoriya Festival	Madhya Pradesh
9.	Mim Kut Festival	Mizoram
10.	Sekrenyi Festival	Nagaland
11.	Tsukhenyi Festival	Nagaland
12.	Aoleang Festival	Nagaland
13.	Moatsu Festival	Nagaland
14.	Miu Festival	Nagaland
15.	Tulini Festival	Nagaland
16.	Nazu Festival	Nagaland
17.	Metemneo Festival	Nagaland
18.	Amongmong Festival	Nagaland
19.	Tokhuemong Festival	Nagaland
20.	Ngada Festival	Nagaland and Assam
21.	Nga-Ngai Festival	Nagaland

S. No.	Festival Name	State
22.	Karama Festival	Bihar, Madhya Pradesh and Odisha
23.	Sume-Gelirak Festival	Odisha
24.	Bija Pandu Festival	Odisha
25.	Bohaggiyo Bishu Festival	Assam
26.	Sammakka Saralamma Jatara	Telangana
27.	Dree Festival	Arunachal Pradesh
28.	Pongtu Kuh Festival	Arunachal Pradesh
29.	Vautha Mela	Gujarat
30.	Minjar Festival	Himachal Pradesh
31.	Behdienkhlam	Meghalaya
32.	Bani Festival	Andhra Pradesh
33.	Made Made Snana	Karnataka
34.	Dhinga Gavar Festival	Rajasthan
35.	Agni Keli	Karnataka
36.	Aadi Festival	Tamil Nadu

Dance Forms in India

The following table depicts the major dance forms in the Indian states/UTs:

States/UTs	Dance Forms
Andhra Pradesh	Kuchipudi, Kottam
Arunachal Pradesh	Lion and Peacock dance, Chalo, Popir, Bardo Chham, Aji Lamu
Assam	Ojapali, Bihu, Ankia Nat
Bihar	Jata Jatin, Faguna or Fag, Purbi, Bidesia
Gujarat	Dandya Ras, Garba Lasya Nritya, Bhavai, Garba, Rasila
Haryana	Swang, Khorla, Gugga dance
Himachal Pradesh	Luddi Dance, Munzra, Kanayala
Karnataka	Yakshagana, Bayalata, Simha Nrutya
Kerala	Chakiarkoothu, Kathakali, Mohiniattam
Madhya Pradesh	Macha, Lota, Pandvan, Tertali, Charkula, Jawara
Maharashtra	Tamasha, Dahi Kala, Lavani, Lezim
Manipur	Thangta, Dhol cholom
Mizoram	Chiraw (Bamboo Dance)

States/UTs	Dance Forms
Punjab	Bhangra, Giddha, Daff, Dhaman, Malwai
Rajasthan	Ghumar, Chakri, Gangaur, Jhulan, Leela, Jhuma
Sikkim	Singhi chham, Yak Chaam
Tamil Nadu	Bharatnatyam, Kumi, Kolattam, Kavadi, Karagattam
Tripura	Hojagiri, Gorja
Uttarakhand	Chholiya, Jagars, Thali-Jadda
Uttar Pradesh	Nautanki, Raslila, Kajri
West Bengal	Jatra, Chau, Kathi

Census Highlights

Most Populous States in India

The following table shows the most populous states of India:

Name of State	Population
Uttar Pradesh	19,95,81,477
Maharashtra	11,23,72,972
Bihar	10,38,04,637
West Bengal	9,13,47,736
Madhya Pradesh	7,25,97,565

Sex Ratio (Females per 1000 males)

The following table shows the sex ratio in India:

Sex Ratio in India	940
Highest sex ratio in state	Kerala (1040)
Lowest sex ratio in state	Haryana (834)

Literacy Rate in India

The following table shows the literacy rate of India:

Total Person Literacy Rate	74%
Males	82.14%
Females	65.46%
Highest Literacy Rate in state	Kerala - 93.11%
Lowest Literacy Rate in state	Bihar - 63.82%

COUNCIL OF UNION MINISTERS

The Council of Union Ministers (as of August 2017) is depicted in the table below:

Name	Portfolio
Narendra Modi	Personnel, Public Grievances and Pensions Department of Atomic Energy Department of Space All important policy issues and all other portfolios not allocated to any Minister
Raj Nath Singh	Home Affairs
Nirmala Sitharaman	Defence
Sushma Swaraj	External Affairs
Arun Jaitley	Finance & Corporate Affairs
Prakash Javdekar	Human Resource Development (HRD)
Nitin Jairam Gadkari	Minister of Road Transport and Highways; Minister of Shipping; and Minister of Water Resources, River Development and Ganga Rejuvenation.
Suresh Prabhu	Minister of Commerce and Industry.
Shri Mukhtar Abbas Naqvi	Minister of Minority Affairs.
Shri Dharmendra Pradhan	Minister of Petroleum and Natural Gas; and Minister of Skill Development and Entrepreneurship.
D. V. Sadananda Gowda	Statistics & Programme Implementation
Uma Bharati	Minister of Drinking Water and Sanitation.
Ramvilas Paswan	Consumer Affairs, Food and Public Distribution
Shri Piyush Goyal	Minister of Railways; and Minister of Coal.
Maneka Sanjay Gandhi	Women and Child Development
Ananthkumar	Chemicals and Fertilisers, Parliamentary Affairs
Ravi Shankar Prasad	Law & Justice, Electronics & Information Technology
Jagat Prakash Nadda	Health and Family Welfare
Ashok Gajapathi Raju Pusapati	Civil Aviation
Anant Geete	Heavy Industries and Public Enterprises

Name	Portfolio
Harsimrat Kaur Badal	Food Processing Industries
Narendra Singh Tomar	Minister of Rural Development; Minister of Panchayati Raj; and Minister of Mines.
Chaudhary Birender Singh	Steel
Jual Oram	Tribal Affairs
Radha Mohan Singh	Agriculture & Farmers Welfare

Name	Portfolio
Thawar Chand Gehlot	Social Justice and Empowerment
Smriti Zubin Irani	Textiles Information & Broadcasting
Dr. Harsh Vardhan	Minister of Science and Technology; Minister of Earth Sciences; and Minister of Environment, Forest and Climate Change.

Dams, Rivers, Mountain Ranges

Dams

The following table shows major dams in India:

States/UTs	Name of Dam	Height	Length	Installed Capacity
Jharkhand	Maithon Dam	165 ft.	4789 m	60 MW
Karnataka	Krishnarajasagar Dam	125 ft.	2621 m	200 MW
Kerala	Cheruthoni Dam	450 ft.	650 m	32 MW
Madhya Pradesh	Indira Sagar Dam	302 ft.	653 m	1,000 MW
Maharashtra	Koyna Dam	339 ft.	805 m	1,920 MW
Rajasthan	Bisalpur Dam	130 ft.	574 m	172 MW
Karnataka	TungaBhadra Dam	162 ft.	2441 m	72 MW
Tamil Nadu	Mettur Dam	120 ft.	1700 m	32 MW
Uttar Pradesh	Rihand Dam	299 ft.	934 m	300 MW

Rivers

The following table depicts major rivers in India:

Name	Length (km)	Originates from	Falls into	Places Benefitted
Brahmaputra	2900	Near Mansarovar Lake	Bay of Bengal	Arunachal Pradesh, Assam, Nagaland, Meghalaya, West Bengal and Sikkim
Ganga	2480	Gangotri	Bay of Bengal	Uttar Pradesh, Uttarakhand, Bihar and West Bengal
Godavari	1465	Nasik Hills	Bay of Bengal	South-easterly part of Andhra Pradesh
Krishna	1400	Near Mahabaleshwar in Maharashtra	Bay of Bengal	Maharashtra & Andhra Pradesh
Yamuna (Jamuna)	1370	Yamunotri	Bay of Bengal	Delhi, Haryana and Uttar Pradesh
Narmada	1312	Amarkantak hill in Madhya Pradesh	Arabian sea	Madhya Pradesh and Maharashtra
Ghagra	1080	Matsatung Glacier	Ganga	Uttar Pradesh and Bihar
Narmada	1057	Amarkantak	Gulf of Khambat	Madhya Pradesh, Maharashtra, Gujarat
Satluj	1050	Mansarovar Rakas Lakes	Chenab	Punjab
Mahanadi	858	Amarkantak Plateau	Bay of Bengal	Jharkhand, Chhattisgarh and Orissa
Kaveri	805	Hills of Coorg, Karnataka	Bay of Bengal	Karnataka and Tamil Nadu
Brahmaputra	725	Lake Mansarovar	Bay of Bengal	North Eastern states
Tapti	724	Betul	Arabian Sea	Madhya Pradesh and Maharashtra

Mountain Ranges

The following table depicts major mountain ranges in India:

Mountain	Height (in metres)	Range	State Name
Kanchenjunga	8586	Kanchenjunga, Himalaya	Sikkim
Nanda Devi	7816	Garhwal, Himalaya	Uttarakhand
Kamet	7756	Garhwal, Himalaya	Uttarakhand
Saltoro Kangri	7742	Saltoro, Karakoram	Jammu & Kashmir
Saser Kangri I	7672	Saser, Karakoram	Jammu & Kashmir
Mamostong Kangri	7516	Rimo, Karakoram	Jammu & Kashmir
Saser Kangri II	7513	Saser, Karakoram	Jammu & Kashmir
Saser Kangri III	7495	Saser, Karakoram	Jammu & Kashmir
Teram Kangri I	7462	Siachen, Karakoram	Jammu & Kashmir
Jongsong Peak	7462	Kanchenjunga, Himalaya	Sikkim

FIRSTS IN INDIA

First	Name
Prime Minister	Jawahar Lal Nehru
Woman Prime Minister	Indira Gandhi
Deputy Prime Minister	Sardar Vallabhbhai Patel
President	Dr. Rajendra Prasad
Woman President	Pratibha Patil
Chief Election Commissioner	Sukumar Sen
Law Minister of India	B. R. Ambedkar
Chief Justice of India	H. J. Kania
Speaker of Lok Sabha	G. V. Mavlankar
Woman Speaker of Lok Sabha	Meira Kumar
Finance Minister	R. K. Shanmukham Chetty
Home Minister	Sardar Vallabhbhai Patel
Nobel Prize	Rabindranath Tagore
Man Booker Prize	Arundhati Roy
Magsaysay Award	Vinoba Bhave
Nishan-e-Pakistan	Morarji Desai

First	Name
Olympics Gold Medallist (Individual)	Abhinav Bindra
Silent Film	Raja Harishchandra
Sound Film	Alam Ara
Colour Film	Kisan Kanya
Oscar Winner	Bhanu Athaiya

INDIAN MUSEUMS

The following table shows a few of the most well-known museums of India:

Name	City	Artefacts
National Museum	New Delhi	Artefacts held are from Indus Valley Civilisation, Mauryas, Guptas, miniature paintings from Mughal era and others.
The Prince of Wales Museum	Mumbai	Art, sculpture, old firearms, rare coins and antiques from pre- historic era
Indian Museum	Kolkata	Antiques, armour and ornaments, fossils, skeletons, mummies, and Mughal paintings are held in the museum
Salar Jung Museum	Hyderabad	Ancient Qurans, sculptures, paintings, carvings, textiles, manuscripts, ceramics, metallic artefacts, carpets, clocks, and furniture belonging to Japan, Nepal, Europe, Egypt, Iran, North America, China and Myanmar
Calico Museum of Textiles	Ahmedabad	Textiles belonging to the 15 th century to 19 th century era
Government Museum	Chennai	Archaeological and numismatic collections as well as the biggest collection of Roman antiquities outside of Europe
Shankar's International Dolls Museum	New Delhi	Large collection of dolls belonging to India, UK, USA, Australia, New Zealand, Asian, African and Middle Eastern countries
National Rail Museum	New Delhi	Several unique rail locomotives
Napier Museum	Thiruvananthapuram	Bronze idols, ancient ornaments, a temple chariot and ivory carvings, art belonging to Mughal and Tanjore era

Name	City	Artefacts
Dr. Bhau Daji Lad Museum	Mumbai	Maps and historical photographs of Mumbai, clay models, silver and copper ware and costumes and monolithic basalt elephant sculpture

Top Producers (crops, minerals, etc.)

The following table shows the top producing states of various crops, minerals and fruits in India:

Name of Mineral/Crop/Fruit	Name of State
Bauxite	Odisha
Iron ore	Karnataka
Coal	Jharkhand
Gold	Karnataka

Name of Mineral/Crop/Fruit	Name of State
Diamond	Madhya Pradesh
Copper	Madhya Pradesh
Mica	Jharkhand
Rice	West Bengal
Wheat	Uttar Pradesh
Maize	Andhra Pradesh
Sugar	Maharashtra
Cotton	Gujarat
Banana	Tamil Nadu
Grapes	Maharashtra
Apple	Jammu & Kashmir
Mango	Uttar Pradesh and Andhra Pradesh
Cocoa	Kerala

International Institutions

The following table depicts the details of international institutions:

Organisation and Agencies	Headquarters	Head	Established	Total Member (Countries)
United Nations Organization (UNO)	New York, United States of America (USA)	Antonio Guterres (Secretary General)	24 October 1945	193
International Monetary Fund (IMF)	Washington D.C., USA	Christine Lagarde	27 December 1945	189
World Trade Organization (WTO)	Geneva, Switzerland	Roberto Azevêdo	1 January 1995	162
International Court of Justice (ICJ)	The Hague, Netherlands	Ronny Abraham	26 June 1945	193
World Health Organization (WHO)	Geneva, Switzerland	Margaret Chan	7 April 1948	194
Food and Agriculture Organization (FAO)	Rome, Italy	Jose Gaziano da Silva	16 October 1945	194
International Atomic Energy Agency (IAEA)	Vienna, Austria	Yukiya Amano	29 July 1957	168
International Civil Aviation Organization (ICAO)	Montreal, Canada	Fang Liu	4 April 1947	191
International Fund for Agricultural Development (IFAD)	Rome, Italy	Kanayo F. Nwanze	1977	176
International Labour Organization (ILO)	Geneva, Switzerland	Guy Ryder	1919	187
International Telecommunication Union (ITU)	Geneva, Switzerland	Houlin Zhao	17 May 1865	193
United Nations Educational, Scientific and Cultural Organization (UNESCO)	Paris, France	Irina Bokova	16 November 1945	195
Universal Postal Union (UPU)	Bern, Switzerland	Bishar Abdirahman Hussein	1874	192

Organisation and Agencies	Headquarters	Head	Established	Total Member (Countries)
World Bank (WB)	Washington, D.C., USA	Jim Yong Kim	July 1944	189
World Intellectual Property Organization (WIPO)	Geneva, Switzerland	Francis Gurry	14 July 1967	188
World Meteorological Organization (WMO)	Geneva, Switzerland	David Grimmes	1950	191
Asian Development Bank (ADB)	Mandaluyong, Philippines	Takehiko Nakao	19 December 1966	67

Intergovernmental Organisations

The following table presents the basic facts about intergovernmental organisations:

Name of Organisations	Headquarters	Year and Place of Establishment	Member States
South Asia Association for Regional Cooperation (SAARC)	Kathmandu, Nepal	8 December 1985, Dhaka, Bangladesh	Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka
Association of South East Asian Nations (ASEAN)	Jakarta, Indonesia	8 August 1967, Bangkok, Thailand	Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei, Vietnam, Laos, Myanmar and Cambodia
The Organization of the Petroleum Exporting Countries (OPEC)	Vienna, Austria	September 1960, Baghdad, Iraq	Algeria, Angola, Ecuador, Equatorial Guinea, Gabon, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela
North Atlantic Treaty Organization (NATO)	Brussels, Belgium	4 April 1949, Washington, D.C., United States	Belgium, Canada, Denmark, France, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, the United Kingdom and the United States
BRICS (Brazil, Russia, India, China and South Africa)	Shanghai, China	16 May 2008	Brazil, Russia, India, China and South Africa
Group Twenty (G-20)	Cancún, Mexico	20 September 1999	Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, South Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom and the United States—along with the European Union (EU)

BOOKS AND AUTHORS

The following table lists some prominent books published recently:

Name of Book	Author
Unstoppable: My Life So Far	Maria Sharapova
Indira Gandhi: A Life in Nature	Jairam Ramesh
The Flaming Tresses of Draupadi	M Veerappa Moily
Hope in a Challenged Democracy: An Indian Narrative	Ashwani Kumar
Veerappan, Chasing the Brigand	K Vijay Kumar
The Golden House	Salman Rushdie
Khullam Khulla: Rishi Kapoor Uncensored	Rishi Kapoor and Meena Iyer
Jinnah Often Came to Our House	Kiran Doshi
Book Courts of India-Past to Present	Supreme Court Editorial Committee
Death Under the Deodars	Ruskin Bond
An Era of Darkness: The British Empire in India	Hamid Ansari
The Ministry of Utmost Happiness	Arundhati Roy
Modi's Midas Touch in Foreign Policy	Venkaiah Naidu
Democrats and Dissenters	Ramachandra Guha

IMPORTANT DATES AND DAYS

Some important dates and days as given by the UN are shown in the following table:

Date	Event
January 12	National Youth Day (Swami Vivekananda Birth Anniversary)
February 4	World Cancer Day
February 13	World Radio Day [UNESCO]
March 4	World Day of the Fight Against Sexual Exploitation
May 1	International Labour day
May 3	World Press Freedom Day
May 8	International Women's Day
May 22	Global Biodiversity Day
May 31	World No Tobacco Day
June 5	World Environment Day
June 21	International Yoga Day, World Hydrography Day
July 11	World Population Day
July 26	Kargil Victory Day
August 15	Independence Day
August 29	National Sports Day (Birthday of Dhyan Chand)
September 5	Teacher's Day
September 8	International Literacy Day
September 14	Hindi day
September 16	World Ozone Day
October 2	Gandhi Jayanthi
October 8	Indian Airforce Day
November 14	Children's Day
December 1	World AIDS Day
December 4	Navy Day
December 10	Human Rights Day
December 22	National Mathematics Day (Birth anniversary of Srinivasa Ramanujan)

GOVERNMENT PROGRAMMES AND SCHEMES

Digi Dhan Vyapar Yojana: NITI Aayog announced the launch of Digi Dhan Vyapar Yojana for merchants who transact digitally at merchant establishments.

Yatri Mitra Sewa: The Railways introduced Yatri Mitra Sewa through which old and differently abled passengers can book wheelchair cum porter services.

Shyama Prasad Mukherjee Rurban Mission: Prime Minister Narendra Modi launched Rurban Mission whose objective is to transform rural areas by giving them a more urban look.

Pradhan Mantri Ujjwala Yojana: Prime Minister Narendra Modi launched Pradhan Mantri Ujjwala Yojana in order to provide cooking gas connections to 5 crore beneficiaries who are below the poverty line in a span of 3 years.

Mahila e-Haat: Maneka Gandhi, the Minister of Women and Child Development, launched “Mahila e-Haat”, an online marketing platform for women, in New Delhi on 7th March 2016. It is a part of ‘Digital India’ and ‘Stand Up India’ initiatives, launched by Prime Minister Narendra Modi.

Pradhan Mantri Fasal Bima Yojana: Prime Minister Narendra Modi has launched the 'Pradhan Mantri Fasal Bima Yojana' for farmer's welfare.

Key facts of 'Pradhan Mantri Fasal Bima Yojana' are as follows:

- In this scheme, a uniform premium of only 2% is to be paid by farmers for all kharif crops and 1.5% for all rabi crops. In case of annual commercial and horticultural crops, the premium to be paid by farmers will be only 5%.
- There is no upper limit on Government subsidy. Even if the balance premium is 90%, it will be borne by the Government.
- The use of technology will be encouraged to a great extent. Smart phones will be used to capture and upload data of crop cutting to faster claim of payment to farmers.

Beti Bachao Beti Padhao Scheme: Union Minister Maneka Gandhi, Department of Women and Child Development, has extended the 'Beti Bachao Beti Padhao' Scheme in additional 61 districts across 11 states and union territories with low child sex ratio.

Key facts of 'Beti Bachao Beti Padhao' scheme are as follows:

- The scheme will address the issue of declining child sex ratio and other related issues responsible for the exploitation of women in the society.
- The chief objective of the scheme is to prevent gender-based sex selection through strict enforcement of laws and punishment to violators.

Gram Uday Se Bharat Uday Abhiyan: Prime Minister Narendra Modi inaugurated 'Gram Uday Se Bharat Uday Abhiyan' (Village Self Governance Campaign) to strengthen the Panchayati Raj system in villages and ensure social development. It was launched at Mhow, Madhya Pradesh (the birthplace of Dr. Bhim Rao Ambedkar on his 125th birth anniversary).

Key facts of 'Gram Uday Se Bharat Uday Abhiyan' are as follows:

- The aims of the campaign are to strengthen the Panchayati Raj system, promote rural development and uplift the status of rural people.
- The campaign will be run jointly by the Union Ministries of Rural Development, Social Justice, Agriculture, Labour and Information and Broadcasting along with the States Governments.

PRACTICE QUESTIONS

Answer the following questions by selecting the most appropriate option.

1. **The headquarters of the International Monetary Fund (IMF) are located in**
 - (1) Geneva, Switzerland
 - (2) Vienna, Austria
 - (3) Washington D.C., USA
 - (4) Rome, Italy
2. **How many countries are the members of the United Nations (UN)?**
 - (1) 189
 - (2) 192
 - (3) 193
 - (4) 191
3. **Which of the following agencies of the United Nations engages in the promotion of socio-cultural rights of the people?**
 - (1) UNICEF
 - (2) General Assembly
 - (3) ICAO
 - (4) UNESCO
4. **The headquarters of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) is located at**
 - (1) Geneva, Switzerland
 - (2) Paris, France
 - (3) Bern, Switzerland
 - (4) Mandaluyong, Philippines
5. **The headquarters of the World Health Organization (WHO) are located in**
 - (1) Geneva, Switzerland
 - (2) Paris, France
 - (3) Washington, D.C., USA
 - (4) Montreal, Canada
6. **The headquarters of the UN General Assembly are located at**
 - (1) Washington, D.C., USA
 - (2) New York, USA
 - (3) Rome, Italy
 - (4) Geneva, Switzerland
7. **India became the member of the United Nations organisation in the year**
 - (1) 1948
 - (2) 1947
 - (3) 1950
 - (4) 1945
8. **Every year, the International Women's Day is observed on**
 - (1) 7th March
 - (2) 7th April
 - (3) 8th March
 - (4) 8th May
9. **SAARC stands for**
 - (1) South Asian Association for Regional Countries
 - (2) South Asian Association for Regional Cooperation
 - (3) South Asian Association for Regional Coordination
 - (4) South Asian Association for Religion Cooperation
10. **The river Ganga originates from**
 - (1) Mansarovar
 - (2) Yamunotri
 - (3) Matsatung Glacier
 - (4) Gangotri
11. **Who is the current president of China?**
 - (1) Li Keqiang
 - (2) Jiang Zemin
 - (3) Hu Jintao
 - (4) Xi Jinping
12. **Who is the present president of Russia?**
 - (1) Viktor Zubkov
 - (2) Nicolas Sarkozy
 - (3) Mikhail Fradkov
 - (4) Vladimir Putin
13. **Arjuna Award is given for**
 - (1) outstanding performance in sports
 - (2) lifetime contribution to Indian cinema
 - (3) exceptional service towards the advancement of arts
 - (4) distinguished service of a high order to the nation
14. **The Siddhivinayak Temple is located in**
 - (1) Maharashtra
 - (2) Gujarat
 - (3) Andhra Pradesh
 - (4) Tamil Nadu
15. **UNESCO stands for**
 - (1) United Nations Energy, Scientific and Cultural Organization
 - (2) United Nations Educational, Scientific and Cultural Organization
 - (3) United Nations Educational, Social and Cultural Organization
 - (4) United Nations Economic, Scientific and Cultural Organization
16. **BRICS stands for**
 - (1) Britain, Russia, India, China and South Africa
 - (2) Brazil, Russia, Indonesia, China and South Africa
 - (3) Brazil, Russia, India, China and South Africa
 - (4) Brazil, Russia, India, China and South Korea
17. **Which of the following dance forms is found in Gujarat?**
 - (1) Chholiya
 - (2) Hojagiri
 - (3) Tamasha
 - (4) Garba
18. **Who was the first governor of the Reserve Bank of India (RBI)?**
 - (1) James Braid Taylor
 - (2) Benegal Rama Rau
 - (3) C. D. Deshmukh
 - (4) K. G. Ambegaonkar

- 19. The capital of the Andaman and Nicobar islands is**
(1) Silvassa (2) Kavaratti
(3) Port Blair (4) Aizawl
- 20. Which of the following rivers originates from Nasik Hills and falls into the Bay of Bengal?**
(1) Krishna (2) Godavari
(3) Sutlej (4) Kaveri
- 21. The headquarters of the ASEAN are located in**
(1) Jakarta, Indonesia (2) Kathmandu, Nepal
(3) Vienna, Austria (4) Brussels, Belgium
- 22. Which of the following organisations is related to petroleum?**
(1) SWAPO (2) FAO
(3) OECD (4) OPEC
- 23. The five permanent members of the United Nations Security Council are**
(1) China, France, Russia, U.K. and U.S.A.
(2) Germany, France, Russia, U.K. and U.S.A.
(3) France, Russia, South Korea, U.K. and U.S.A.
(4) China, France, Japan, U.K. and U.S.A.
- 24. NATO stands for**
(1) North Atlantic Treaty Organisation
(2) North Association of Treaty Orientation
(3) Nuclear Atomic Treaty Organisation
(4) Nuclear Atomic Testing Organisation
- 25. The headquarters of SAARC is located in**
(1) Lahore, Pakistan (2) New Delhi, India
(3) Kathmandu, Nepal (4) Dhaka, Bangladesh
- 26. Which one of the following is the longest river of peninsular India?**
(1) Narmada (2) Godavari
(3) Krishna (4) Mahanadi
- 27. First atomic power station of India was started at**
(1) Kalpakkam (2) Rana Pratap Sagar
(3) Narora (4) Tarapur
- 28. Dipa Karmakar is associated with which of the following sports?**
(1) Hockey (2) Tennis
(3) Gymnastics (4) Swimming
- 29. Wimbledon Tournament is associated with which sport?**
(1) Football (2) Golf
(3) Tennis (4) Badminton
- 30. World Population Day is observed on**
(1) 7th July (2) 9th July
(3) 11th July (4) 13th July
- 31. Jnanpith Award is given in the field of**
(1) sports (2) literature
(3) music (4) reporting
- 32. With which of the following sports is Krishna Poonia associated?**
(1) Shooting (2) Wrestling
(3) Handball (4) Discus throw
- 33. The capital of _____ is Agartala.**
(1) Assam (2) Manipur
(3) Meghalaya (4) Tripura
- 34. Where are the headquarters of the Board of Control for Cricket in India (BCCI) situated?**
(1) Kolkata (2) Delhi
(3) Hyderabad (4) Mumbai
- 35. Which state has the highest sex ratio in India?**
(1) Kerala (2) Tamil Nadu
(3) Andhra Pradesh (4) Chhattisgarh
- 36. Which city is known as the 'City of Palaces'?**
(1) Jodhpur (2) Udaipur
(3) Mysuru (4) Junagadh
- 37. When is International 'Yoga Divas' celebrated?**
(1) 25th April (2) 21st July
(3) 21st May (4) 21st June
- 38. The classical dance of Andhra Pradesh is**
(1) Kathakali (2) Bharatanatyam
(3) Kuchipudi (4) Odissi
- 39. Who among the following was the first recipient of Rajiv Gandhi's 'Khel Ratna' award?**
(1) Geet Sethi (2) Vishwanathan Anand
(3) Dhanraj Pillay (4) Leander Paes
- 40. Who was the first Asian to win the Nobel Prize?**
(1) Rabindranath Tagore
(2) Mahatma Gandhi
(3) Kim Dae-jung
(4) Hideki Yukawa
- 41. The headquarters of NATO are located at**
(1) New York, U.S.A
(2) Washington, D.C., U.S.A.
(3) Brussels, Belgium
(4) Cancun, Mexico
- 42. Which of the following states has instituted the 'Tansen Samman'?**
(1) West Bengal (2) Maharashtra
(3) Madhya Pradesh (4) Haryana
- 43. Which of the following days is observed as Anti-Terrorism Day throughout India?**
(1) 5th May (2) 21st April
(3) 19th May (4) 21st May
- 44. Which one of the following places receives the highest rainfall in the world?**
(1) Silchar (2) Cherrapunji
(3) Mawsynram (4) Guwahati

- 45. Which of the following is a west-flowing river of India?**
 (1) Mahanadi (2) Krishna
 (3) Narmada (4) Cauvery
- 46. In which of the following states is the Wular Lake located?**
 (1) Himachal Pradesh (2) Rajasthan
 (3) Punjab (4) Jammu & Kashmir
- 47. Which one of the following lakes is a salt water lake?**
 (1) Sambhar (2) Wular
 (3) Dal (4) Gobind Sagar
- 48. The National Doctors' Day is observed every year on**
 (1) 1st July (2) 2nd July
 (3) 3rd July (4) 4th July
- 49. Which country gives the Ramon Magsaysay Award?**
 (1) Norway (2) USA
 (3) Britain (4) The Philippines
- 50. In which of the following towns of India is the Jim Corbett National Park located?**
 (1) Madhopur (2) Nainital
 (3) Sundarban (4) Eravikulam
- 51. The "United Nations Children's Fund" (UNICEF) is headquartered in**
 (1) Paris, France (2) Washington DC, USA.
 (3) Vienna, Austria (4) New York City, USA
- 52. How many Nobel Prize Awards are awarded each year?**
 (1) 7 (2) 4
 (3) 6 (4) 5
- 53. Wellington Trophy is associated with**
 (1) Chess (2) Hockey
 (3) Bridge (4) Rowing
- 54. The term of office for the Secretary General of the United Nations (UNSG) is**
 (1) 4 years (2) 5 years
 (3) 6 years (4) 1 years
- 55. Which of the following states has the least literacy rate in India?**
 (1) Bihar (2) Arunachal Pradesh
 (3) Telangana (4) Jharkhand
- 56. The super computer "Param Kanchenjunga" has been launched in _____**
 (1) Kerala (2) NCT of Delhi
 (3) Sikkim (4) Maharashtra
- 57. There are _____ members in the United Nation's Security Council.**
 (1) 5 (2) 10
 (3) 15 (4) 193
- 58. Which of the following rivers fall into Ganga?**
 (1) Ghagra (2) Godavari
 (3) Krishna (4) Kaveri
- 59. Which of the following rivers originate from Nasik Hills?**
 (1) Narmada (2) Krishna
 (3) Godavari (4) Ghagra
- 60. Which of the following days is celebrated as 'World Tuberculosis Day'?**
 (1) 22nd April (2) 24th April
 (3) 8th May (4) 24th March
- 61. The World No Tobacco Day (WNTD) is observed globally on**
 (1) 31st March (2) 31st April
 (3) 31st May (4) 31st June
- 62. Which of the following pairs is not correct?**
 (1) World Cancer Day - 4th February
 (2) World Water Day - 22nd March
 (3) World Food Day - 16th October
 (4) International Literacy Day- 5th September
- 63. Who was the first recipient of the Jawaharlal Nehru Award?**
 (1) Martin Luther King, Jr.
 (2) U Thant
 (3) Nelson Mandela
 (4) Aung San Suu Kyi
- 64. The International Court of Justice (ICJ) constitutes how many judges?**
 (1) 15 (2) 10
 (3) 25 (4) 35
- 65. The wind blowing on the northern plains during summers is known as**
 (1) Kal Baisakhi (2) trade winds
 (3) Loo (4) cyclone
- 66. Which one of the following bio-reserves of India is not included in the World Network of Biosphere Reserves?**
 (1) Manas (2) Gulf of Mannar
 (3) Nilgiri (4) Nanda Devi
- 67. Which one of the following rivers has the largest river basin in India?**
 (1) Indus (2) Ganga
 (3) Brahmaputra (4) Krishna
- 68. Which one of the following is the point of confluence of Alaknanda and Bhagirathi?**
 (1) Vishnuprayag (2) Karnaprayag
 (3) Rudraprayag (4) Devprayag
- 69. The longest stretch of Narmada lies in**
 (1) Madhya Pradesh (2) Gujarat
 (3) Rajasthan (4) Maharashtra

- 70. Which of the following is the 100th amendment under the Indian Constitution?**
 (1) Incorporation of Dadra Nagar Haveli as a Union Territory
 (2) Land Boundary Agreement (LBA) Bill to be passed
 (3) Incorporation of Goa, Daman and Diu as a Union Territory
 (4) Secure the constitutional validity of acquisition of estates and place land acquisition laws
- 71. Agha Khan Cup is related to which of the following sporting events?**
 (1) Table Tennis (2) Football
 (3) Hockey (4) Cricket
- 72. The birthday of which of the following leaders is celebrated as Teachers' Day in India?**
 (1) Lala Lajpat Rai
 (2) Dr. C. Rajgopalachari
 (3) Dr. S. Radhakrishnan
 (4) Dr. Rajendra Prasad
- 73. To whom is the line "A thing of beauty is a joy for ever" attributed?**
 (1) John Keats
 (2) Charles Dickens
 (3) William Wordsworth
 (4) Jonathan Swift
- 74. The award given for outstanding performance in sports is**
 (1) Dronacharya Award (2) Padma Shri Award
 (3) Bharat Ratna (4) Arjuna Award
- 75. India's first Noble Prize was given in the field of:**
 (1) Literature (2) Physics
 (3) Chemistry (4) Medicine
- 76. Bangladesh was created in:**
 (1) 1973 (2) 1970
 (3) 1972 (4) 1971
- 77. What is the currency of Saudi Arabia?**
 (1) Riyal (2) Pound
 (3) Lira (4) Dinar
- 78. In India, the 'Van Mahotsav' Day is observed on:**
 (1) 1st July (2) 2nd October
 (3) 1st December (4) 10th August
- 79. Which country would aid India in its Smart Cities Mission?**
 (1) Russia (2) UAE
 (3) China (4) Japan
- 80. Which city has been named as second capital of Himachal Pradesh?**
 (1) Dharamsala (2) Manali
 (3) Dalhousie (4) Kasauli
- 81. Senior citizens who are above the age of 80 years are exempt from tax up to**
 (1) ₹ 3,00,000 (2) ₹ 7,00,000
 (3) ₹ 5,00,000 (4) ₹ 10,00,000
- 82. Where was the first smart police station inaugurated?**
 (1) Telangana (2) Karnataka
 (3) Andhra Pradesh (4) Kerala
- 83. Which state became the first to set up a cashless system for distribution of food grains?**
 (1) Maharashtra (2) Bihar
 (3) Goa (4) Gujarat
- 84. Whose birthday would be celebrated as Water Day in India?**
 (1) B.R. Ambedkar (2) C.V. Raman
 (3) Rajendra Prasad (4) Swami Vivekananda
- 85. Who among the following won the first World Sanskrit award?**
 (1) Akhilesh Yadav
 (2) Maha Chakri Sirindhorn
 (3) George Cardona
 (4) N. Gopalaswami
- 86. Sunway TaihuLight is the world's fastest supercomputer. It was built by**
 (1) China (2) Japan
 (3) USA (4) UK
- 87. Where was India's first Digi Dhan Mela held?**
 (1) Jaipur (2) Mumbai
 (3) Delhi (4) Gurugram
- 88. Which of the following Indian state will host the 2022 National Games?**
 (1) Meghalaya (2) Sikkim
 (3) Jammu & Kashmir (4) Assam
- 89. The world's largest solar power plant is situated in**
 (1) Madhya Pradesh (2) Karnataka
 (3) West Bengal (4) Tamil Nadu
- 90. Who is the winner of the 2017 World Snooker Championship?**
 (1) Pankaj Advani (2) Geet Sethi
 (3) Aditya Mehta (4) Mark Selby
- 91. Who won the 2017 men's singles Madrid Open tennis tournament?**
 (1) Rafael Nadal (2) Novak Djokovic
 (3) Andy Murray (4) Dominic Thiem
- 92. Who won the Hero of the League Award at the I-League 2017?**
 (1) Sunil Chhetri (2) Alfred Kemah Jaryan
 (3) CK Vineeth (4) Udanta Singh

- 93. Which football team won the 38th Indian federation Cup Football Tournament 2017, held at Cuttack?**
(1) Aizwal FC (2) Bengaluru FC
(3) Churchill Brothers (4) DSK Shivajians
- 94. In which state is the Barabati Stadium located?**
(1) Odisha (2) Maharashtra
(3) West Bengal (4) New Delhi
- 95. Where was India's first National Basket Ball Association opened?**
(1) Mumbai (2) New Delhi
(3) Bangalore (4) Greater Noida
- 96. Which of the following is the official mascot of the 22nd edition of the Asian Athletics Championship 2017?**
(1) Appu-elephant
(2) Bhoorsingh-the Barasingha
(3) Flying Squirrel
(4) OLLY- the turtle
- 97. Who won the Spanish Grand Prix 2017?**
(1) Fernando Alonso
(2) Sebastian Vettel
(3) Lewis Hamilton
(4) Michael Schumacher
- 98. Who defeated Sakshi Malik at the Asian Wrestling Championship 2017?**
(1) Mika Akino (2) Yoko Bito
(3) Risako Kawai (4) Aika Ando
- 99. Pentala Harikrishna is related to which game?**
(1) Badminton (2) Lawn Tennis
(3) Chess (4) Hockey
- 100. Who won the bronze in men's Greco-Roman 85 kg category at the 2017 Asian Wrestling Championship?**
(1) Sushil Kumar (2) Anil Kumar
(3) Joginder Singh (4) Yogeshwar Dutt
- 101. Andhra Pradesh government amended a law to appoint which of the following eminent sportspersons as a Group-1 officer in the government?**
(1) P.V Sindhu
(2) Pallela Gopichand
(3) Dronavalli Harika
(4) Karnam Malleswari
- 102. Where is the headquarters of the United Nations Human Rights Council (UNHRC) located?**
(1) Geneva (2) Hague
(3) Vienna (4) Madrid
- 103. Which of the following is the world's smallest island republic?**
(1) Vatican City (2) Monaco
(3) Nauru (4) Malta
- 104. Where is the Headquarter of the International Solar Alliance?**
(1) New Delhi (2) Ahmedabad
(3) Gandhinagar (4) Gurugram
- 105. In which of the following country was the Ujala Scheme launched in May 2017?**
(1) France (2) China
(3) Spain (4) UK
- 106. Which country has launched world's first operational robot police officer 'Robocop'?**
(1) Saudi Arabia (2) UAE
(3) India (4) China
- 107. The 'Adiyogi bust' was declared world's largest by Guinness Book of World Record. In which state is this 'Adiyogi' Lord Shiv statue located?**
(1) Madhya Pradesh
(2) Andhra Pradesh
(3) Tamil Nadu
(4) Karnataka
- 108. In May 2017, the OIC Independent Permanent Human Rights Commission Headquarters (IPHRC) was inaugurated at**
(1) Saudi Arabia (2) Seoul
(3) UAE (4) Syria
- 109. Which of the following countries hosted the first ever OBOR (One-Belt One-Road) Summit?**
(1) India (2) Bangladesh
(3) Nepal (4) China
- 110. India's first small arms manufacturing unit opened in Madhya Pradesh is a joint venture between India and**
(1) Russia (2) France
(3) Israel (4) US
- 111. The headquarters of the UN-Habitat is situated at**
(1) Kenya (2) France
(3) New York (4) Washington DC
- 112. Which of the following countries convened the first-ever G20 digital ministers meeting?**
(1) USA (2) Russia
(3) China (4) Germany
- 113. Which two countries started the first ever 'passenger ferry service' to develop links and boost economic cooperation in May 2017?**
(1) Russia and China
(2) Russia and North Korea
(3) India and Indonesia
(4) Sri Lanka and Pakistan
- 114. Which country has been elected as the new President of Governing Council of UN-Habitat?**
(1) China (2) India
(3) Russia (4) Kenya

- 115. The 2017 Multinational military exercise 'Eager Lion' has started in which country?**
 (1) India (2) China
 (3) Bangladesh (4) Jordan
- 116. Which organisation has launched Polar Prediction Project (PPP)?**
 (1) WHO (2) World Bank
 (3) IMF (4) WMO
- 117. Which among the following railway stations is set to become India's first private railway station?**
 (1) Gorakhpur Railway Station, U.P.
 (2) Habibganj Railway Station, Bhopal
 (3) Kollam Junction, Kerala
 (4) Jhansi Junction, UP
- 118. Who among the following has been sworn-in as the new Prime Minister of Nepal?**
 (1) Pushpa Kamal Dahal
 (2) Sher Bahadur Deuba
 (3) Kirti Nidhi Bishta
 (4) Bam Bahadur Kunwar
- 119. Which city is to host the second edition of National Health Editors' Conference on Yoga, 2017?**
 (1) Mumbai (2) Thiruvananthapuram
 (3) Guwahati (4) New Delhi
- 120. On which of the following days is the International Day for Family Remittances observed?**
 (1) 16th June (2) 16th May
 (3) 15th June (4) 15th May
- 121. With what theme was the third International Yoga Day observed on 21st June, 2017?**
 (1) Yoga for Health
 (2) Yoga for a Healthy Life
 (3) Yoga: Key for Health
 (4) Yoga for the Achievement of Sustainable Development Goals
- 122. Who among the following has been appointed as the new CEO of the Public Service Broadcaster of the country, Prasar Bharati?**
 (1) Vinay Dube
 (2) Sanjiv Singh
 (3) Shashi Shekhar Vempati
 (4) Rajeev Singh
- 123. P.N. Bhagwati, who passed away on 15th June, 2017, has served India for which of the following posts?**
 (1) Former Attorney General of India
 (2) Former CAG of India
 (3) Former Governor of Uttar Pradesh
 (4) Former Chief Justice of India
- 124. Which among the following personalities has been appointed as the ambassador of the Skill India Campaign launched by the Government of India?**
 (1) Amitabh Bachchan (2) Priyanka Chopra
 (3) Anushka Sharma (4) Sachin Tendulkar
- 125. Among the following personalities, who is the newly appointed Executive Director of RBI?**
 (1) Sanjiv Singh (2) S. Ganesh Kumar
 (3) Shashi Shekhar (4) Chandan Sinha
- 126. Among the following, who has been appointed as the 15th Attorney General of India, replacing the former Attorney General of India, Mukul Rohatgi?**
 (1) Kaushik Basu (2) P.B. Sharma
 (3) K.K. Venugopal (4) Ranjit Kumar
- 127. Who among the following has authored the book 'Indira Gandhi: A Life in Nature'?**
 (1) Ramesh Pokhriyal (2) Muchkund Dubey
 (3) Shashi Tharoor (4) Jairam Ramesh
- 128. Venkaiah Naidu released the book titled 'The Emergency - Indian Democracy's Darkest Hour'. Who among the following persons has authored the book?**
 (1) Vikram Seth (2) Swapan Dasgupta
 (3) Surya Prakash (4) Shashi Kant Sharma
- 129. Who among the following eminent personalities has won the 5th Bhupen Hazarika National Award, 2017?**
 (1) Lou Majaw
 (2) Yeshe Dorjee Thongchi
 (3) Jahnu Barua
 (4) Samudra Gupta Kashyap
- 130. Among the following persons who has been selected for the best Parliamentarian Award for 2016?**
 (1) Arun Jaitley (2) Mallikarjun Kharge
 (3) Sharad Yadav (4) N.K. Premachandran
- 131. The Goods and Services Tax (GST) was implemented in India on 01.07.2017 under which of the following Constitution Amendment Bill?**
 (1) 122nd (2) 121st
 (3) 123rd (4) 125th
- 132. The Goods and Services Tax (GST) was introduced in through which of the following amendment acts?**
 (1) 100th (2) 150th
 (3) 125th (4) 101st
- 133. Among the following which has become the second city in the country, and the first in south India, to have a full-fledged Metro rail?**
 (1) Kolkata (2) Kochi
 (3) Mumbai (4) Bangalore

- 134. In India, GST came into effect from July 1, 2017. India has chosen the model of dual GST model of which country?**
 (1) USA (2) UK
 (3) China (4) Canada
- 135. The Indian GST model has _____ rate structure.**
 (1) 3 (2) 4
 (3) 5 (4) 2
- 136. Recently in June 2017, the first ever BRICS games were organised in which of the following countries?**
 (1) Brazil (2) India
 (3) Russia (4) China
- 137. Among the following, who is the winner of his tenth French Open title held in 2017?**
 (1) Roger Federer (2) Novak Djokovic
 (3) Andy Murray (4) Rafael Nadal
- 138. Which of the given countries won the ICC Champions Trophy 2017?**
 (1) Australia (2) Bangladesh
 (3) Pakistan (4) India
- 139. Who is collaborating with Microsoft India's plan to equip Indian Schools with digital classes?**
 (1) Indian Government
 (2) ASHA Foundation
 (3) Tata Institute of Social Science
 (4) NISA (National Independent School Alliance)
- 140. Who is the Prime Minister of France?**
 (1) Theresa May (2) Angela Merkel
 (3) François Hollande (4) Édouard Philippe
- 141. Which is the latest state in India to implement GST?**
 (1) Manipur (2) Meghalaya
 (3) Mizoram (4) Jammu and Kashmir
- 142. Who was the captain of Indian Women Cricket Team in the 2017 Women's World Cup?**
 (1) Harmanpreet Kaur (2) Ekta Bisht
 (3) Mithali Raj (4) Mansi Joshi
- 143. Which Luxury phone maker collapsed after plans to save it failed and went out of business?**
 (1) Panasonic (2) Lumia
 (3) Vertu (4) Nokia
- 144. Which countries' all girls robotics team got the American visa after Trump's intervention?**
 (1) Afghanistan (2) Yemen
 (3) South Korea (4) North Korea
- 145. Who launched a security firm Parakram Suraksha Pvt. Ltd.?**
 (1) Kiran Bedi
 (2) Satyapal Singh
 (3) Acharya Balkrishna
 (4) Baba Ramdev
- 146. In which state is EVM fraud registered?**
 (1) Maharashtra (2) Andhra Pradesh
 (3) Madhya Pradesh (4) Karnataka
- 147. Which country's economy is growing fastest in 2017?**
 (1) USA (2) Ethiopia
 (3) India (4) Bhutan
- 148. Which private bank acquired FreeCharge from Snapdeal?**
 (1) Kotak Mahindra (2) HDFC Bank
 (3) ICICI Bank (4) Axis Bank
- 149. Which country's Supreme Court recently gave hearing against its own Prime Minister?**
 (1) Philippines (2) Bangladesh
 (3) Pakistan (4) Bhutan
- 150. Which Bank has appointed Melwyn Rego as its new CEO and MD?**
 (1) Axis Bank
 (2) Union Bank
 (3) State Bank of India
 (4) Syndicate Bank
- 151. With which other exchange will ICEX merge to create India's third biggest commodity exchange?**
 (1) NSE (NewYork) (2) BSE
 (3) NSE (4) NMCE
- 152. Which country has launched two ballistic missiles towards Japan?**
 (1) Russia (2) South Korea
 (3) North Korea (4) USA
- 153. Which sportsperson defeated then top seeded Wawrinka in first round of Wimbledon 2017?**
 (1) Sania Mirza (2) Saina Nehwal
 (3) Leander Paes (4) Medvedev
- 154. Who has been appointed as new National Disaster Response Force (NDRF) Chief?**
 (1) Achal Kumar Joti (2) Sanjay Kumar
 (3) Sanjeev Sinha (4) Ajay Tyagi
- 155. Indian consortium led by which company has offered to spend \$11 billion in Iranian gas deal?**
 (1) GAIL (2) ONGC
 (3) Reliance (4) HP
- 156. After whom an Israeli flower has been named recently?**
 (1) Vladimir Putin (2) Donald Trump
 (3) Barack Obama (4) Narendra Modi
- 157. Who has been appointed as the chairman of Tata Global Beverages?**
 (1) Ratan Tata
 (2) Cyrus Mistry
 (3) N. Chandrashekhara
 (4) Cyrus Poonawala

- 158. Which automobile company has signed a MoU to set up ₹2,000 crore car plant in Gujarat?**
(1) SAIC Motor (2) Hyundai Motor
(3) General Motors (4) Honda Motor
- 159. Who has been named as Tata Sons' Chief Digital Officer?**
(1) Aarthi Subramanian
(2) Indra Nooyi
(3) Arundhati Bhattacharya
(4) B. Lakshmi
- 160. Hui Ka Yen is the chairman of**
(1) Reliance Group (2) Evergrande group
(3) Birla Group (4) ITC Group
- 161. Which of the following(s) is the second car manufacturer to quit Le Mans is going to join Formula E?**
(1) Porsche (2) Volkswagen
(3) BMW (4) Audi
- 162. Which state will have mandatory GPS systems installed for taxis and autos?**
(1) Kerala (2) Maharashtra
(3) Madhya Pradesh (4) Andhra Pradesh
- 163. With which country has India's agreement of peaceful use of N-energy come into force recently?**
(1) US (2) Iran
(3) Syria (4) Japan
- 164. Which state has announced to offer compensation of ₹1 crore to families of every martyr?**
(1) Nagaland (2) Himachal Pradesh
(3) Assam (4) Madhya Pradesh
- 165. Which state is set to construct India's first Eco-bridges for the movement of tigers?**
(1) Gujarat (2) Tamil Nadu
(3) Bihar (4) Telangana
- 166. Which country was recently provided a loan of \$1.8 bn by International Monetary Fund (IMF)?**
(1) New Zealand (2) Somalia
(3) Greece (4) Syria
- 167. Which bank had to Block All Maestro Debit Cards due to RBI orders?**
(1) State Bank of India
(2) Axis Bank
(3) Punjab National Bank
(4) Union Bank
- 168. What is the name of the Chinese heavy-lift carrier rocket, whose launch failed recently?**
(1) Long March-6 CZ-500
(2) Long March 2F
(3) Long March-5 Y2
(4) Long March 7- V4
- 169. Who has been appointed as the next attorney general of India?**
(1) Ashok Desai (2) Soli Sorabjee
(3) K.K. Venugopal (4) Mukul Rohatgi
- 170. Who has recently been appointed as the Indian envoy to Greece?**
(1) Mr. M Manimekalai (2) Shamma Jain
(3) Dilip Sinha (4) Mr. A. K. Banerjee
- 171. Which Indian firm recently crossed Rs. 4 trillion market capitalisation?**
(1) ITC (2) Wipro
(3) Patanjali (4) TCS
- 172. Which country recently announced to create 'Special Corps' branch for its Armed forces?**
(1) Israel (2) UAE
(3) Russia (4) USA
- 173. Which state has launched the third version of women's safety app 'Himmat'?**
(1) Goa (2) Maharashtra
(3) Delhi (4) Tamil Nadu
- 174. Who was UPA's Presidential nominee?**
(1) Ram Nath Kovind (2) Meira Kumar
(3) P. Chidambaram (4) Pranab Mukherjee
- 175. Who won the Green Oscars 2017?**
(1) Purnima Barman (2) Sanjay Gubbi
(3) Narayan Srinivasan (4) Both 1 and 2

ANSWERS AND EXPLANATIONS

1. (3) The International Monetary Fund (IMF) was established in 1945 to maintain constancy of the international monetary system.
2. (3) There are 193 member countries of the UN. South Sudan has become the 193rd member of the UN.
3. (4) The United Nations Educational, Scientific and Cultural Organisation (UNESCO) was established on 16 November 1945 to promote of socio-cultural rights of people.
4. (2) The United Nations Educational, Scientific and Cultural Organization (UNESCO) was established in the year 1945. It has 195 members.
5. (1) The World Health Organization (WHO) was established in the year 1948 and its headquarters are located in Geneva, Switzerland.
6. (2) The first session of the UN General Assembly was convened in the Westminster Central Hall, London, on 10 January 1946. The next few annual sessions of the UN General Assembly were held in different cities. It moved to the permanent UN headquarters in the New York City on 14 October 1952.
7. (4) India was one of the founding members of the United Nations and also participated in the UN Conference on International Organisation at San Francisco from 25 April to 26 June 1945. India joined the United Nations Organization on 30th October 1945.
8. (3) International Women's Day is observed on 8th March every year. It is a day dedicated towards celebrating the social, economic, cultural and political achievements of women.
9. (2) The South Asian Association for Regional Cooperation (SAARC) was established in December 1985 for the promotion of regional cooperation in the field of science, cultural and socio-economic development.
10. (4) The Ganga originates from Gangotri and falls in the Bay of Bengal. It flows in Uttar Pradesh, Uttarakhand, Bihar and West Bengal.
11. (4) Mr. Xi Jinping was appointed as the President of China in March 2013. He is also the General Secretary of the Communist Party of China
12. (4) Vladimir Putin was appointed as the President of Russia in May 2012. Putin was the Prime Minister of Russia from 1999 to 2000, President of Russia from 2000 to 2008 and then again the Prime Minister from 2008 to 2012. Currently, Putin is the President of Russia.
13. (1) The Arjuna Award is given by the Ministry of Youth Affairs and Sports, Government of India, to recognise outstanding achievements in national sports.
14. (1) The Siddhivinayak Temple is dedicated to Lord Ganesh, and it is located in Mumbai, Maharashtra. The temple was established in the year 1801.
15. (2) United Nations Educational, Scientific and Cultural Organization (UNESCO) was established on 16th November 1945, with its headquarters in Paris, France.
16. (3) BRICS was established on 16th May 2008, with its headquarters in Shanghai, China.
17. (4) Garba is a Gujarati folk dance celebrated in the festive season of 'Navratri'.
18. (3) C. D. Deshmukh was the first governor of the Reserve Bank of India (RBI); his term of office was from 11th August 1943, to 30th June 1949. The present Governor of RBI is Raghuram Rajan, who took over the charge from D. Subbarao on 4 September 2013.
19. (3) Situated in the Bay of Bengal, the capital of the Andaman and Nicobar Islands is Port Blair. It is the headquarters of Andaman and Nicobar Administration as all major departments of UT Government and Central Government function from Port Blair.
20. (2) Godavari River originates from Nasik Hills and falls into the Bay of Bengal. Its length is 1465 km and it flows in the south-eastern part of Andhra Pradesh.
21. (1) Established in 1967 at Bangkok, Thailand, the Association of South East Asian Nations (ASEAN) has its headquarters located at Jakarta, Indonesia.
22. (4) Established in 1960 at Baghdad, Iraq, the Organisation of the Petroleum-Exporting Countries (OPEC) is related to petroleum and its export.
23. (1) The five permanent members of the United Nations Security Council, who have veto

power, are China, France, Russia, U.K. and U.S.A.

- 24.** (1) North Atlantic Treaty Organisation (NATO) constitutes a system of collective defence, whereby its member states agree to mutual defence.
- 25.** (3) The South Asian Association for Regional Cooperation (SAARC) was established in 1985 at Dhaka, Bangladesh, with its headquarters at Kathmandu, Nepal.
- 26.** (2) Godavari is the longest peninsular river in India. It is also called Dakshin Ganga. It rises in the Nasik district of Maharashtra and discharges its water into the Bay of Bengal. It is 1,465 km long.
- 27.** (4) Tarapur is the first atomic power station established in India. The other important nuclear power projects are Rawatbhata (Rajasthan), Kalpakkam (Tamil Nadu), Narora (Uttar Pradesh), Kaiga (Karnataka) and Kakrapara (Gujarat).
- 28.** (3) Dipa Karmakar is an Indian artistic gymnast from Agartala, Tripura. In April 2016, she became the first female Indian gymnast ever to secure an Olympic berth.
- 29.** (3) Wimbledon is the oldest tennis tournament in the world and is widely considered the most prestigious. It has been held at All England Club in Wimbledon, London, since 1877.
- 30.** (3) World Population Day is annually observed on 11 July. The event was established by the United Nations Development Programme in 1989. The day aims at increasing people's awareness about various population issues such as the importance of family planning, gender equality, poverty, maternal health and human rights.
- 31.** (2) Jnanpith Award is given in the field of literature to any Indian citizen who writes in any of the 22 official languages of India, mentioned in Schedule VIII of the Constitution of India.
- 32.** (4) Krishna Poonia is associated with discus throw. She won a gold medal in the Commonwealth Games 2010.
- 33.** (4) Agartala is the capital of Tripura.
- 34.** (4) The headquarters of Board of Control for Cricket in India (BCCI) is situated at Wankhede Stadium, Mumbai, Maharashtra.
- 35.** (1) Kerala has the highest sex ratio according to the 2011 Census. It has a sex ratio of 1084 females per 1000 males.
- 36.** (3) Mysuru is known as the 'City of Palaces'. It served as the capital of the kingdom of Mysore from 1399 till independence. The famous Mysore Palace is situated in the city.
- 37.** (4) International Yoga Divas or simple Yoga Day is celebrated on 21st June every year. The United Nations General Assembly declared Yoga Day on 11th December 2014.
- 38.** (3) Kuchipudi is the classical dance of Andhra Pradesh. It has its roots in the Sanskrit text Natya Shastra.
- 39.** (2) Vishwanathan Anand was the first recipient of Rajiv Gandhi's 'Khel Ratna'. Anand is a renowned chess player.
- 40.** (1) Rabindranath Tagore was the first Asian who won the Nobel Prize for literature in 1913.
- 41.** (3) The North Atlantic Treaty Organisation (NATO) was established on 4th April, 1949, and its headquarters are located at Brussels, Belgium.
- 42.** (3) 'Tansen Samman' has been instituted by the Madhya Pradesh Government. Tansen Samaroh or Tansen Sangeet Samaroh is celebrated every year in the month of December in Gwalior Madhya Pradesh.
- 43.** (4) 21st May is observed every year as Anti-Terrorism Day throughout India to spread awareness among people about the danger of terrorism. The day marks the death anniversary of Ex-Prime Minister Rajiv Gandhi who was killed at an election rally by a suicide bomber from LTTE on 21st May 1991.
- 44.** (3) Mawsynram is a village in the East Khasi Hills of Meghalaya, India, and receives the highest rainfall in the world.
- 45.** (3) Narmada originates from the Amarkantak plateau and flows westwards into the Arabian Sea. The total length of Narmada is 1312 km.
- 46.** (4) Wular Lake is located in the state of Jammu & Kashmir (Bandipora district). Jhelum River passes through this lake.
- 47.** (1) Sambhar Lake is India's largest inland salt water lake located near Jaipur, Rajasthan.
- 48.** (1) The National Doctors' Day is annually observed on 1st July across India. The day is celebrated to honour the legendary physician Dr. Bidhan Chandra Roy whose birth and death anniversaries fall on the same day.
- 49.** (4) Ramon Magsaysay Award is given by the Philippines. The award was established in 1957 and is widely regarded as

- Asia's equivalent of the Nobel Prize. It was started in the memory of the Philippine's Former President Ramon Magsaysay.
- 50.** (2) Jim Corbett National Park is located in the Nainital district of Uttarakhand. It is a small part of the larger Corbett Tiger Reserve that was created under the Project Tiger.
- 51.** (4) The United Nations Children's Emergency Fund (UNICEF) was established on 11 December 1946 and is headquartered at New York City.
- 52.** (3) The Nobel Prize is awarded in six different categories, namely economics, peace, medicine, chemistry, physics and literature.
- 53.** (4) The Wellington Trophy is associated with the sport of rowing.
- 54.** (2) The Secretary General of the United Nations (UNSG) is the head of the United Nations Secretariat. The term of office of the UNSG is 5 years. The term is renewable for 5 years (traditionally limited to 2 terms).
- 55.** (1) Bihar is the least literate state. According to the census of 2011, the literacy rate of Bihar was 63.82%.
- 56.** (3) Sikkim has launched the super computer "Param Kanchenjunga". It was launched by Sikkim Governor Shrinvas Patil at Ravangla, NIT Sikkim campus.
- 57.** (3) The Security Council consists of a total of 15 members, which include 5 permanent members and 10 non-permanent members. Five permanent members of the Security Council are US, UK, France, Russia and China. Non-permanent members are elected on a regional basis to serve two-year terms.
- 58.** (1) The Ghagra river originates from Matsatung Glacier and falls into the Ganga river or the Ganges. The Ghagra river passes through the states of Uttar Pradesh and Bihar.
- 59.** (3) Godavari originates from Brahmagiri Mountain, Trimbakeshwar, Nasik, and falls into the Bay of Bengal. The length of this river is 1465 km.
- 60.** (4) 24th March is observed as the 'World Tuberculosis Day'. This day aims at building public awareness about the global epidemic of tuberculosis (TB) and efforts to eliminate the disease.
- 61.** (3) The World No Tobacco Day is observed on 31st May. On this day, World Health Organisation (WHO) and various government and non-government agencies organise events and workshops to create awareness among the masses about the bad effects of tobacco processing, trade and usage.
- 62.** (4) The International Literacy Day is observed every year on 8th September.
- 63.** (2) Former Secretary General of the United Nations 'U Thant' was the first recipient of the Jawaharlal Nehru Award in the year 1965.
- 64.** (1) The International Court of Justice (ICJ) is composed of 15 judges elected by the UN General Assembly and the Security Council for nine-year terms of office.
- 65.** (3) Local storms of hot weather season are known by different names in different parts of India, such as mango shower in Karnataka, blossom shower in Kerala, Kal Baisakhi in Bengal and Loo in northern plains.
- 66.** (1) Ten biosphere reserves of India, namely Nilgiri, Nanda Devi, Sunderban, Gulf of Mannar, Nokrek, Pachmarhi, Simlipal, Achanakmar-Amarkantak, Nicobar Islands and Agasthyamalai, have been recognised by UNESCO as part of the World Network of Biosphere Reserves in its region Asia and the Pacific.
- 67.** (2) The Ganga river has the largest basin in India. Ganga originates in the Gangotri Glacier near Gaumukh in the Uttarkashi district of Uttarakhand.
- 68.** (4) The rivers Bhagirathi and Alaknanda meet at Devprayag. Hereafter, they are known as Ganga. Alaknanda meets with Pindar at Karnaprayag, while Mandakini meets it at Rudraprayag.
- 69.** (1) Narmada flows through Madhya Pradesh (1,077 km), Maharashtra, (74 km) and Gujarat (161 km).
- 70.** (2) India-Bangladesh Land Boundary Agreement seeks to settle India's 41-Year old issue with Bangladesh.
- 71.** (3) The Aga Khan Cup is associated with the game of hockey. It was started by Sir Sultan Mohammad Shah in 1903.
- 72.** (3) The birthday of Dr. S. Radhakrishnan is celebrated as Teachers' Day, which falls on 5 September.
- 73.** (1) "A thing of beauty is a joy forever" was the opening line of a poem "Endymion" written by John Keats in 1818.
- 74.** (4) Arjuna Award is given for outstanding achievement in sports by the Ministry of Youth

- Affairs and Sports, the Government of India.
- 75.** (1) The first Nobel Prize to an Indian was awarded to Rabindranath Tagore in 1913 in the field of Literature.
- 76.** (4) Bangladesh was created in the year 1971 at the conclusion of the 1971 India-Pakistan war. Bangladesh means 'Country of Bengal'.
- 77.** (1) The currency of Saudi Arabia is Riyal which is divided into 100 halalas.
- 78.** (1) The Van Mahotsav Day is celebrated on 1st July every year. It was started in 1950 for creating awareness about the conservation of forests and planting of trees.
- 79.** (4) Japan would aid India in its Smart Cities Mission to help develop Chennai, Varanasi and Hyderabad as smart cities.
- 80.** (1) Dharamsala has been named as second capital of Himachal Pradesh. Shimla would serve as the summer capital of the state while Dharamsala would be the winter capital.
- 81.** (3) Senior citizens who are above the age of 80 years are exempt from tax up to an individual income of ₹ 5,00,000.
- 82.** (3) The first smart police station was inaugurated in Guntur District, Andhra Pradesh on 6 February. The police station is similar in look to a corporate office and has a custody room with a double bed instead of a lock up for holding detainees.
- 83.** (4) Gujarat became the first state to set up a cashless system for distribution of food grains in India through Aadhar Enabled Payment System in 17250 fair price shops.
- 84.** (1) B.R. Ambedkar's will be celebrated as Water Day in India to commemorate his contribution in water resource management of the country.
- 85.** (2) Maha Chakri Sirindhorn won the first World Sanskrit award on 21 November 2016 for her contribution towards the promotion of Sanskrit language for the year 2015.
- 86.** (1) Sunway TaihuLight was built by China. It is ranked as the world's third most energy efficient computer in the TOP500 Supercomputer list.
- 87.** (4) India's first Digi Dhan Mela was held in Gurugram on 26 December 2016 to promote cashless transactions.
- 88.** (1) Meghalaya will host the 2022 National Games. The event will coincide with the state's 50th year of statehood.
- 89.** (4) The world's largest solar power plant is situated in Kamuthi, Tamil Nadu. An investment of ₹ 4550 crores has been made in the plant.
- 90.** (4) Mark Anthony Selby, an English professional snooker player, defeated John Higgins in the final of 2017 World Snooker Championship, in Sheffield, England.
- 91.** (1) Rafael Nadal won the 2017 men's singles Madrid Open tennis tournament. This is the fifth time he won the Madrid Open.
- 92.** (1) Sunil Chhetri won the Hero of the League Award at the I-League 2017. Sunil Chhetri is the skipper of the Bengaluru FC team
- 93.** (2) Bengaluru FC won the 38th Indian federation Cup Football Tournament 2017, defeating Mohun Bagan.
- 94.** (1) The Barabati Stadium is located in Cuttack, Odisha.
- 95.** (4) India's first National Basketball Association (NBA) academy has officially opened in Greater Noida, Uttar Pradesh. The NBA academy will employ a holistic, 360-degree approach to player development with a focus on education, leadership, character development and life skills.
- 96.** (4) 'OLLY- the turtle' is the official mascot of the 22nd edition of the Asian Athletics Championship 2017. Odisha hosted the event at the Kalinga Stadium during 6-9 July 2017
- 97.** (3) Lewis Hamilton, a British Formula One racing driver, won the Spanish Grand Prix 2017. He is a three time Formula One World Champion.
- 98.** (3) Sakshi Malik was defeated by Risako Kawai at Asian Wrestling Championship 2017. Sakshi Malik, Vinesh Phogat & Divya Kakran had bagged silver medals at the Asian Wrestling Championship, held at the KD Jadhav Stadium in New Delhi.
- 99.** (3) Pentala Harikrishna is related to Chess. He defeated Ian Nepomniachtchi at the FIDE Grand Prix in Moscow.
- 100.** (2) Anil Kumar won the bronze in men's Greco-Roman 85 kg category at the 2017 Asian Wrestling Championship. The event was held in KD Jhadav indoor stadium, New Delhi.
- 101.** (1) Following her success in the Olympics in 2016, the Andhra Pradesh Cabinet had passed a resolution on 22 August 2016, offering Sindhu a Group-1 (gazetted officer) post of her choice.
- 102.** (1) The UNHRC is an inter-governmental body within the United Nations, made up of 47 States responsible for the

promotion and protection of all human rights around the globe. It is located at Geneva.

- 103.** (3) Nauru is the world's smallest island republic, situated in the South Pacific Ocean.
- 104.** (4) India launched the International Solar Alliance at the CoP 21 Climate Conference in Paris. The alliance brings together developed and developing countries, governments and industries, laboratories and institutions in a common enterprise. All the countries, located fully or partly between the tropics of Cancer and Capricorn, have been invited to join the Alliance. The new body will function from the National Institute of Solar Energy in India, Gurugram
- 105.** (4) The Union Minister Piyush Goel launched the Ujala Scheme in the UK in May 2017. The Unnat Jyoti by Affordable LEDs for All (UJALA) is being implemented by Energy Efficiency Services Limited (EESL).
- 106.** (2) UAE launched world's first operational robot police officer 'Robocop'. Robocop – standing 1.7 metres tall and weighing 100 kilograms – is equipped with an emotion detector which can recognise gestures and hand signals from up to 1.5 metres away. He can detect a person's emotions and facial expressions.
- 107.** (3) The 112-feet tall bust of 'Adiyogi' Lord Shiva at the Isha Yoga Foundation has been declared the world's largest bust by the Guinness Book of World Records.
- 108.** (1) The Independent Permanent Human Rights Commission (IPHRC) is an expert body with advisory capacity established by the Organisation of Islamic Cooperation (OIC) as one of the principal organs working independently in the area of human rights. Its headquarters is inaugurated in Saudi Arabia in May 2017.
- 109.** (4) China hosted the first ever OBOR. India did not attend the summit due to its opposition to China-Pakistan Economic Corridor (CPEC), which is a part of OBOR.
- 110.** (3) Joint venture between India's Punj Lloyd and Israel Weapon Systems will produce four products: X95 carbine and assault rifle, Galil sniper rifle, Tavor assault rifle and Negev Light Machine Gun.
- 111.** (1) The headquarters of the UN-Habitat is situated in Kenya. The UN-Habitat is also known as the UN Human Settlement Programme.
- 112.** (4) The Think20 Taskforce was the outcome of the first ever conducted G20 meet of digital ministers. It aims to strengthen digital economies and manage digitalisation of traditional sector
- 113.** (2) The vessel, called the Mangyongbong, will sail once a week to the port city and will also carry cargo. North Korea is under wide-ranging UN sanctions.
- 114.** (2) India has been unanimously elected as the President of the UN-Habitat, an organ of the United Nations' Organization (UNO) that promotes socially and environmentally sustainable human settlements across the world, after 10 years. UN-Habitat reports to the United Nations General Assembly.
- 115.** (4) 'Eager Lion', an annual military exercise with about 7,400 troops from more than 20 nations, has been kicked off in Jordan
- 116.** (4) The World Meteorological Organization (WMO) announced the start of the Year of Polar Prediction (YOPP). The Year of Polar Prediction (YOPP) is one of the key elements of the PPP.
- 117.** (2) The Habibganj project is a part of the Indian Railways' ambitious plan to re-develop 400 A1- and A-category railway stations. The environment-friendly railway station will be powered by solar energy.
- 118.** (2) Sher Bahadur Deuba has taken the charge of Prime Ministership for the 4th time. The 2017 Election for new Prime Minister was held due to resignation by the CPN (Maoist Centre) Chief, Pushpa Kamal Dahal from the post of Prime Minister.
- 119.** (4) The 2nd edition of National Health Editors' Conference on Yoga was inaugurated by Shripad Yesso Naik, the Minister of State for AYUSH (Independent Charge) at National Media Centre in New Delhi on June 9, 2017. The theme of 2017 conference was "Yoga for Health and Harmony".
- 120.** (1) In recognition of the fundamental contribution of migrant workers to their families and communities back home, and to the sustainable development of their countries of origin, the International Day for family remittances is celebrated every year on 16th of June.
- 121.** (1) The theme for 2017 organised by the Permanent Mission of India to the United Nations is 'Yoga for Health'. The theme highlights that yoga can contribute in a holistic way to achieving an equilibrium between mind and body.

- 122.** (3) Shashi Shekhar Vempati, a former principal architect of Infosys Technologies, has been appointed the new chief executive officer (CEO) of public broadcaster Prasar Bharati. The appointment announced on 2 June 2017, seven months after the last CEO, Jawhar Sircar, resigned from the post.
- 123.** (4) Justice P.N. Bhagwati was the architect of a new concept – Public Interest Litigation (PIL) – for dispensing justice to the voiceless poor on whose behalf a third person could approach the Supreme Court or high courts.
- 124.** (2) The Skill India campaign was launched by Prime Minister Modi in July 2015. The government aims to train 40 crore people by 2022 through its skilling initiatives. Priyanka will use her celebrity status to motivate youngsters to hone their abilities through a media campaign.
- 125.** (2) S. Ganesh Kumar replaced Chandan Sinha. As Executive Director (ED), Kumar would be looking after the departments of Information Technology, Payment and Settlement Systems and External Investments and Operations. Prior to being promoted as ED, he was Chief General Manager-in-Charge, Department of Information Technology. Currently, the central bank has 11 Executive Directors.
- 126.** (3) Attorney General for India is the Indian government's chief legal advisor, and its primary lawyer in the Supreme Court of India. He is appointed by the President of India under Article 76(1) of the Constitution and holds office during the pleasure of the President. He is part of the Union Executive.
- Earlier, in the Morarji Desai's government (1977–79), Venugopal had served as Additional Solicitor of India.
- 127.** (4) The book "Indira Gandhi: A life in nature" presents the former prime minister's life as a naturalist and examines how she steered India's conservation policy, which is authored by Jairam Ramesh, the senior Congress leader and former Environment Minister.
- 128.** (3) The book 'The Emergency – Indian Democracy's Darkest Hour' was launched at a conference to mark the anniversary of the Emergency and to honour all those who fought for the restoration of democracy in the country in the mid-1970s. It is written by Surya Prakash who was the ex-chairman of Prasar Bharati.
- 129.** (2) Yeshe Dorjee Thongchi, the renowned litterateur from Arunachal Pradesh, has been conferred with the 5th Bhupen Hazarika National Award, 2017 by the chief minister of Arunachal Pradesh, Prem Khandu Thungan. The award was instituted by Pune-based social organisation Sarhad in 2012 and is conferred on a person every year who has rendered an outstanding work at the national and international levels. It consists of ₹ 51,000, a memento and a certificate.
- 130.** (4) Revolutionary Socialist Party (R.S.P.) leader and Lok Sabha member N.K. Premachandran has been selected for the Best Parliamentarian Award for 2016. N.K. Premachandran, the 57-year-old member of Lok Sabha from Kollam in Kerala is a central secretariat member of RSP.
- 131.** (1) Goods and Services Tax (GST) is an indirect tax applicable throughout India which replaced multiple cascading taxes levied by the central and state governments. It was introduced as The Constitution (One Hundred and First Amendment) Act 2017 following the passage of Constitution 122nd Amendment Bill, 2014
- 132.** (4) The Constitution (101st) Amendment Act, 2016 allows both the centre and states to levy the destination based Goods and Services Tax (GST). The present amendments would subsume a number of indirect taxes presently being levied by Central and State Governments into GST thereby doing away the cascading of taxes and providing a common national market for Goods and Services. Before the 2016 amendment, taxation powers were divided between the centre and states.
- 133.** (4) Bengaluru has become the second city in the country, and the first in south India, to have a full-fledged Metro rail in operation following the opening of a final 12 km section of the 42 km first phase of the Metro project. The first phase, comprising an 18 km east-west line and a 24 km north-south line, built at a cost of ₹ 13,845 crore, was dedicated to the nation by President Pranab Mukherjee at an event in Bengaluru.
- 134.** (4) GST was proposed in India in the year 2000 but was implemented on July 1, 2017. Till now, only Canada had the dual GST model in the world, now followed by India. India followed the footsteps of Canada and introduced a structure where both Centre and states have the powers to levy and collect taxes.

- 135.** (2) The Indian GST model has adopted four rate structures – 5%, 12%, 18% and 28%, which now makes India the country with highest GST rate going past Argentina that levies 27% tax on goods and services
- 136.** (4) The first-ever BRICS Games had started at the Guangzhou Baiyun International Convention Center in Guangzhou, China on June 17, 2017. India has won six medals in the Wushu competition of the first-ever BRICS Games.
- 137.** (4) Spain's Rafael Nadal defeated Swiss Stanislas Wawrinka to win his record 10th French Open title. This was Nadal's Fifteenth Grand Slam title. With this, Nadal moves to the second place above Pete Sampras on the list of all-time Grand Slam winners of men's tennis only behind Roger Federer, who recently registered his 18th title win at the Australian Open in January 2017.
- 138.** (3) Pakistan saved their best for the last as they humbled arch-rivals India by a huge margin of 180 runs to win their maiden ICC Champions Trophy title. This also completed Sarfraz Ahmed's team's remarkable comeback since losing their tournament opener to the same opposition.
- 139.** (4) Microsoft India signed MoU with NISA (National Independent school Alliance) to equip 55,000 schools across 21 Indian states with digital classrooms. It is a platform that brings together budget private schools (BPS) from across the country to give them a unified voice to address their concerns about legislations and bye-laws which apply to them and to facilitate quality improvement in schools.
- 140.** (4) Édouard Philippe was appointed as the French Prime Minister by Emmanuel Macron (French President) on 15 May 2017. He has served as a member of the National Assembly representing the 7th constituency of Seine-Maritime since 2012, as well as mayor of Le Havre and president of the agglomeration community of Le Havre since 2010.
- 141.** (4) Jammu and Kashmir Assembly passed a resolution to implement GST on 7 July 2017. The resolution was moved by state Finance Minister Haseeb Drabu, and was adopted through a presidential order. With this, no state in India now remains uncovered under GST.
- 142.** (3) Right handed batsman Mithali Raj was the Indian Women Cricket Team Captain in the 2017 Women's World Cup. She is the highest run-scorer in Women's International Cricket and the only female cricketer to surpass the 6,000 run mark in ODIs.
- 143.** (3) Luxury phone maker Vertu went out of business in early July 2017. It was a British manufacturer and retailer of luxury handmade mobile phones, established by Finnish mobile-phone manufacturer Nokia in 1998
- 144.** (1) All girls robotics team from Afghanistan got visa after Trump's intervention to attend the international robotics competition in Washington DC. After the tournament, the judges awarded the team a silver medal for 'courageous achievement' as well.
- 145.** (4) Baba Ramdev launched his security firm Parakram Suraksha Pvt. Ltd. in July 2017 with an aim to prepare individuals for self and country's security. According to him, this organisation would also help to develop military instinct in each and every citizen of the country so as to awaken the spirit and determination for individual and national security.
- 146.** (1) EVM fraud was registered in Zilla Parishad elections of Buldhana in Maharashtra on 22 July 2017. This was caught after an RTI was filed when certain reports came in from Sultanpur polling station about EVM discrepancies.
- 147.** (4) Bhutan's economy has increased the most by almost 11% in 2017. This is mainly because it is one of the world's smallest and least developed countries, and depends largely on agriculture and forestry, for its citizen's main livelihood. This has resulted in higher percentages even after less actual growth as compared to other nations.
- 148.** (4) Axis Bank will acquire FreeCharge from Snapdeal in an all cash deal of Rs.385 crore. This was done via share purchase agreement with Snapdeal to acquire 100 per cent equity capital of Accelyst Solution and FreeCharge Payment Technologies.
- 149.** (3) In a historic decision, Pakistan Supreme Court disqualified Pakistan Prime Minister Nawaz Sharif as he was found guilty in corruption in the Panama Papers case. Nawaz Sharif's brother Shahid Khaqan Abbasi succeeded him as the next Prime Minister of Pakistan.
- 150.** (4) Melwyn Rego, former chairman of the Bank of India, has been appointed as

Managing Director and Chief Executive Officer of the Manipal-based Syndicate Bank. He has also held the position of Deputy Managing Director, IDBI Bank. He is a career banker and has been with IDBI Bank Ltd. since 1984

- 151.** (4) National Multi Commodity Exchange (NMCE), India's first demutualised online national multi-commodities exchange will merge with Indian Commodity Exchange (ICEX). Deemed to be the third largest commodity exchange in India, its merger is expected to be completed by December 2017.
- 152.** (3) North Korea launched two ballistic missiles aimed at two of the most well established economic zones of Japan. One of the Hyunmoo-2 missiles "accurately hit" a target 250 km away in the Sea of Japan, simulating the distance between its Launchpad and Sunan. But the second missile fell into the water "in the initial stage".
- 153.** (4) Medvedev won against three time Grand Slam Champion Stan Wawrinka in the first round of Wimbledon 2017 creating a major upset. This was his first Wimbledon appearance and Wawrinka's sixth first-round Wimbledon exit.
- 154.** (2) Himachal Pradesh Director General of Police (DGP) Sanjay Kumar has been appointed as the new chief of National Disaster Response Force (NDRF) on 3 July 2017. Prior to this, the NDRF chief was R.K. Pachnanda who has now been appointed as the chief of the Indo-Tibetan Border Police (ITBP), the Sino-Indian border guarding force.
- 155.** (2) A consortium led by ONGC (Oil and Natural Gas Corporation) is willing to spend \$11 billion to develop Farzad-B gas field in Iran. ONGC Videsh Ltd. (OVL) has offered to invest as much as \$6 billion on the Farzad-B field and spend the remaining amount to build a liquefied natural gas export facility.
- 156.** (4) In the historic visit of PM Modi to Israel, Israeli Chrysanthemum flower has been named as 'MODI'. This was done as a special gesture to mark the first visit by an Indian Prime Minister to Israel in 70 years.
- 157.** (3) Tata Global Beverages (TGBL) appointed Tata Sons head N.Chandrashekharan as the additional director and Chairman of the Board of Company. He joined the board of Tata Sons in October 2016 and was appointed as the Chairman in January 2017.
- 158.** (1) China's SAIC Motor Corp will set up a passenger car manufacturing facility at Halol in Panchmahals district of Gujarat. The company expects to invest over ₹ 2,000 crore in the next five years and begin production from 2019 as per the deal.
- 159.** (1) Tata Sons, the holding company of salt-to-software Tata Group, has appointed Aarthi Subramanian as the group's Chief Digital Officer on 13 July 2017. Subramanian was previously the Executive Director at Tata Consultancy Services and she commenced office as the Chief Digital Officer from August 2017.
- 160.** (2) Hui Ka Yen is the chairman of Evergrande group, which was in news recently as its stocks increased by 393% this year. This group is China's second-largest property developer by sales. It is based in southern China's Guangdong Province, and sells apartments mostly to upper and middle-income dwellers.
- 161.** (1) Porsche will quit Le Mans World Endurance Championship and join Formula E. Formula E, officially the FIA Formula E Championship, is a class of auto racing that uses only electric-powered cars.
- 162.** (2) Auto rickshaws and taxis in Maharashtra will have GPS installed for passengers' safety. For this, the state government has also inserted a condition that in order to get new permits the owner will have to install GPS in taxis and auto rickshaws.
- 163.** (4) India-Japan agreement on peaceful uses of N-energy came into force on 20 July 2017 with the exchange of diplomatic notes between Dr. S. Jaishankar, Foreign Secretary and H.E. Mr. Kenji Hiramatsu, Ambassador of Japan to India
- 164.** (4) Government of Madhya Pradesh has announced to provide Rs.1 crore to family of every martyr. This was made clear by Chief Minister Shivraj Singh Chouhan during his speech in the state assembly at the end of discussions on the farmer unrest in the state.
- 165.** (4) In first of its kind, the Telangana state will have eco-friendly bridge over a canal cutting across the Tdoba Andhari Tiger reserve in the Chandrapur district of Maharashtra
- 166.** (3) The International Monetary Fund's board approved a \$1.8 billion loan to Greece. This loan was taken to reduce Greece's budget deficits. Apart from this, Greece is also continuously expanding its tax base and cutting spending on pensions.

- 167.** (3) Punjab National Bank (PNB) Maestro debit cards were blocked or hotlisted on July 31, 2017 for security based reasons. The replacement is as per RBI advisory issued in 2015, asking all the banks to migrate to a much secured EMV chip based cards.
- 168.** (3) China launched a new heavy-lift rocket, the Long March-5 Y2, carrying the heaviest ever satellite on 2 July 2017. This happened as abnormalities were detected during the flight of the rocket, which blasted off from Wenchang Space Launch Centre in southern province of Hainan.
- 169.** (3) Senior advocate K.K. Venugopal was appointed as the next attorney general of India by former president Pranab Mukherjee. Earlier, Venugopal had served as the additional solicitor general under Morarji Desai's government.
- 170.** (2) Senior diplomat 'Shamma Jain' was appointed as India's ambassador to Greece. A 1983-batch Indian Foreign Service officer, Jain is currently serving as the Indian envoy to Panama.
- 171.** (1) FMCG giant ITC became the fourth Indian company to cross market capitalisation of Rs. 4 trillion. It's also the first Indian FMCG firm to cross this milestone.
- 172.** (4) US house Armed Service Committee has voted to create a 'Space Corps', a sixth branch of the country's Armed Forces to incorporate current space mission of the US Air Force. It would be the first new military service in the country since 1947.
- 173.** (3) Delhi Police have launched an upgraded version of the women's safety app 'HIMMAT' for the third time. The app was first launched in 2015 and despite its relaunch in April this year, it found few takers.
- 174.** (2) Meira Kumar was nominated as the Presidential candidate by the National Democratic Alliance (NDA) for the Presidential elections. She was elected unopposed as the first woman Speaker of Lok Sabha and served from 2009 to 2014. Prior to being a member of the 15th Lok Sabha, she had been elected earlier to the 8th, 11th, 12th and 14th Lok Sabha.
- 175.** (4) Green Oscars is the informal name of the Whitley Awards. It was awarded to Purnima Barman for Inspiring women to protect Assam's Greater Adjutant Stork (A giant bird) and its habitat, and Sanjay Gubbi for reducing deforestation in Karnataka's tiger corridors, India.

10

INDIAN RAILWAYS

HISTORY AND PHYSICAL STRUCTURE

Indian Railways (IR) is the third largest railways network in the world, comprising 1, 19,630 kms of total track and 92,081 kms of running track over a route of 66,687 km with 7,216 stations at the end of 2015-16. In 2015-16, IR carried 8.107 billion passengers annually or more than 22 million passengers a day and 1.101 billion tons of freight annually. As of the end of 2015-16, of the total 68,525-km route length, 28,327 km or 45% were electrified and 28,371 km or 37% were double or multiple line routes.

Indian Railway is the world's eighth biggest employer and had 1.331 million employees at the end of 2015-16. The first railways service in India started on 16th April, 1853, when the first train was flagged off from Bombay (now Mumbai) to Thane to cover a distance of 34 kms with 14 coaches and 400 passengers.

Railway Zones

Indian Railways (IR) is divided into 17 zones, which are further sub-divided into divisions. The number of zones in IR increased from six to eight in 1951, to nine in 1966 and to sixteen in 2003. Each zonal railway is made up of a certain number of divisions, each having a divisional headquarter. There are a total of sixty-nine divisions.

Each zone is headed by a general manager, who reports directly to the Railway Board. The zones are further divided into divisions, under the control of divisional railway managers (DRMs). The divisional officers, of engineering, mechanical, electrical, signal and telecommunication, accounts, personnel, operating, commercial, security and safety branches report to the respective Divisional Railway Managers are in-charge of the operation and maintenance of the assets. Further down the hierarchy line are the station masters, who control individual stations and train movements through the track territory under their stations' administration.

The seventeen zones and their headquarters are as follows:

1.	Northern Railway	NR	Delhi
2.	North-Eastern Railway	NER	Gorakhpur
3.	Northeast Frontier Railway	NFR	Guwahati
4.	Eastern Railway	ER	Kolkata
5.	South-Eastern Railway	SER	Kolkata
6.	South-Central Railway	SCR	Secunderabad
7.	Southern Railway	SR	Chennai
8.	Central Railway	CR	Mumbai
9.	Western Railway	WR	Mumbai
10.	South-Western Railway	SWR	Hubballi
11.	North-Western Railway	NWR	Jaipur
12.	West-Central Railway	WCR	Jabalpur
13.	North-Central Railway	NCR	Allahabad
14.	South-East Central Railway	SECR	Bilaspur
15.	East Coast Railway	ECOR	Bhubaneswar
16.	East Central Railway	ECR	Hajipur
17.	Konkan Railway	KR	CBD Belapur, Navi Mumbai

RRB (RAILWAY RECRUITMENT BOARD)

Railway Recruitment Control Board is a government organisation in India. It was set up in 1998 in the Ministry of Railways (Railway Board), New Delhi.

Railway Recruitment Boards (RRBs) are organisations under the Government of India that manage the appointment of new employees to work in Indian Railways. There are 21 boards situated in different parts of India:

- Ahmedabad
- Ajmer
- Allahabad
- Bengaluru
- Bhopal
- Bhubaneswar
- Bilaspur
- Chandigarh
- Chennai
- Gorakhpur

- Guwahati
- Jammu and Kashmir
- Kolkata
- Malda
- Mumbai
- Muzaffarpur
- Patna
- Ranchi
- Secunderabad
- Siliguri
- Thiruvananthapuram

Memorandum of Understanding with various Foreign Governments

Ministry of Railways has signed MoUs for technical cooperation in the Rail sector with various foreign Governments and National Railways. The identified areas of cooperation include high-speed corridors, speed raising of existing routes, development of world-class stations, heavy haul operations and modernization of rail infrastructure, etc. The cooperation is achieved through exchange of information on developments in areas of railways technology & operations, knowledge sharing, technical visits, training & seminars and workshops in areas of mutual interest. Some of the important MOUs are as follows:

- Indian Railways and German Railways sign Joint Declaration of intent regarding carrying out of feasibility study on existing Chennai-Kazipet corridor of Indian Railways for increasing the speed trains to 200 kmph.
- A Memorandum of Understanding was signed between Ministry of Railways, Government of India and the Federal Department of the Environment, Transport, Energy and Communications of Swiss Confederation on Technical Cooperation in Rail Sector. The MoU was signed on 31st August, 2017.
- India Japan agrees for cooperation in Rail Safety in this regard a team/ Mission of Safety experts from Japan concluded its second visit in September 2017. This team comprised of representatives of

Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT), JICA (Japan International Cooperation Agency) and railway operators etc. This mission discussed detailed scope of cooperation. This Mission visited Indian Railway's (IR) coach/wagon/loco maintenance facilities. The Mission also observed rail welding and track maintenance practices followed by IR.

Types of Passenger Trains

1. **Gatimaan Express:** It is a semi-high-speed train that runs between Delhi and Agra in India. It operates at a speed of 160 km/h and is the fastest train in India. The train takes a travel time of 100 minutes to cover 188 km journey from Hazrat Nizamuddin to Agra Cantonment railway stations.
2. **Shatabdi Express:** The Shatabdi trains are air-conditioned, intercity trains for travel during daytime. Unlike the Rajdhani or Duronto Expresses, all Shatabdi Expresses make round trips on the same day. The Bhopal Shatabdi Express (Train no: 12001/12002) is the second fastest train in India. Between New Delhi and Agra cantonment, this train travels at an average speed of 90 km/h and touches the top speed of 150 kilometres per hour.
3. **Rajdhani Express:** These are air-conditioned trains linking the major cities to New Delhi. They have high priority and are one of the fastest trains in India, travelling at a maximum speed of around 130-140 km/h. They have limited stops.
4. **Duronto Express:** These are the non-stop point-to-point rail services introduced for the first time in 2009. They connect the metros and major state capitals of India and were introduced to travel as fast as or faster than the Rajdhani Express. They provide first AC, two-tier AC and three-tier AC accommodation. Some of them provide non-air-conditioned Sleeper Class accommodation.
5. **Humsafar Express:** These are fully AC three-tier-coach trains. It is also called a semi-luxury train. These trains provide many facilities like LED screen display to show information about stations and train's speed, speakers for announcement system, vending machines for tea and coffee, charging ports for charging electronic devices such as mobiles and laptops, bio-toilets in compartments, safety measures in compartments such as introduction of smoke alarms and CCTV cameras, heating chamber as well as a refrigerating box for keeping food, curtains to maintain privacy, providing with new khadi bedrolls, etc.
6. **Vivek Express:** These trains were introduced to commemorate the 150th birth Anniversary of Swami Vivekananda in 2013. Currently, four pairs of Vivek Express run in the country.
7. **Mahamana Express:** It is the new version of coaches with modern benefits and facilities. The livery of the train is also different from other trains. It is a tri-weekly superfast train service which runs between the cities of Varanasi and New Delhi via Jaunpur, Sultanpur, Lucknow and Moradabad.
8. **Antyodaya Express:** These are fully non-reserved superfast trains. Antyodaya Express operates on peak routes. These trains are run to reduce the pressure on other trains on that route.
9. **Mountain railways of India:** These are the railways that run in the hilly regions in India. Three of these lines were combined and declared a World Heritage site as "Mountain Railways of India" by UNESCO.

Luxury Trains

Palace on Wheels is a specially designed luxury tourist train service, frequently hauled by a steam locomotive, for promoting tourism in Rajasthan. The train has 7-nights-and-8-days itinerary. It departs from New Delhi and covers Jaipur, Sawai Madhopur and Chittaurgarh, Udaipur, Jaisalmer, Jodhpur, Bharatpur and Agra, and then returns back to New Delhi.

Royal Rajasthan on Wheels, a luxury tourist train service, it covers various tourist destinations in Rajasthan. The train takes the tourists on a 7-day/8-night tour through Rajasthan. The train starts from New Delhi's Safdarjung railway station and has stops at Jodhpur, Udaipur and Chittaurgarh, Ranthambore

National Park and Jaipur, Khajuraho, Varanasi and Sarnath, Agra and then back to New Delhi.

Maharaja Express, a luxury train operated by IRCTC, runs on five circuits covering more than 12 destinations across North-West and Central India, mainly centered around Rajasthan from the months of October to April.

Deccan Odyssey, a luxury tourist train service, covers various tourist destinations in Maharashtra and Goa. The 7-night/8-day tour starts from Mumbai and covers Jaigad Fort, Ganapatipule and Ratnagiri, Sindhudurg, Tarkarli and Sawantwadi, Goa, Kolhapur and Pune, Aurangabad and Ellora Caves, Ajanta Caves and Nashik, and back to Mumbai.

The Golden Chariot luxury train runs on two circuits – Pride of the South and Splendor of the South.

Mahaparinirvan Express is an A.C. train service, also known as Buddhist Circuit Train, which is run by IRCTC to attract Buddhist pilgrims. The 7-night/8-day tour starts from New Delhi and covers Bodh Gaya, Rajgir and Nalanda, Varanasi and Sarnath, Kushinagar and Lumbini, Sravasti, Taj Mahal (Agra) before returning to New Delhi.

Other Trains

Samjhauta Express is a train that runs between India and Pakistan. However, hostilities between the two nations in 2001 saw the line being closed. It was reopened when the hostilities subsided in 2004. Another train connecting Khokhrapar (Pakistan) and Munabao (India) is the Thar Express that restarted its operations on 18th February, 2006. It was earlier closed down after the 1965 Indo-Pak war.

Maitree Express between Dhaka and Kolkata started in April 2008 using the Gede-Darshana route, in addition to a Freight Train service from Singhabad and Petrapole in India to Rohanpur and Benapole in Bangladesh.

Lifeline Express is a special train, popularly known as the "Hospital-on-Wheels", which provides healthcare to the rural areas.

Fairy Queen is the oldest operating locomotive in the world today, though it is operated only for specials between Delhi and Alwar. John Bull, a locomotive older

than *Fairy Queen*, operated in 1981, commemorating its 150th anniversary. Gorakhpur Junction railway station also has the distinction of having the world's longest railway platform at 4,483 ft (1,366 m). The Ghum station along the Darjeeling Toy Train route is the second highest railway station in the world to be reached by a steam locomotive. The Mumbai-Pune Deccan Queen has the oldest running dining car in the Indian Railways.

The **Science Express** is a mobile scientific exhibition for children mounted on a train which travels across India. The project was launched on 30th October, 2007 at the Safdarjung railway station, New Delhi by the Department of Science and Technology (DST), Government of India. Although open for all, the project primarily targets the students and teachers.

UNESCO WORLD HERITAGE SITES

There are two UNESCO World Heritage Sites on the route of Indian Railways, the Chhatrapati Shivaji Maharaj Terminus and the Mountain Railways of India. The latter consists of three separate railway lines located in different parts of India, the Darjeeling Himalayan Railway, a 610-mm (2-ft) narrow gauge railway in lesser Himalayas in West Bengal, the Nilgiri Mountain Railway, a 1,000-mm (3-ft-3-38-in) metre gauge railway in the Nilgiri Hills in Tamil Nadu and the Kalka-Shimla Railway, a 762-mm (2-ft-6-in)-narrow gauge railway in the Sivalik Hills in Himachal Pradesh.

Ministry of Railways

The Ministry of Railways is a ministry in the Government of India responsible for the country's rail transport. The ministry operates the state-owned Indian Railways, an organisation that operates as a monopoly in rail transport and is headed by the Chairman of the Railway Board. The ministry is headed by the Minister of Railways, a cabinet-level minister who presents the rail budget every year in the Parliament.

Rail Bhavan is the headquarters of the Indian Railways. It is located at 1, Raisina Road, New Delhi, near Sansad Bhavan. The current railways minister of India is **Piyush Goyal**. Manoj Sinha and Rajen Gohain are the Ministers of State for Railways.

Ashwani Lohani is the Chairman of the Indian Railway Board. He is the administrative head of the Indian Railways, which functions under the overall control of the Parliament of India through the Ministry for Railways.

Rail Budget

- India's Rail Budget is the Annual Financial Statement of the state-owned Indian Railways, which handles rail transport in India. It is presented every year by the Minister of Railways, representing the Ministry of Railways, in the Parliament. The Railway Budget was presented every year, a few days before the Union budget of India, till 2016. The Government on 21st September, 2016 approved merger of the Railway and General budgets from the next year, ending a 92-year-old practice of a separate budget for the nation's largest transporter.
- In November 1947, John Mathai (not formally designated the Minister for Railways) presented the first Railway budget for independent India.
- In the year 2000, Mamata Banerjee, who is the current Chief Minister of West Bengal, became the first woman Railway Minister of India.
- In the 2014 railway budget, the then Railway Minister D.V. Sadananda Gowda announced the first bullet train and 9 high-speed trains for India.
- The last Railway Budget was presented on 25th February, 2016 by the then Railway Minister Mr. Suresh Prabhu.

Some Important Facts

- Slowest train in India is the Mettupalayam-Ooty-Nilgiri Passenger Train, which runs at a speed of 10 kmph.
- Kolkata became the first Indian city to get a metro rail system in 1984, followed by the Delhi Metro in 2002.
- EMU services were started in Howrah-Seoraphuli section by Pandit Jawaharlal Nehru on 14th December, 1957.
- Vivek Express is like an odyssey. India's longest-route train runs between Dibrugarh and Kanyakumari, a distance of 4,286 km with 56 stops and a running time of 82.30 hours.

- **Last stations in the North-South-East-West directions:** Northernmost railway station is Baramulla in Jammu and Kashmir, westernmost

railway station is Naliya near Bhuj in Gujarat, and southernmost railway station is Kanyakumari, while the last station on the east of India is Ledo on branch line from Tinsukia.

- **Longest Platform:** The world's longest platform is in Gorakhpur Junction, India which is 1,366.33 m long
- In January 2016, Mumbai Central station had become the first railway station in India to have free Wi-Fi facility and now the service has been extended to 10 more railway stations.
- Located in Pir Panjal Range of Himalayas in Jammu and Kashmir, the Pir Panjal Tunnel – which is 11 km long – is the longest railway tunnel of India.
- **Vembanad railway bridge** in Kerala is the longest railway bridge in India with the total length of 4.62 km.
- **Rail Museum:** The National Rail Museum in Delhi, set up in 1977, is one of the unique museums in Asia. Sprawled over an area of 11 acres, the museum has collections like antique steam engines, locomotives, models, carriages, photographs among other things.
- **Sea Bridge:** India's first sea bridge, the Pamban Bridge is a cantilever bridge on the Palk Strait. It connects Rameshwaram on Pamban Island (Tamil Nadu) to mainland India.
- **World Record:** The New Delhi station entered the Guinness Book of World Records for having the world's largest route relay interlocking system.
- **Indian Railway Catering and Tourism Corporation (IRCTC)** is a subsidiary of the Indian Railways that handles the catering, tourism and online ticketing operations of the Indian Railways.
- Bholu, an elephant, is the mascot of Indian Railways.
- The station which has all the three gauges, viz. narrow, metre and broad, is the Siliguri station.

- The 114 km long **Manamadurai-Rameswaram** stretch of the Southern Railway was India's first 'Green Corridor'.
- The Green Corridor ensures zero toilet discharge on railway tracks as part of its commitment to clean

environment under the 'Swachh Rail-Swachh Bharat' initiative. The trains in this section have been equipped with bio-toilets to ensure zero discharge of human waste on the railway tracks and preventing corrosion of the tracks.

- Rohtak-Rewari DEMU is a passenger train of the Indian Railways which runs between **Rohtak Junction** and **Rewari Junction** railway stations of Haryana. This train is India's first CNG train which was flagged off on January 14, 2015 by the then Union Minister for Railways, Suresh Prabhu.

List of Important Institutes

Name of the Institute	Location
1. National Academy of Indian Railways (Railway Staff College)	Vadodara
2. Indian Railway Institute of Civil Engineering	Pune
3. Indian Railway Institute of Signal Engineering and Telecommunications	Secunderabad
4. Indian Railway Institute of Mechanical and Electrical Engineering	Jamalpur
5. Indian Railway Institute of Electrical Engineering	Nasik
6. Indian Railway Institute of Transport Management	Lucknow
7. Indian Railway Institute of Financial Management	Secunderabad

Railway Manufacturing Units

Name of the Unit	Location
1. Chittaranjan Locomotive Works	Chittaranjan, West Bengal
2. Central Organisation for Railway Electrification	Allahabad, Uttar Pradesh

Name of the Unit	Location
3. Diesel Locomotive Works	Varanasi, Uttar Pradesh
4. Diesel-Loco Modernisation Works	Patiala, Punjab
5. Integral Coach Factory	Chennai, Tamil Nadu
6. Rail Coach Factory	Kapurthala, Punjab
7. Rail Wheel Factory (Wheel and Axle Plant)	Bengaluru, Karnataka
8. Modern Coach Factory	Raebareli, Uttar Pradesh
9. Rail Wheel Plant	Chhapra, Bihar
10. Diesel Component Factory	Dankuni, West Bengal

Recent Developments

- **Tejas Express:** New Premier Train between Mumbai and Goa
- **Habiganj** Railway Station to become India's First Private Railway Station
- Concerned over the complaints received from the public over the premium trains of Indian Railways like **Rajdhani and Shatabdi Express**, Railways have decided to launch "**Operation Swarn (gold)**". The operation is aimed at improving the services in these premium trains. The Railways have decided to launch this operation after it received complaints from passengers regarding the sanitation, food quality and delay in train arrivals, etc.
- Indian Railways have launched India's **first solar-powered diesel multiple unit (DEMU)** broad-gauge train. It is a 1600-Horse-Power (HP) train with all solar-powered coaches. The train will run from Sarai Rohilla in New Delhi to Farukh Nagar in Haryana. It will replace an existing non-solar-powered train on the same route.
- In the presence of Prime Minister of India and Prime Minister of Japan, Ceremony for commencement of Work for First High Speed Train Project (popularly referred as Bullet Train) between Mumbai Ahmedabad to take place on 14th September 2017.
- Shri Piyush Goyal took over as the New Minister of Railways in Rail Bhavan today i.e. 04th September, 2017. He is also Minister of Coal. Prior to this, he

was Minister of State (Independent Charge) of Ministries of Power; Coal; New and Renewable Energy & Mines.

- Shri Ashwani Lohani, has been appointed as Chairman, Railway Board (Ministry of Railways) and ex-officio Principal Secretary to Government of India. He assumed charge of his new assignment from 24th August, 2017. Prior to this assignment, Shri

Ashwani Lohani was serving as Chairman and Managing Director, Air India.

- The Cabinet Committee on Economic Affairs, has approved the proposal of Ministry of Railways to close the Bharat Wagon and Engineering Company Limited (BWEL) - a Central Public Sector Enterprise (CPSE) under Ministry of Railways.

PRACTICE QUESTIONS

Answer the following questions by selecting the most appropriate option.

- 1. When was the first underground railway (Metro Railway) started?**
(1) 1992 (2) 1989
(3) 1984 (4) 1982
- 2. The first Shatabdi Express train was introduced in the year**
(1) 1988 (2) 1984
(3) 1985 (4) 1990
- 3. At which of the following places is Diesel Component Works established?**
(1) Jamshedpur (2) Varanasi
(3) Perambur (4) Patiala
- 4. Which zone is the largest in the Indian Railways?**
(1) Northern Railway (2) Central Railway
(3) Western Railway (4) Eastern Railway
- 5. The railway station situated in the extreme south is**
(1) Cochin
(2) Chennai
(3) Thiruvananthapuram
(4) Kanyakumari
- 6. A platform surrounded by railway lines from all the four sides is called**
(1) passenger platform (2) dock platform
(3) Island platform (4) goods platform
- 7. When was the nationalisation of Indian Railways done?**
(1) 1950 (2) 1951
(3) 1952 (4) 1954
- 8. 'Toy train' is the name given to**
(1) Darjeeling Himalayan Railway
(2) Kalka-Shimla Railway
(3) Nilgiri Mountain Railway
(4) Konkan Railway
- 9. Railway Staff College is situated at**
(1) Chennai (2) Secunderabad
(3) Bengaluru (4) Vadodara
- 10. Where is the headquarter of Indian Railways known as Rail Bhavan situated?**
(1) Lucknow (2) Kolkata
(3) Allahabad (4) New Delhi
- 11. Which of the following pairs of the regional railways and their headquarters is not true?**
(1) Northern Railway-New Delhi
(2) Central Railway-Bhopal
(3) Southern Railway-Chennai
(4) South-Central Railway-Secunderabad
- 12. Between which of the destinations was the first train in India started?**
(1) From Bombay (now Mumbai) to Madras (now Chennai)
(2) From Bombay (now Mumbai) to Thane
(3) From Bombay (now Mumbai) to Surat
(4) From Calcutta (now Kolkata) to Delhi
- 13. In which year was the first train in Indian started?**
(1) 1850 (2) 1851
(3) 1852 (4) 1853
- 14. In which Governor General's reign were the railway lines established in India?**
(1) Lord Cornwallis (2) Lord William Bentick
(3) Lord Dalhousie (4) Lord Kenning
- 15. The station where the railway lines end is called**
(1) Junction station (2) Wayside station
(3) Block station (4) Terminal station
- 16. How much distance was travelled by the first train of India?**
(1) 36 km (2) 33 km
(3) 46 km (4) 34 km
- 17. What is the length of the Northeast Frontier Railway (NEFR)?**
(1) 4,200 km (2) 3,700 km
(3) 3,990 km (4) 5,000 km
- 18. The headquarters of Northeast Frontier Railway (NEFR) are in**
(1) Gorakhpur (2) Guwahati
(3) Chennai (4) Kolkata
- 19. The headquarters of South-Central Railway are situated at**
(1) Mumbai (Central) (2) Mumbai (V.T.)
(3) Secunderabad (4) Chennai
- 20. The headquarters of Southern Railways are situated at**
(1) Mumbai (2) Chennai
(3) Delhi (4) Kolkata
- 21. Who invented the railway engine?**
(1) James Watt (2) Isaac Newton
(3) Charles Babbage (4) George Stephenson
- 22. The zone with the minimum length is**
(1) Northeast Railway
(2) Northeast Frontier Railway
(3) Southeast Railway
(4) South-Central Railway

- 23. How many training institutions of Railways are there in India?**
(1) 3 (2) 4
(3) 5 (4) 6
- 24. Which of the gauges is used in the hilly areas?**
(1) Special gauge (2) Meter gauge
(3) Narrow gauge (4) Broad gauge
- 25. How many institutions do give suggestions for the railways technology?**
(1) 2 (2) 3
(3) 4 (4) 5
- 26. The manufacturing of steam engine in Chittaranjan Locomotive Works stopped in the year**
(1) 1961 (2) 1965
(3) 1971 (4) 1973
- 27. Indian Railways is divided into how many regions?**
(1) 17 (2) 18
(3) 19 (4) 20
- 28. The 'Palace on Wheels' train was inaugurated in**
(1) 1975 (2) 1980
(3) 1982 (4) 1965
- 29. Rajasthan is under which of the following railway zones?**
(1) Northern region
(2) Western region
(3) North-Western region
(4) Central region
- 30. The first locomotive was manufactured in Chittaranjan in**
(1) November 1950 (2) September 1949
(3) October 1950 (4) October 1954
- 31. When did the Jammu-Tawi railway station appear in the map of the Indian Railways?**
(1) 1972 (2) 1973
(3) 1974 (4) 1975
- 32. In which city is the railway museum of India situated?**
(1) Delhi (2) Bengaluru
(3) Chennai (4) Mumbai
- 33. Which train in India has the longest route length?**
(1) Guwahati-Thiruvananthapuram Express
(2) Kanyakumari-Jammu Tawi Himsagar Express
(3) Kanyakumari-Dibrugarh Vivek Express
(4) Howrah-Jammu Tawi Himgiri Express
- 34. Which is the fastest train in India?**
(1) Mahamana Express (2) Duronto Express
(3) Gatiman Express (4) Shatabdi Express
- 35. When was the first railway budget presented in India?**
(1) November 1947 (2) December 1948
(3) January 1950 (4) November 1952
- 36. In which of the following cities are the three zonal headquarters of Indian Railways located?**
(1) New Delhi (2) Kolkata
(3) Guwahati (4) Mumbai
- 37. Which of the following is the eastern-most division of the Indian Railways?**
(1) Rangiya (2) Katihar
(3) Tinsukia (4) Lumding
- 38. Gorakhpur, which has the longest railway platform in the world, is located in which of the following states?**
(1) Uttar Pradesh (2) Chhattisgarh
(3) Odisha (4) West Bengal
- 39. What is the width of the broad-gauge railway line in India?**
(1) 5 feet 6 inches (2) 5 feet 3 inches
(3) 4 feet 11 inches (4) 5 feet 4 inches
- 40. Which of the following stations was formerly known as Victoria Terminus?**
(1) Chhatrapati Shivaji Terminus
(2) Churchgate Railway Station
(3) Mumbai Central
(4) Lokmanya Tilak Terminus
- 41. Who among the following was the first Railway Minister of independent India?**
(1) Shanmugham Shetty
(2) Jawaharlal Nehru
(3) Lal Bahadur Shastri
(4) John Mathai
- 42. Who was the Governor General of India when Railways were first introduced in India?**
(1) Lord Ripon (2) Lord Canning
(3) Lord Dalhousie (4) Lord William Bentick
- 43. The Maitree Express connects India with which of the following countries?**
(1) Nepal (2) Myanmar
(3) Bangladesh (4) Pakistan
- 44. Which of the following is the largest marshalling yards in India (also the longest in Asia)?**
(1) Mughalsarai (2) Mathura
(3) Itarsi (4) Guntakal
- 45. In which city is the Indian Railway Institute of Financial Management (IRIFM) being set up as announced in the Railway Budget 2013?**
(1) Lucknow (2) Gurgaon
(3) Secunderabad (4) Rae Bareilly

- 46. Into how many divisions is the Indian Railways organised?**
(1) 67 (2) 68
(3) 69 (4) 70
- 47. Which state has the longest route (in kilometres) of railway line in India?**
(1) Rajasthan (2) Uttar Pradesh
(3) Maharashtra (4) Andhra Pradesh
- 48. Which is the last railway station in North India?**
(1) Jammu-Tavi
(2) Baramulla
(3) Ghagwal railway station
(4) Banihal
- 49. Which is the last railway station in South India?**
(1) Kanyakumari (2) Attur
(3) Aduturai (4) Avad
- 50. Which is the last railway station in Western India?**
(1) Warka in Gujarat
(2) Okra in Gujarat
(3) Naliya near Bhuj in Gujarat
(4) Porbandar in Gujarat
- 51. Who was the first female locopilot in India?**
(1) Roze Millian Bethew (2) Surekha Yadav
(3) Puneeta Arora (4) Sushma Chawla
- 52. What is the full form of IRCTC?**
(1) Indian Railway Catering and Tourism Counsel
(2) Indian Railway Corporation and Tourism Corporation
(3) Indian Railway Catering and Tourism Corporation
(4) Indian Railway Catering and Tourist Corporation
- 53. Which of the following is the first railway station in India to have free high-speed Wi-Fi Internet facility?**
(1) Chennai Central station
(2) Mumbai Central station
(3) Kolkata station
(4) New Delhi station
- 54. Which is the busiest railway station in India?**
(1) New Delhi railway station
(2) Howrah junction
(3) Kalyan junction
(4) Kanpur central
- 55. Which is the oldest railway station currently operational in India?**
(1) Royapuram railway station
(2) Chhatrapati Shivaji Terminus
(3) Chennai central
(4) Howrah junction
- 56. When did Lifeline (Jeevan Rekha) Express start?**
(1) 1989 (2) 1990
(3) 1991 (4) 1992
- 57. When did the first live telecast of the railway budget take place?**
(1) 1993 (2) 1994
(3) 1995 (4) 1996
- 58. India's first CNG train runs between**
(1) Rohtak and Rewari
(2) Mathura and Agra
(3) Allahabad and Varanasi
(4) Delhi and Palwal
- 59. In which year was the Indian Railway Board established?**
(1) 1850 (2) 1857
(3) 1853 (4) 1860
- 60. Which train is named after Pt. Shri Madan Mohan Malaviya?**
(1) MUV-Anand Vihar Express
(2) Shabdbhedi Express
(3) Mahamana Express
(4) Uday Express
- 61. Which of the following is not a tourist train?**
(1) Palace on Wheels
(2) Swarn Jayanti Express
(3) The Golden Chariot
(4) Maharaja Express
- 62. Which of the following has been declared the World Heritage Site by UNESCO in 1999?**
(1) Delhi railway station
(2) Darjeeling Himalayan Railway
(3) Konkan Railway
(4) Chhatrapati Shivaji terminus
- 63. Which country has the longest railways network?**
(1) Russia (2) United States
(3) China (4) India
- 64. The longest rail journey in the world is between**
(1) Shanghai and Lhasa
(2) Moscow and Pyongyang
(3) Sydney and Perth
(4) Toronto and Vancouver
- 65. What is the full form of SCRA?**
(1) Special Class Railway Association
(2) Special Commercial Railway Apprentice
(3) Super Class Railway Apprentice
(4) None of these
- 66. What is the position of the Indian Railways in the world according to the length of the railway lines?**
(1) First (2) Second
(3) Third (4) Fourth

67. The headquarters of North-Eastern Railway are situated at

- (1) Mumbai
- (2) New Delhi
- (3) Gorakhpur
- (4) Guwahati

68. In which of the following cities was the first subway train started?

- (1) Chennai
- (2) Kolkata
- (3) Delhi
- (4) Mumbai

69. The headquarters of Northern Railways are in

- (1) New Delhi
- (2) Guwahati
- (3) Gorakhpur
- (4) Mumbai

70. In which institution is the training of electric work being given?

- (1) Indian Railways Institute of Mechanical and Electrical Engineering
- (2) Indian Railways Institute of Civil Engineering
- (3) Railway Staff College
- (4) Indian Railways Institute of Electrical Engineering

ANSWERS AND EXPLANATIONS

1. (3) The Kolkata Metro was the first metro railway in India opening for commercial services from 1984. On 29 December 2010, Metro Railway, Kolkata became the 17th zone of the Indian Railways operated by the Ministry of Railways.
2. (1) The first Shatabdi Express train was introduced in 1988 to commemorate the birth centenary of Jawaharlal Nehru, the first Prime Minister of India. Madhavrao Scindia was the Indian Railways Minister at that point of time and the Shatabdi Express was his brainchild.
3. (4) Diesel-Loco Modernisation Works, formerly known as Diesel Component Works, is located in Patiala at the Indian state of Punjab. It was set up in the year 1981 to extend the service life of Diesel Locomotives of the Indian Railways and to significantly raise the level of their availability.
4. (1) Northern Railway is the largest zone in the India Railways. It has 6,807-km route length and covers the states of Himachal Pradesh, Punjab, Jammu and Kashmir, Haryana, NCT, Uttarakhand, Uttar Pradesh. Its headquarters are in Delhi.
5. (4) Kanyakumari railway station is a railway terminus of the Indian Railways serving the coastal city of Kanyakumari in the state of Tamil Nadu. It is the southernmost railway station in India.
6. (3) An island platform (also center platform or centre platform) is a station layout arrangement where a single platform is positioned between two tracks within a railway station, tram stop or transitway interchange. Island platforms are popular on twin-track routes due to pragmatic and cost-effective reasons.
7. (2) Indian Railways was introduced in 1853 and nationalised in 1951 as one unit during the tenure of N. Gopalaswami Ayyangar.
8. (1) The Darjeeling Himalayan Railway, also known as the DHR or "Toy Train", is a 2-ft narrow-gauge railway that runs between New Jalpaiguri and Darjeeling in the Indian state of West Bengal, India
9. (4) The National Academy of Indian Railways is the alma mater for the officers of the Indian Railways. It is situated in a sprawling campus of 55 acres of the Pratap Vilas Palace at Lalbaug, Vadodara. It provides training to all levels of Indian Railways officers, from probationers to General Managers.
10. (4) Rail Bhavan is the headquarter of the Indian Railways. It is located at 1, Raisina Road, New Delhi, near the Sansad Bhavan (Parliament House). The Minister of Railways sits in the Rail Bhavan, along with the Railway Board, comprising 7 members.
11. (2) Central Railway is one of the 16 zones of Indian Railways. Its headquarters are in Mumbai at Chhatrapati Shivaji Terminus. It has the distinction of operating the first passenger railway line in India, which opened from Mumbai to Thane on 16th April, 1853.
12. (2) The first commercial train journey in India between Bombay and Thane on 16th April, 1853 was a 14-carriage-long train drawn by three locomotives named Sultan, Sindh and Sahib. It was around 21 miles in length and took approximately 45 minutes.
13. (4) The first commercial train journey in India began between Bombay (now Mumbai) and Thane on 16th April, 1853 in a 14-carriage-long train drawn by 3 locomotives named Sultan, Sindh and Sahib.
14. (3) Lord Dalhousie laid down the broad outlines of the schemes in his famous Railway Minute of 1853, which formed the basis for the future railway extension in India. The foundation of the first railway line connecting Bombay (now Mumbai) with Thane was laid down in 1853.
15. (4) A "terminal" or "terminus" is a station at the end of a railway line. Trains arriving there have to end their journeys (terminate) or reverse out of the station.
16. (4) The first commercial train journey in India began between Bombay (now Mumbai) and Thane on 16th April, 1853 in a 14-carriage-long train drawn by 3 locomotives named Sultan, Sindh and Sahib. It travelled around 34 km and took approximately 45 minutes.
17. (2) The Northeast Frontier Railway is one of the 17 railway zones in India. Headquartered in Maligaon, Guwahati in the state of Assam, it has a length of nearly 3,700 km.
18. (2) The Northeast Frontier Railway is one of the 17 railway zones in India. It is headquartered in Maligaon, Guwahati in the state of Assam.

- 19.** (3) The South-Central Railway is one of the sixteen zones of the Indian Railways. The jurisdiction of the zone is spread over the states of Andhra Pradesh, Maharashtra, Telangana State and some portions of Karnataka, Madhya Pradesh and Tamil Nadu. Its headquarters are in Secunderabad in Hyderabad, Andhra Pradesh.
- 20.** (2) The Southern Railway, headquartered at Chennai Central, is one of the 17 zones of Indian Railways. It is the earliest of the 17 zones of the Indian Railways, created in independent India. It was created on 14th April, 1951 by merging three state railways, namely the Madras and Southern Mahratta Railway, the South Indian Railway Company, and the Mysore State Railway.
- 21.** (4) In 1825, George Stephenson built the Locomotion for the Stockton and Darlington Railway. This was the first public steam railway in the world.
- 22.** (2) Responsible for rail operations in the entire Northeast and parts of West Bengal and Bihar, the Northeast Frontier Railway is the zone with the minimum length. It is one of the 17 railway zones in India and is headquartered in Maligaon, Guwahati.
- 23.** (4) There are six Centralized Training Institutes for training the personnel of Indian Railways. These are National Academy of Indian Railways, Vadodara; Indian Railways Institute of Civil Engineering, Pune; Indian Railways Institute of Mechanical and Electrical Engineering, Jamalpur; Indian Railways Institute of Signal and Telecommunications Engineering, Secunderabad; Indian Railways Institute of Electrical Engineering, Nasik; Indian Railways Institute of Transportation Management, Lucknow; and Jagjivan Ram Railway Protection Force Academy, Lucknow.
- 24.** (3) Since narrow-gauge railways are usually built with smaller radius curves, smaller structure gauges, lighter rails, etc., they can be substantially less costly to build, equip, and operate than the standard-gauge or broad-gauge railways, particularly in mountainous or difficult terrain.
- 25.** (1) Only two institutes give suggestions for the railways technology.
- 26.** (4) Chittaranjan Locomotive Works is an electric locomotive-manufacturing factory of the Government of India, and is one of the largest locomotive manufacturers in the world. Founded in 1947, it stopped manufacturing steam locomotives in 1973 and diesel locomotives in 1994. Now it manufactures only electric locomotives.
- 27.** (1) The Indian Railways is divided into 17 zones, which are further sub-divided into divisions, each having divisional headquarters. There are a total of 73 divisions.
- 28.** (3) The 'Palace on Wheels' is a luxury tourist train. It was launched by the Indian Railways in association with Rajasthan Tourism Development Corporation to promote tourism in Rajasthan on January 26 in 1982.
- 29.** (2) Rajasthan is under the Western region of the 17 railway zones. The major railway routes of Indian Railways, which come under Western Railways, are: Mumbai Central-Ratlam, Mumbai Central-Ahmedabad and Palanpur-Ahmedabad.
- 30.** (1) On November 1, 1950, the then Indian President Dr. Rajendra Prasad formally dedicated the first steam rail-engine produced by the company (a WG class locomotive bearing the registration number 8401) to the freedom fighter Deshbandhu Chittaranjan Das.
- 31.** (4) The old Jammu station was built around 1897 but was abandoned after the Partition of India as the railway link to Sialkot was broken. Jammu had no rail services until 1971 when the Indian Railways laid the Pathankot-Jammu Tawi broad-gauge line. The new Jammu Tawi station was opened in 1975.
- 32.** (1) The National Rail Museum is a museum in Chanakyapuri, New Delhi, which focusses on the rail heritage of India. It opened on 1st February, 1977.
- 33.** (3) Dibrugarh-Kanyakumari Vivek Express is a weekly Express train of the Vivek Express series of the Indian Railways, which runs from Dibrugarh in India's north-eastern state Assam to Kanyakumari in Tamil Nadu, the southernmost state of India. In 82.30 hours, the train covers a distance of 4,233 kilometres (2,630 mi) and traverses seven states in India. This train currently holds the prestigious record of being the longest running train route in the the Indian subcontinent both in terms of distance as well as time. The train has 57 halts across its route.
- 34.** (3) Gatiman Express is the fastest train in India. It has a maximum speed of 160 km/hr. The other faster trains are

- Shatabdi Express at 150 km/hr and Rajdhani Express at 130 km/hr.
- 35.** (1) In November 1947, John Mathai (not formally designated the Minister for Railways) presented the first Railway budget for independent India.
- 36.** (2) Apart from the headquarters of the Eastern and the South-Eastern Railways, Kolkata also has the headquarters of the Kolkata Metro Railways, which is now a zone of the Indian Railways. There is no city that has three zonal headquarters except Kolkata.
- 37.** (3) Tinsukia is the eastern-most division of the Indian Railways. A railway junction station situated on the Lumding-Dibrugarh section, it serves Tinsukia and the surrounding areas.
- 38.** (1) The North-east Gorakhpur Railway Station is located in the city of Gorakhpur in the Indian state of Uttar Pradesh. It serves as the headquarters of the North-Eastern Railway.
- 39.** (1) Indian gauge 1,676 mm (5 ft 6 in) (a broad gauge) is the predominant gauge used by the Indian Railways with 1,08,500 km (67,400 mi) of track length (94% of entire track length of all the gauges) and 59,400 km (36,900 mi) of route-kilometre (91% of entire route-kilometre of all the gauges).
- 40.** (1) Chhatrapati Shivaji Terminus was formerly known as Victoria Terminus. It is a historic railway station and a UNESCO World Heritage Site in Mumbai, Maharashtra, India which serves as the headquarters of the Central Railways.
- 41.** (4) John Mathai became the first Railway Minister of Independent India on 15th August, 1947.
- 42.** (3) Lord Dalhousie was the Governor-General of India when railways were introduced in India.
- 43.** (3) The Maitree Express or Moitree Express is the name of the international passenger train service connecting Bangladesh to the Indian state of West Bengal. It was incepted in 2008.
- 44.** (1) Mughalsarai Junction railway station (station code MGS) is an Indian Railways station in the Indian state of Uttar Pradesh. It is the largest marshaling yard in India and the fourth busiest railway junction in India. The station contains the largest railway marshalling yard in Asia.
- 45.** (3) The Indian Railway Institute of Financial Management (IRIFM) is being set up in Secunderabad as announced in the Railway Budget 2013.
- 46.** (3) The railways is divided into 17 zones and 69 divisions.
- 47.** (2) Uttar Pradesh has the longest route (in kilometres) of railway line in India. The state also has the sixth highest railway density. As of 2011, there were 8,546 km (5,310 mi) of railway lines in the state.
- 48.** (2) The last railway station in North India is Baramulla in Jammu and Kashmir.
- 49.** (1) The last railway station in South India is Kanyakumari in Tamil Nadu.
- 50.** (3) The last railway station in Western India is Naliya near Bhuj in Gujarat.
- 51.** (2) Surekha Yadav, born on 2nd September, 1965 is a female locopilot (train driver) of the Indian Railways in India. She became India's first female train driver in 1988.
- 52.** (3) IRCTC stands for Indian Railway Catering and Tourism Corporation (IRCTC). It is a subsidiary of the Indian Railways that handles the catering, tourism and online ticketing operations of the Indian Railways.
- 53.** (2) Google India and Indian Railways' telecom arm RailTel has launched free Rail Wire Public Wi-Fi service for railway passengers at the Mumbai Central Station. With this, Mumbai Central has become the first railway station in India to have free high-speed Wi-Fi Internet facility.
- 54.** (2) Howrah junction is the busiest railway station in India. Other busiest railway stations of India also include Mumbai Central, Ahmedabad, Chennai Central, Nagpur station, Jhansi and Katni Junction railway station.
- 55.** (2) The oldest railway station currently operational in India is Chhatrapati Shivaji Terminus. A UNESCO World Heritage Site, the historic Chhatrapati Shivaji Terminus was opened to the Queen on her Golden Jubilee in 1887.
- 56.** (3) The Lifeline Express or Jeevan Rekha Express was started on 16th July, 1991. It is the world's first hospital train run by the Impact India Foundation.
- 57.** (2) The first live telecast of the railway budget took place on 24th March, 1994.
- 58.** (1) Rohtak-Rewari DEMU is a passenger train of the Indian Railways which runs between Rohtak and Rewari Junction railway stations of Haryana. This train is India's first CNG train which was flagged off on January 14, 2015 by the then Union Minister for Railways Suresh Prabhu.

- 59.** (3) The Indian Railway Board was established on 16th April, 1853. It is the apex body of the Indian Railways and reports to the Parliament of India through the Ministry of Railways headed by the Railway Minister of India.
- 60.** (3) Mahamana Express is a ModelRake-based superfast express series train named after and in honour of Pt. Shri Madan Mohan Malaviya (Mahamana), a freedom fighter and an educationist, who established Banaras Hindu University, Varanasi.
- 61.** (2) Swarna Jayanti express trains are weekly superfast trains introduced in 1997 for the 50th "Golden Jubilee" year of India's independence. It is not a tourist train.
- 62.** (2) The Darjeeling Himalayan Railway was the first Indian railway to be declared as the World Heritage site by UNESCO. It was inducted in 1999.
- 63.** (2) The United States has the world's longest railways network, followed by China and India.
- 64.** (2) The world's longest run without changing trains is one of 10,214 km (6,346 miles) from Moscow, Russia to Pyongyang, North Korea.
- 65.** (4) The full form of SCRA is Special Class Railway Apprentice (SCRA). It is a programme by which the candidates are selected by the Union Public Service Commission (UPSC), India to train in the undergraduate program in mechanical engineering at the Indian Railways Institute of Mechanical and Electrical Engineering, Jamalpur.
- 66.** (3) The Indian nationwide rail network, the third longest in the world, is owned and operated by state-owned Indian Railways and includes an operating route length of more than 65,000 kms. The network carried about eight billion passengers (the highest in the world) and 1.01 million tonnes of freight (fourth highest in the world).
- 67.** (3) The North-Eastern Railway is one of the 17 railway zones of India. It is headquartered at Gorakhpur and comprises the Lucknow and Varanasi divisions as well as the reorganised Izzatnagar division.
- 68.** (2) The Kolkata Metro was the first metro railway in India, opening for commercial services from 1984.
- 69.** (1) The Northern Railways is one of the 17 railway zones of India and the northernmost zone of the Indian Railways. Its headquarters are in New Delhi.
- 70.** (4) Indian Railways Institute of Electrical Engineering (IRIEEN), Nashik was set up by the Indian Railways at Nashik in Maharashtra for imparting training to the newly appointed officers of Indian Railway Service of Electrical Engineers (IRSEE), recruited through Engineering Services Examination conducted by UPSC.



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