

1. **B**

Current fallow: this is the land which is left without cultivation for one or less than one agricultural year

Culturable-waste land: any land which is left uncultivated for more than five years

Net area sown: the physical extent of land on which crops are sown and harvested

2. **C**

Kharif

Northern states:

Rice, Cotton, Bajra, Maize, Jowar, Tur

Southern states:

Rice, Maize, Ragi, Jowar, Groundnut

Rabi

Northern states:

Wheat, Gram, Rapeseeds, Mustard, Barley

Southern states:

Rice, Maize, Ragi, Groundnut, Jowar

3. **D**4. **A**

China has the largest reserve of iron ore in Asia,

In the past, India has been a world leader, but now the fourth largest producer (but in NCERT it is given India as the largest producer)

The two main type of ore found in India are haematite and magnetite

5. **B**

Odisha is the leading producer of Manganese and Bauxite

The copper deposit mainly occur in Singhbhum district in Jharkhand, Balaghat district in Madhya Pradesh and Jhunjhunu and Alwar districts in Rajasthan

Minor producers of copper are Agnigundala in Guntur district of Andhra Pradesh, Chitradurg and Hasan districts of Karnataka and South Arcot district of Tamil Nadu

6. **D**

Elasticity is defined as the property by virtue of which a material is able to stretch when a force is applied and is able to get back to its original state when the force is removed.

The greater the **range of force** that can be applied to a material and yet retain this ability to get back to normal, the more elastic the material. The greater the force that needs to be applied to cause this stretching, the more the modulus of elasticity of the material (modulus means 'measure').

A rubber band is not really very '*elastic*'. It is merely more *stretchable*. It cannot retain this property of regaining its original shape over the same range of force that a steel wire can. It merely stretches more than the steel wire. It is therefore not more *elastic*. It is merely more *deformable*.

Let's consider an example:

The same pull exerted on a rubber band will stretch it more than it stretches a steel wire, where the stretching will be practically imperceptible.

But the steel wire will remain stretchable for a much higher force.

A rubber band will stretch easily for a small force that you apply with your fingers. But if you pull more and more, it simply snaps.

But the steel wire will be so strong that you will not be able to break it by pulling it with your hands.

The rubber band may stretch by about an inch before it snaps.

The steel wire will stretch only by a small fraction of a millimeter for the force you apply with your fingers.

If you suspend a heavy weight (say 10 kg) using this wire, it will survive. It will stretch by perhaps a fraction of a millimeter. When you remove the 10 kg weight, the steel wire will regain its original length.

If you then suspend a weight of 20 kg, the wire will still sustain it, and it will stretch twice as much. If you remove the 20 kg load, the wire will still be back to normal.

You can continue this, and depending on the size (diameter) of the steel wire, the upper limit may be several hundred pounds.

But if you repeat the experiment with a rubber band of the same size (diameter) as the wire, you will find that the initial 1 pound load will stretch it by several inches (not a fraction of a millimeter), and any further increase will deform it permanently or even break it. When the load is removed, the rubber band will not regain its original shape. So it is a lot less elastic than steel.

The key is in understanding the technical definition of 'elastic'.

It should not be confused with *the amount of stretching*.

Once you understand this and interpret it as the *range of force where it remains stretchable* (however small the amount of stretching), or the magnitude of the force that you need to apply to cause a predefined amount of stretching, you will understand why steel is always more elastic than rubber.

7. A

When a solid body is immersed wholly or partially in a liquid then there is some apparent loss in its weight. this loss in weight is equal to the weight of the liquid displaced by the body.

Applications of Archimedes principle are given below

Archimedes principle is used in determining the relative density of a substance

It is used in designing ships and submarines

The hydrometers used for determining the density of liquids are based on Archimedes principle

The lactometers used for determine in the purity of milk are based on this

Hydraulic lift is based on Pascal's Law

8. D

9. B

The National thermal power corporation is installing the first geothermal power plant at Tattapani area of the Balrampur district of Chhattisgarh. The puga and chhumathang in J&K, Cambay graben in Gujarat, Surajkund in Jharkand and Manikaran in Himachal Pradesh are other promising sites. The first successful(1890) attempt to tap the underground heat was made in the city of Boise(U.S.A), where a hot water pipe network was built to give heat to the surrounding buildings. this plant is still working.

10. B

Ecological debt refers to the accumulated debt of wealthier countries(from a defined date in the past until present) for having plundered poorer countries by the exploitation of their resources, the degradation of their natural habitat, the beggaring of local people and/or the free occupation of environmental space for waste discharge. The definition in itself has varied over the years and several scholars have attempted a greater specification of the concept.

Within the ecological debt definition, two types of aspects are understood: the ecological damage caused over time by a country in one or other countries or to ecosystems beyond national jurisdiction through its production and consumption patterns; and the exploitation or use of ecosystems over time by a country at the expense of the equitable rights to these ecosystems by other countries.

A **carbon credit** is a generic term for any tradable certificate or permit representing the right to emit one tonne of carbon dioxide or the mass of another greenhouse gas with a carbon dioxide equivalent (tCO₂e) equivalent to one tonne of carbon dioxide.

One carbon credit is equal to one metric tonne of carbon dioxide, or in some markets, carbon dioxide equivalent gases.

Carbon trading is an application of an emissions trading approach. Greenhouse gas emissions are capped and then markets are used to allocate the emissions among the group of regulated sources.

The mechanism was formalized in the Kyoto Protocol, an international agreement between more than 170 countries, and the market mechanisms were agreed through the subsequent Marrakesh Accords. The mechanism adopted was similar to the successful US Acid Rain Program to reduce some industrial pollutants.

The Kyoto Protocol provides for three mechanisms that enable countries or operators in developed countries to acquire greenhouse gas reduction credits:-

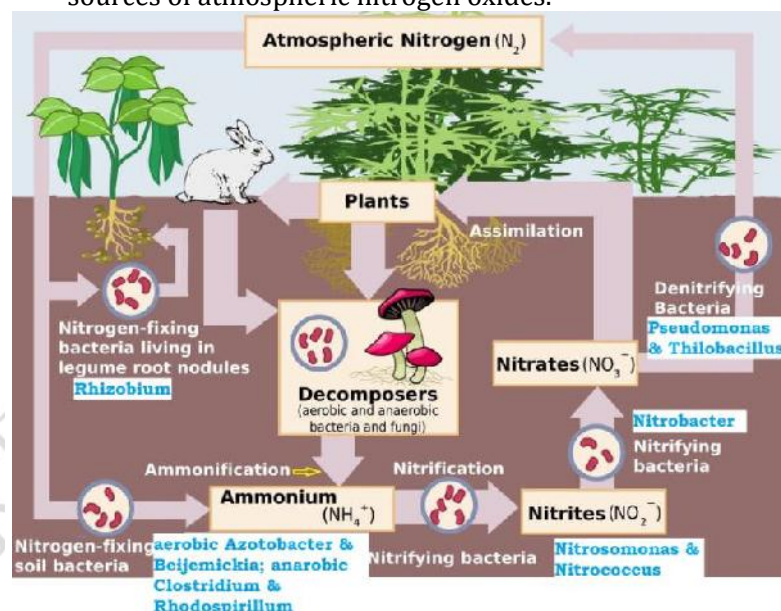
Under Joint Implementation (JI) a developed country with relatively high costs of domestic greenhouse reduction would set up a project in another developed country.

Under the Clean Development Mechanism (CDM) a developed country can 'sponsor' a greenhouse gas reduction project in a developing country where the cost of greenhouse gas reduction project activities is usually much lower, but the atmospheric effect is globally equivalent. The developed country would be given credits for meeting its emission reduction targets, while the developing country would receive the capital investment and clean technology or beneficial change in land use.

Under International Emissions Trading (IET) countries can trade in the international carbon credit market to cover their shortfall in Assigned amount units. Countries with surplus units can sell them to countries that are exceeding their emission targets under Annex B of the Kyoto Protocol.

11. D

- Apart from carbon, hydrogen and oxygen, nitrogen is the most prevalent element in living organisms.
- Nitrogen is a constituent of **amino acids, proteins, hormones, chlorophylls** and many of the **vitamins**. [All of these explained under Biology]
- Plants compete with microbes for the limited nitrogen that is available in soil. Thus, nitrogen is a **limiting nutrient** for both natural and agricultural ecosystems.
- Nitrogen exists as two nitrogen atoms (N_2) joined by a very strong **triple covalent bond** ($N \equiv N$).
- In nature, **lightning** and **ultraviolet radiation** provide enough energy to convert nitrogen to nitrogen oxides (NO , NO_2 , N_2O).
- Industrial combustions, forest fires, automobile exhausts and power-generating stations are also sources of atmospheric nitrogen oxides.



Nitrogen Fixing – Nitrogen to Ammonia (N_2 to NH_3)

There is an inexhaustible supply of nitrogen in the atmosphere but the elemental form cannot be used directly by most of the living organisms.

Nitrogen needs to be 'fixed', that is, converted to ammonia, nitrites or nitrates, before it can be taken up by plants.

Nitrogen fixation on earth is accomplished in three different ways:

By microorganisms (bacteria and blue-green algae),

By man using industrial processes (fertilizer factories) and

To a limited extent by atmospheric phenomenon such as thunder and lightning.

Certain microorganisms are capable of fixing atmospheric nitrogen into ammonia (NH_3) and ammonium ions (NH_4^+).

Ammonia is a molecule consisting of nitrogen and hydrogen having molecular NH_3 , while ammonium (NH_4^+) is an ion of ammonia that is formed by accepting hydrogen ion.

- The enzyme, **nitrogenase** which is capable of **nitrogen reduction** is present exclusively in **prokaryotes**. Such microbes are called **N_2 -fixers**. These include:
 1. free living nitrogen fixing bacteria (non-symbiotic nitrogen fixing bacteria or nitrogen fixing soil bacteria) (e.g. **aerobic Azotobacter** and **Beijemickia**; **anaerobic Clostridium** and **Rhodospirillum**),
 2. symbiotic nitrogen fixing bacteria (e.g. **Rhizobium**) living in association with leguminous plants and non-leguminous root nodule plants and
 3. some cyanobacteria (major source of nitrogen fixation in oceans) (**blue green algae. E.g. Nostoc, Anabaena, Spirulina etc.**).

Leguminous: denoting plants of the pea family (Leguminosae), typically having seeds in pods, distinctive flowers, and root nodules containing nitrogen-fixing bacteria.

Nitrification – Ammonia to Nitrates

- Ammonium ions can be directly taken up as a source of nitrogen by some plants.
- Others absorb **nitrates** which are obtained by oxidizing ammonia and ammonium ions.
- Ammonia and ammonium ions are oxidized to **nitrites or nitrates** by two groups of specialized bacteria.
 1. **Ammonium** ions are first oxidized to **nitrite** by the bacteria **Nitrosomonas** and/or **Nitrococcus**.
 2. The nitrite is further oxidized to **nitrate** with the help of the bacterium **Nitrobacter**.
 - These steps are called **nitrification**. These nitrifying bacteria are **chemoautotrophs**.
 - The nitrate thus formed is absorbed by plants and is transported to the leaves.
 - In leaves, it is reduced to form ammonia that finally forms the amine group of **amino acids**, which are the building blocks of proteins. These then go through higher trophic levels of the ecosystem.

Nitrification is important in agricultural systems, where fertilizer is often applied as ammonia. Conversion of this ammonia to nitrate **increases nitrogen leaching** because nitrate is more water-soluble than ammonia.

Nitrification also plays an important role in the removal of nitrogen from municipal wastewater. The conventional removal is **nitrification**, followed by **denitrification**.

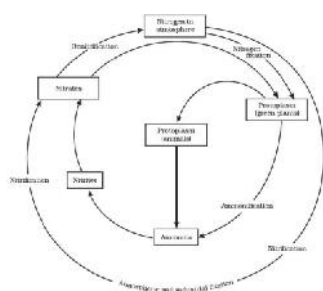


Fig. 14.6: Nitrogen cycle in nature

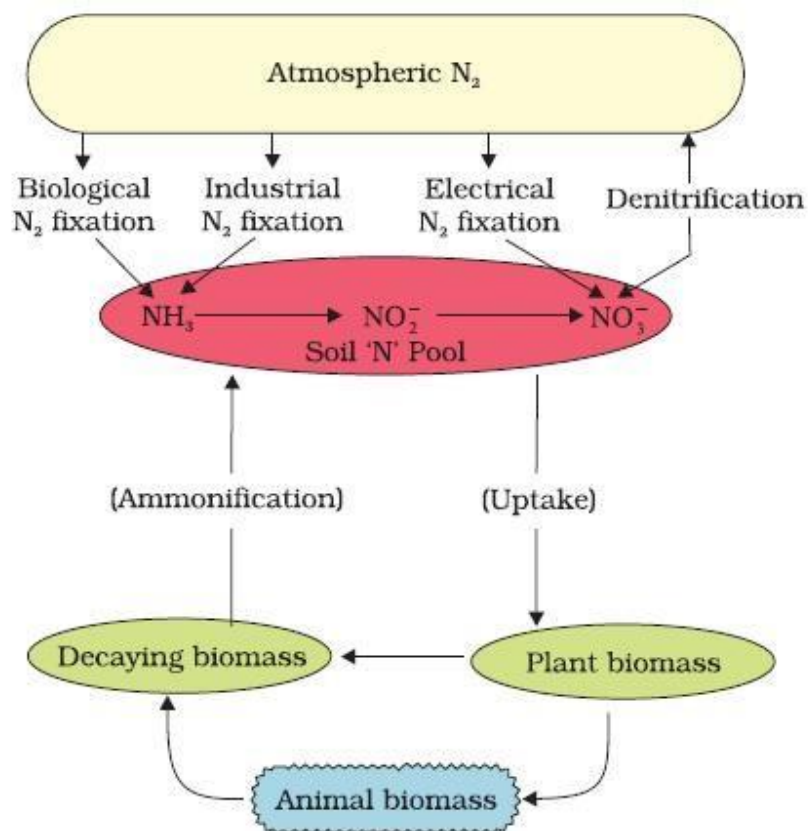


Figure 12.3 The nitrogen cycle showing relationship between the three main nitrogen pools – atmospheric soil, and biomass

Ammonification – Urea, Uric Acid to Ammonia

- Living organisms produce nitrogenous waste products such as urea and uric acid (organic nitrogen).
- These waste products as well as dead remains of organisms are converted back into inorganic ammonia and ammonium ions by the bacteria. This process is called ammonification.
- Some of this ammonia volatilizes and re-enters the atmosphere but most of it is converted into **nitrate** by soil bacteria.

Denitrification – Nitrate to Nitrogen

- Nitrate present in the soil is **reduced to nitrogen** by the process of **denitrification**.

- In the soil as well as oceans there are special denitrifying bacteria (***Pseudomonas*** and ***Thiobacillus***), which convert the nitrates/nitrites to elemental nitrogen. This nitrogen escapes into the atmosphere, thus completing the cycle.

Step 1: N₂ Fixing → Nitrogen → Ammonia or Ammonium Ions

Step 2: Nitrification → Ammonia or Ammonium Ions → Nitrite → Nitrate

Step 3: Ammonification → Dead Matter + Animal Waste (Urea, Uric Acid) → Ammonia or Ammonium Ions.

Dead Matter + Animal Waste (Urea, Uric Acid) → Ammonia or Ammonium Ions [most of it escapes into atmosphere. Rest is Nitrified (**Step 2**) to nitrates]

Nitrate [some of it is available for plants. Rest is Denitrified (**Step 4**)]

Step 4: Denitrification → Nitrate → Nitrogen.

- The amount of Nitrogen fixed by man through industrial process has far exceeded the amount fixed by the Natural Cycle.
- As a result Nitrogen has become a pollutant which can disrupt the balance of nitrogen. It may lead to **Acid rain**, **Eutrophication** and **Harmful Algal Blooms**.

12. D

13. B

In response, Government of India launched Project Tiger in 1973. Project Tiger is a centrally sponsored scheme which is under the administrative control of Ministry of Environment and Forest. National Tiger conservation authority administers the project tiger. India has declared several national parks and wildlife sanctuaries as Tiger Reserves.

Aim and objectives of Project Tiger

- To maintain a viable population of tigers in their natural habitats and save them from extinction to preserve its scientific, economic, ecological and cultural value.
- To ensure conservation of other endangered species, and harmonise the rights of tribal people with conservation of wildlife in the tiger reserves and areas around it.

Tiger Reserves

- Tiger Reserves - the areas for the protection of tigers and their prey; which are notified under the project tiger launched in 1973.
- The total number of Tiger reserves has increased from 9 in 1973 to around 50 presently.
- The state governments declare an area as a tiger reserve on the recommendations of national Tiger conservation authority.
- The Tiger Reserves are divided into core zone and buffer zone.

Core zone

- Core zone is the areas which are to be kept free of biotic disturbances and Forestry operations and are required to be kept inviolate to ensure Tiger conservation. The above objectives have to be achieved without affecting the lawful rights of Scheduled Tribes and other forest dwellers.
- The state governments, after consultation with an expert committee which is constituted for this purpose, notify the core areas and the Tiger Reserves.
- Activities such as Forestry operations, a collection of minor forest produce grazing of domestic animals and human disturbances etc are not allowed in core areas.

Buffer zone

- Buffer zone includes the area which is peripheral to the core area of Tiger Reserves. It aims at providing supplementary habitat for dispersing tigers along with allowing the coexistence of human activity.
- Buffer zone areas aim to promote coexistence of tigers and its prey species with the tribal population and ensure their livelihood, developmental, social and cultural rights.
- The gram sabha and expert committee constituted for this purpose determine the limitations of human activity in the buffer zone.

- The boundaries of tiger reserves cannot be changed without the recommendations of National tiger conservation authority and the approval of the national board for wildlife.
- The state governments, cannot de-notify any tiger reserve, except in public interest with the approval of and NTCA and the national board for wildlife.

Tiger task force

- To ensure the proper implementation of Project Tiger; it required the need for a statutory authority to ensure Tiger conservation. The Tiger task force was set up to look after the problems of Tiger conservation in India, on the recommendations of the national board for wildlife.
- The Tiger task force has given recommendations to strengthen the project tiger by providing it statutory and administrative powers.
- National board for wildlife Tiger task force NTCA.

National Tiger conservation authority (NTCA)

- In December 2005, after the recommendations of Tiger task force, the national Tiger conservation authority was established.
- The Wildlife Protection Amendment Act, 2006 provides for constitution of a Statutory authority, the national Tiger conservation authority. This was to help in the implementation of various Tiger conservation efforts and measures.

14. C

- Eutrophic water body: it is a body of water rich in nutrients and so supporting a dense plant population, the decomposition of which kills animal life by depriving it of oxygen.
- Eutrophication is the response to the addition of nutrients such as **nitrates** and **phosphates** naturally or artificially, fertilizing the aquatic ecosystem.
- **Algal blooms** are the consequence of Eutrophication.
- Eutrophication occurs naturally due to deposition of nutrients [such as in depositional environments] carried by flood waters. It takes over centuries for eutrophication to occur naturally.
- Similar nutrient enrichment of lakes at an accelerated rate is caused by human activities [discharge of wastewaters or agricultural runoff, Combustion of fossil fuel (produces gases — nitrogen oxides), growing urban population in the coastal areas) and the consequent phenomenon is known as '**cultural eutrophication**'. It takes only decades.
- Phytoplankton (algae and blue-green bacteria) thrive on the excess nutrients and their population explosion covers almost entire surface layer. This condition is known as **algal bloom**.
- Oxygen in aquatic ecosystem is replenished by photosynthetic aquatic plants. Algal Blooms restrict the penetration of sunlight resulting in **death of aquatic plants**, and hence restricts the replenishment of oxygen.
- The oxygen level is already depleted due to the population explosion of phytoplankton.
- Phytoplankton are **photosynthetic during day time** adding oxygen to aquatic ecosystem. But **during nights, they consume far more oxygen** as they respire aggressively. i.e. Algal blooms accentuate the rate of oxygen depletion as the population of phytoplankton is very high.
- The primary consumers like small fish are killed due to oxygen deprivation caused by algal blooms.
- Death of primary consumers adversely effects the food chain and leads to the destruction of higher life forms.
- Further, more **oxygen is taken up by microorganisms during the decomposition process** of dead algae, plants and fishes. Due to reduced oxygen level, the remaining fishes and other aquatic organisms also die. All this eventually leads to degradation of aquatic ecosystem.

- The new anaerobic conditions [absence of oxygen] created promote growth of bacteria such as **Clostridium botulinum** which produces **toxins** deadly to aquatic organisms, birds and mammals.

Effects of Eutrophication

- **Loss of fresh water lakes:** Eutrophication eventually creates detritus layer in lakes and produces successively **shallower** depth of surface water. Eventually the water body is reduced into marsh whose plant community is **transformed** from an aquatic environment to recognizable **terrestrial** [Lakes are one of the major sources of fresh water]
- **New species invasion:** Eutrophication may cause the ecosystem competitive by transforming the normal limiting nutrient to abundant level. This cause shifting in species composition of ecosystem.
- **Toxicity:** Some algal blooms when died or eaten, release **neuro & hepatotoxins** which can kill aquatic organism & pose threat to humans. E.g. **Shellfish poisoning**.
- **Loss of coral reefs:** Occurs due to decrease in water transparency (increased turbidity).
- Affects navigation due to increased turbidity; creates colour (yellow, green, red), smell and water treatment problems; increases biomass of inedible toxic phytoplankton, benthic and epiphytic algae and bloom of gelatinous zooplankton.

Mitigation of Eutrophication

Checking water pollution is the ultimate solution to eutrophication.

- Treating Industrial effluents domestic sewage to remove nutrient rich sludge through waste water processing.
- Riparian buffer: Interfaces between a flowing body of water and land created near the waterways, farms, roads, etc. in an attempt to filter pollution. Sediments and nutrients are deposited in the buffer zones instead of deposition in water [Wetlands, estuaries are natural riparian buffers].
- Increase in efficiency of nitrogen & phosphorous fertilizers and using them in adequate levels.
- Nitrogen testing & modeling: N-Testing is a technique to find the optimum amount of fertilizer required for crop plants. It will reduce the amount of nitrogen lost to the surrounding area.
- Encouraging organic farming.
- Reduction in nitrogen emission from vehicles and power plants.

Harmful Algal Blooms

- Algae or phytoplankton are microscopic organisms that can be found naturally in coastal waters.
- They are major producers of oxygen and food for many of the animals that live in these waters.
- When environmental conditions are favorable for their development, these cells may multiply rapidly and form high numbers of cells and this is called an algal bloom.
- Water temperature has also been related to the occurrence of algal blooms, with unusually **warm water being conducive to blooms**.
- A bloom often results in a color change in the water. Algal blooms can be any color, but the most common ones are red or brown. These blooms are commonly referred to as **red or brown tides**.
- Most algal blooms are not harmful but some produce toxins and do affect fish, birds, marine mammals and humans. The toxins may also make the surrounding air difficult to breathe. These are known as Harmful Algal Blooms (HABs).
- Harmful Algal Blooms are considered an environmental hazard because these events can make people sick when contaminated **shellfish or finfish** are eaten, or when people breathe aerosolized HAB toxins near the beach.
- HAB events adversely affect commercial and recreational fishing, tourism, and valued habitats, creating a significant impact on local economies and the livelihood of coastal residents.

- India is most favourable region for Vultures: Hindus do not eat cows, which they consider sacred, and when a cow dies, it is left to be fed on by vultures. India has a high species diversity and hence vultures get lot of food.
- Nine species of vulture can be found living in India. But today, most are in danger of extinction due to a veterinary drug called diclofenac (vultures do not have a particular enzyme to break down diclofenac).

Diclofenac

- Diclofenac is a common anti-inflammatory drug administered to livestock and is used to treat the symptoms of inflammation, fevers and/or pain associated with disease or wounds.
- Diclofenac leads to renal failure in vultures damaging their excretory system [direct inhibition of uric acid secretion in vultures].
- Gyps species were the most affected by diclofenac.
- The population of the White-rumped vulture (*Gyps bengalensis*) fell 99.7% between 1993 and 2002.
- The populations of the Indian vulture (*Gyps indicus*) and the slender-billed vulture (*Gyps tenuirostris*) fell 97.4%.
- The percentages differ slightly because the white-rumped vulture is more sensitive to diclofenac than the other two species, but all three were in danger of extinction.
- Two other species of Gyps, the Himalayan vulture (*Gyps himalayensis*) and the Eurasian griffon (*Gyps fulvus*) were less affected because they come to India only in winters
- They are exclusively mountain-dwelling and hence less vulnerable to diclofenac contamination.
- Vulture populations have continued to decline in India at a rate of between 20% and 40% each year since 2007.

Consequences of Depopulation of Vultures

- Vultures previously played an important role in public sanitation in India and their disappearance has resulted in an explosion of rats and wild dogs and the spread of diseases resulting in an estimated costs of up to ₹1700 billion (US\$25 billion) (as of 2015).
- The carcasses formerly eaten by vultures rot in village fields leading to contaminated drinking water.
- These newly abundant scavengers are not as efficient as vultures. A vulture's metabolism is a true "dead-end" for pathogens, but dogs and rats become carriers of the pathogens.
- The mammals also carry diseases from rotting carcasses such as rabies, anthrax, plague etc. and are indirectly responsible for thousands of human deaths.

Diclofenac Alternative

- The drug was banned for veterinary use in India in March, 2006; Nepal and Pakistan followed suit shortly thereafter.
- A replacement drug was quickly developed and proposed after tests on vultures in captivity: meloxicam.
- Meloxicam affects cattle the same way as diclofenac, but is harmless for vultures.
- Diclofenac for human use was still being diverted into veterinary uses through black markets in certain parts of India
- Soil erosion is the loosening and displacement of topsoil particles from the land.

Pace Of Soil Erosion

- Soil erosion in nature may be
- a slow process (or geological erosion) or
- a fast process promoted by deforestation, floods, tornadoes or other human activities. These two processes are explained below:

Water Erosion

- Running water is one of the main agents, which carries away soil particles.
- Soil erosion by water occurs by means of raindrops, waves or ice.
- Soil erosion by water is termed differently according to the intensity and nature of erosion.
- (i) Raindrop erosion (ii) Sheet erosion (iii) Rill erosion (iv) Stream bank erosion (v) Erosion due to landslides (vi) Coastal erosion.

Raindrop erosion

- Raindrops falling on land surface cause detachment of the soil particles. The loose soil particles are washed away by flowing water.
- An average size of raindrop is approximately 5 mm in diameter falling through the air hits the soil at a velocity of 32 km/hr.
- Larger raindrops and gusts of wind hit the soil surface even at higher velocities.
- Raindrops behave like tiny bombs when falling on exposed soil, displace soil particles and destroy soil structure.
- Presence of vegetation on land prevents raindrops from falling directly on the soil thus erosion of soil in areas covered by vegetation is prevented.
- With continued rainfall the displaced soil particles fill in the spaces between soil particles and so prevent water from seeping into the soil.
- After some time this results in accumulation of water called 'ponding' on the land. This water begins to flow. This flowing water is called runoff. As the water moves it erodes the soil surface.

Sheet erosion

- The detachment and transportation of soil particles by flowing rainwater is called sheet or wash off erosion. This is a very slow process and often remains unnoticed.

Rill erosion

- In rill erosion finger like rills appear on the cultivated land after it has undergone sheet erosion. These rills are usually smoothed out every year while forming. Each year the rills slowly increase in number, become wider and deeper. When rills increase in size they are called gullies. Ravines are deep gullies.

Stream bank erosion

- The erosion of soil from the banks (shores) of the streams or rivers due to the flowing water is called bank erosion.
- In certain areas where a river changes its course, the river banks get eroded at a rapid rate. Stream bank erosion damages the adjoining agricultural lands, highways and bridges.

Landslide

- Sudden mass movement of soil is called landslide. Landslides occur due to instability or loss of balance of land mass with respect to gravity.
- Loss in balance occurred mainly due to excessive water or moisture in the earth mass.
- Gravity acts on such an unstable landmass and causes the large chunks of surface materials such as soil and rocks to slide down rapidly.

Coastal erosion

- Coastal erosion of soil occurs along sea shores. It is caused by the wave action of the sea and the inward movement of the sea into the land.

Consequences of water erosion

- The fine particles of the topsoil which contain the bulk of nutrients and organic matter needed by the plants are lost from soil erosion. Erosion removes the most fertile part of soil. The less fertile subsoil is left.

- Erosion may result in removal of seeds or seedlings so that the soil becomes bare. Bare soil is more vulnerable to erosion both by wind and water.
- Removal of seeds and seedlings reduces the ability of soil to store water.
- Sheet, rill, gully and stream bank erosion also cause siltation of rivers, streams and fields. Deposition of silt results in damage of crops and pastures, and sedimentation of water bodies like streams, dams, reservoirs etc.
- Sedimentation of water bodies deteriorate water quality and damage aquatic habitats and organisms.
- Gully erosion also results in loss of large volumes of soil. Wider deep gullies sometimes reach 30 m and thus severely limit land use.
- Large gullies disrupt normal farm operation.
- Stream bank erosion not only causes loss of land, but also changes the course of a river or stream.
- Stream banks erosion also damage public roads.
- Mass movement of land or landslides also inhibits farm production and land use.
- It also causes mortality in animals and humans.
- Coastal erosion causes the adjoining land to become covered by sand.

Prevention of water erosion

- It is essential to retain vegetation cover that soil is not exposed to rain.
- Plants intercept rainfall and protect soil from direct impact of raindrops.
- Cattle grazing should be controlled.
- Crop rotation and keeping the land fallow (not planting anything in the soil for some time) should be adopted.
- Vegetation and soil management should be improved in order to increase soil organic matter.
- To prevent stream bank erosion runoff water should be stored in the catchment for as possible by maintaining vegetation cover and as by constructing dams for storing water.
- For prevention or reduction of coastal erosion, protective vegetation along the beaches should be re-established.
- The best method of controlling coastal dune erosion is not to disturb the dunes and the coastal system.
- Further, construction of buildings and other development should be located behind the dune system

15. B

Rourkela steel plant was set up in 1959 in the Sundargarh district of Odisha in collaboration with Germany. the plant was located on the basis of proximity to raw materials, thus , minimizing the cost of plant has a unique locational advantage, as it receives coal from Jharia and iron from Sundargarh and Kendujhar. the Hirakund project supplies power for the electric furnaces and water is obtained from the koel and Sankh rivers.

The Tata Iron and Steel plant lies very close to the Mumbai-Kolkata railway line and about 240 km away from Kolkata, which is the nearest port for the export of steel. the rivers Subarnarekha and Kharkai provide water to the plant. the iron ore for the plant is obtained from Noamundi and Badam Pahar and coal is brought from Joda mines in Odisha. Coking coal comes from Jharia and west Bokaro coalfields.

The Vizag steel plant, in Vishakhapatnam in Andhra Pradesh is the first port based steel plant in India which started operating in 1992

16. A

In 1854, The first modern cotton mill was established in Mumbai
Maharashtra, Gujarat and Tamil Nadu are the leading cotton producing states

India is the second largest sugarcane producer, Brazil is the top producer of sugarcane (but in NCERT it is given India as the largest producer of sugarcane)

17. C

Mumbai is the hub of the petrochemical industries

There are eight major industrial regions in India

- Mumbai-Pune Industrial Region:
- The Hugli Industrial Region:
- Bangalore-Tamil Nadu Industrial Region:
- Gujarat Industrial Region:
- Chotanagpur Industrial Region:
- Vishakhapatnam-Guntur Industrial Region:
- Gurgaon-Delhi-Meerut Industrial Region:
- Kollam-Thiruvananthapuram Industrial Region

Bengaluru-Tamil Nadu region is a major Industrial Region in India

Minor-Industrial Regions:(13)

Ambala-Amritsar

Saharanpur-muzaffarnagar-bijnor

Indore-dewas-ujjain

Jaipur-ajmer

Kolhapur-south kannada

Northern Malabar

Middle Malabar

Adilabad-Nizamabad

Allahabad-varanasi-mirzapur

Bhojpur-Munger

Durg-raipur

Bilaspur-korba

Brahmaputra valley

18. C

Golden-Quadrilateral consist of Kolkata-Delhi-Mumbai-Chennai, it comprises construction of 5846 km long 4/6 lane, high big density traffic corridor, to connect India's four big metro cities

East-west corridor connects Silchar in Assam with the Porbandar in Gujarat

North-South corridor aims at connecting Srinagar in Jammu and Kashmir with Kanyakumari in Tamil Nadu

19. D

Hajipur is the headquarter of the East central Railway zone

S.NO	NAME OF THE RAILWAY ZONE	ZONAL HEADQUARTER	DIVISIONS
1	<u>Central Railway</u>	Mumbai	Bhusawal, Nagpur, Mumbai(CST), Solapur,Pune
2	<u>Eastern Railway</u>	Kolkata	Malda, Howrah, Sealdah, Asansol
3	<u>Northern Railway</u>	New Delhi	Ambala, Ferozpur, Lucknow, Moradabad, Delhi
4	<u>North Eastern</u>	Gorakhpur	Lucknow, Varanasi, Izatnagar

	<u>Railway</u>		
5	<u>Northeast Frontier Railway</u>	Guwahati	Katihar, Lumding, Tinsukhia, Alipurduar, Rangiya
6	<u>Southern Railway</u>	Chennai	Chennai, Madurai, Palghat, Trichy, Trivandrum
7	<u>South Central Railway</u>	Secunderabad	Secunderabad, Hyderabad, Guntakal, Vijaywada, Guntur, Nanded
8	<u>South Eastern Railway</u>	Kolkata	Kharagpur, Chakradharpur, Adra, Ranchi
9	<u>Western Railway</u>	Mumbai	Bhavnagar, Mumbai Central, Ratlam, Rajkot, Vadodara, Ahmedabad
10	<u>East Central Railway</u>	Hajipur	Danapur, Dhanbad, Sonapur, Mughalsarai, Samastipur
11	<u>East Coast Railway</u>	Bhubaneswar	Khurda Road, Waltair, Sambalpur
12	<u>North Central Railway</u>	Allahabad	Allahabad, Jhansi, Agra
13	<u>North Western Railway</u>	Jaipur	Bikaner, Jodhpur, Jaipur, Ajmer
14	<u>South East Central Railway</u>	Bilaspur	Nagpur, Bilaspur, Raipur
15	<u>South Western Railway</u>	Hubli	Bangalore, Mysore, Hubli
16	<u>West Central Railway</u>	Jabalpur	Jabalpur, Bhopal, Kota

In 1953 air transport was nationalized and two corporations, Air India International and Indian Airlines were formed

In 1911 -Air transport in India was first launched between Allahabad and Naini

In 1947-Air transport was provided by four major companies namely Indian National Airways, Tata sons limited, Air services of India and Deccan Airways

1951-four more companies joined the services, Bharat Airways, Himalayan Aviation Limited, Airways India and Kalinga Airlines

20. B

Mumbai is a natural harbour and the biggest port of the country

Jawaharlal Nehru port was developed as a satellite port to relieve the pressure at the Mumbai Port. it is the largest container port in India

Kochi port's location is closer to the Suez-Colombo route

21. A

The first population census in India was conducted in 1872 but its first complete census was conducted only in 1881

The period 1901-1921 is referred to as a period of stagnant

The decades 1951-1981 are referred to as the period of population explosion

In post 1981 till present, the growth rate of country's population though remained high, has started slowing down gradually

According to the standard census definition Main worker is a person who works for atleast 183 days in a year.

Marginal worker is a person who works for less than 183 days

22. C

Maharashtra has the highest net in-migrants

Settlements is fragmented into several units physically separated from each other is known as Hamleted settlements

Different types of settlements are:

Clustered settlements

Semi clustered settlements

Hamletted settlements

Dispersed settlements

Urban settlements

Ambala is an example of Garrison Cantonment towns

Other examples of Garrison cantonment towns are: Jalandhar, Mhow, Babina, Udhampur

Different types of towns:

Administrative towns

Industrial town

Transport town

Commercial towns

Mining towns

Educational towns

Religious and cultural towns

Tourist towns

23. C

24. D

Light is a form of energy. Which exhibits properties of Reflection, Refraction, Scattering, Diffraction, Interference, Polarisation. Scattering of light is observed when light passes through medium suspended by particles whose sizes are of the order of wavelength of light, light after striking these particles deviated in all directions this property of light is called scattering of light

Scattering property of light is inversely proportional to its wavelength. In the visible light, spectrum red is scattered least and violet scatters the maximum, because of this red is used to indicate danger. The sky appears blue because of scattering of blue colour but for, an astronaut sky looks black. Even cloud appears white as it scatters all colours equally

During sunrise and sunset, light has to travel the farthest than during the other parts of the day to reach the human eye. As the distance of travel through the atmosphere increases during dawn and dusk, light is refracted much more than during noon. Thus the colours of the light having shorter wavelengths fade out leaving only the red wavelength that reach our eyes.

You can see that the scattering of light is more when the Sun is near the horizon. As the shorter wavelengths are scattered, only red light is left, as it has the largest wavelength of the seven colours. Thus the sun appears red during sunrise and sunset.

25. B

Surface tension is the property of a liquid by virtue of which it tries to minimize its surface area. It is the force acting perpendicularly to unit length on an imaginary line drawn at the surface of the liquid. And its unit is newton/metre. Temperature and soluble impurities will increase surface tension

Applications

Antiseptics reaches the tiny pores of the wound because of its surface tension.

Small insects can walk on the liquid surface because of surface tension.

The needle can float on water due to surface tension.

Mosquitoes cannot live on water surface where kerosene added, as it decreases surface tension

Hair of a shaving brush cling together due to surface tension, when the brush is taken out from the water

Warm soup is tasty because at high temperature its surface tension is low and consequently the soup spreads on all parts of the tongue

Viscosity:

It is the property of the liquid by virtue of which it opposes the relative motion between its adjacent layers

Viscosity is the property of liquids and gases both

With rise in temperature, viscosity of liquids decreases and that for gases increases

viscosity of a fluid is measured by its coefficient of viscosity

26. C

Mangkhut Typhoon

- It is a super storm of category 5, with winds of more than 200 kph (124 mph) which tore across the northern tip of the Philippines.
- It brought heavy rain and causing widespread power and communications outages.
- A hurricane is a storm that occurs in the Atlantic Ocean and north eastern Pacific Ocean, a typhoon occurs in the north western Pacific Ocean, a cyclone occurs in the south Pacific or Indian Ocean, a willy-willy in south-west Australia

27. B

Directorate General of Civil Aviation (DGCA), has recently published final guidelines for operating drones by ordinary citizens.

- It will come into force on December 1,2018, the date when the civilian use of drones becomes legal in India.
- DGCA has identified multiple categories of drones, which can be broadly classified as,

i. Nano (weighing up to 250 g),

ii. Micro (more than 250 g but less than 2 kg) and

iii. Small and above (weighing 2 kg or more).

- Every drone bigger than Nano must obtain a unique identification number from DGCA, similar to the registration number for a car.
- Users of bigger drones will be required to obtain a Unique Air Operator's Permit (UAOP), similar to a driver's licence.
- All categories of drones must be flown in the visual line of sight, and only during daytime.
- The operation of drone will be restricted to 50ft above the ground.
- The drones cannot be operated from a moving vehicle, ship or aircraft.
- The regulator has listed 12 categories of "no-drone zones" which includes airports, International borders including the Line of (Actual) control, strategic locations notified by Ministry of Home affairs, secretariat complexes in state capitals.

28. C

India recently decided to end its boycott of the PISA.

- PISA was introduced in the year 2000 by the Organisation for Economic Cooperation Development (OECD).
- It tests the learning levels of 15-year-olds in reading, mathematics and science.
- The test is carried out every three years.
- India decided to stay away from PISA on account of its dismal performance in 2009. In 2012 and 2015, when it was placed 72nd among the 74 participating countries.
- India, subsequently, chose to not participate in the 2012 and 2015 cycle.
- The “out of context” questions were stated as a reason for the poor show.
- The HRD Ministry, now, had formally decided to end this boycott. The ministry will negotiate India’s terms of participation in 2021 with OECD.
- Unlike 2009, when schools in Tamil Nadu and Himachal Pradesh had participated, the Union government will request OECD to administer the test across all schools in Chandigarh in 2021.
- Chandigarh was selected for three reasons.
 - o Compact area.
 - o To keep number of languages in which the test has to be administered to a minimum and
 - o Chandigarh’s record of performing well in learning assessments.

29. A

Under the Disaster Management Act 2005, a financial mechanism has been set up by way of National Disaster Response Fund (NDRF) at national level and State Disaster Response Funds (SDRF) at state level.

- The funds are to meet the rescue and relief expenditure during any notified disaster.
- The funding for disaster relief are governed by the National Disaster Management Policy.
- As per the policy, the State governments have to provide disaster relief from their respective State Disaster Response Funds (SDRFs).
- Additional assistance will be provided from the National Disaster Response Fund (NDRF) only for a “calamity of severe nature”.
- SDRF has been constituted in each state in which the state had been, so far, contributing 75 per cent for general category states and 90 per cent for special category states of hilly regions.
- The Centre has announced to enhance its contribution to the (SDRF) from 75 per cent to 90 per cent for general category states with effect from April 1 2018
- With the declaration, the contribution of all states to the SDRF fund would be only 10 per cent.
- The NDRF is funded through a National Calamity Contingent Duty levied under GST for selected goods and contribution from any person or institutions

30. A

It is a portal launched by the Ministry of Home Affairs.

- It will enable individuals and private companies to submit application for security clearances and view its status online.
- The Home ministry is the nodal authority for granting security clearances in certain sensitive sectors.

31. A

e-Vidhan, a part of Digital India Programme, is a Mission Mode Project to digitize and make the functioning of State Legislatures paperless.

- Ministry of Parliamentary Affairs is the Nodal Ministry for this project.
- The Ministry desires to roll out e-Vidhan as National e-Vidhan Application (NeVA), covering all 40 Houses including two Houses of Parliament and State legislatures.

- It is to be used by the Legislatures as well as all the Government Departments.
- This project was first executed in Himachal Pradesh which made the Shimla Legislative Assembly the first Assembly in India to go paperless in 2014.
- The mNeVA (NeVA-mobile app) is a user-friendly app that has made information on conduct of business in Legislatures accessible anytime, anywhere to everyone.
- It is a work-flow based app deployed in Cloud (Meghraj).
- It helps the Chair of the House to conduct the proceedings of the House smoothly and the members to carry out their duties in the House efficiently

32. C

Dam Rehabilitation Improvement Project (DRIP) was commenced in the year 2012 as a 6-year project.

- Later, Union Ministry of Water Resources, River Development and Ganga Rejuvenation extended the project period with a revised closure date by June, 2020.
- Cabinet Committee on Economic Affairs has recently approved the revised cost estimate of DRIP.
- The project aims to improve safety and operational performance of 198 Dams, along with strengthening of institutions.
- The funds for this project will be shared by World Bank, State Implementing agencies and Central Water Commission.
- The primary beneficiaries are communities' dependent on reservoir and downstream communities, who are prone to risk associated with dam failure or operational failure.
- It also focusses on capacity building of staff for effectiveness of Dam Safety Organisation to make dams safe from structural and operational point of view.
- Reservoirs in the state of Kerala managed by water resources department and state electricity department will get funded under the DRIP programme to the tune of Rs. 514 crore

33. D

India became the 9th country in the world to have a National Database on Sexual Offenders (NDSO).

- It is accessible only to law enforcement agencies for the purpose of "investigation and monitoring".
- The database is for those convicted for sexual offences 2005 onwards.
- It includes name, address, photograph and fingerprint details of the convict.
- The database will be maintained by the National Crime Records Bureau, that will also track whether the State police were updating the records on time.
- The database will include offenders convicted under charges of rape, gang rape, Protection of Children from Sexual Offenders Act (POCSO) and eve teasing

34. C

Project Cyber Shikshaa focus on skilling women engineering graduates in the niche field of Cyber Security.

- It is launched by Microsoft & Data Security Council of India (DSCI) in association with Ministry of Electronics & IT (MeitY).
- The primary objective is to connect with underserved women from Tier 2 / Tier 3 cities and to align a career path for them in Cyber Security.
- Centre of Advance Computing (CDAC) will impart training to the selected women candidates from all over India.
- Initially, the project will be rolled out in the following cities - Noida, Patna, Hyderabad and Mohali, followed by other cities in the next phase.
- The program will be a 4-months interactive training course with combination of theory, case studies practical hands-on and projects

35. C

Employees' State Insurance Corporation under Ministry of Labour and Employment has recently rolled out Atal Bimit Vyakti Kalyan Yojna.

- The scheme covers Insured Persons (IP) covered under the Employees' State Insurance Act, 1948.
- It aims to provide cash relief to unemployed insured person.
- The relief will be payable in cash directly to their Bank Account in case of unemployment and while they search for new engagement

36. B

India has recently launched digital bridge called e-VidyaBharati & e-ArogyaBharati Network between India and Africa.

- The network covers 48 African countries and operates based on satellite technology.
- It aims at providing quality tele-education and tele-medicine facility by linking select Indian Universities, Institutions and Super Specialty Hospitals to African educational institutions and hospitals

37. C

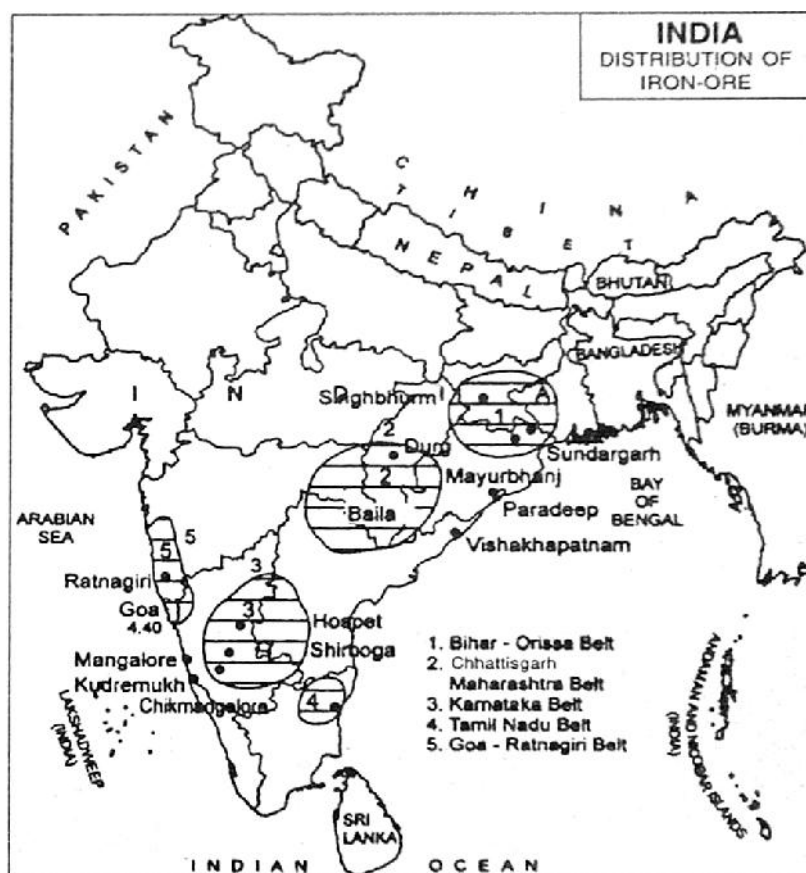
The 67th biennial meeting of International Whaling Commission (IWC) was organized in Brazil.

- IWC was set up for the proper conservation of whale stocks and orderly development of the whaling industry.
- Its objectives are
 - i. Setting out catch limits by species and area which may be zero as it the case for commercial whaling,
 - ii. Designating specified areas as whale sanctuaries,
 - iii. Protection of calves and females accompanied by calves,
 - iv. Prescribe open and closed seasons and areas for whaling and restrictions on hunting methods.
- The headquarters of the IWC is in Impington, near Cambridge, England.
- Currently, 88 nations are members to this commission including India.
- In 1982 the IWC adopted a moratorium on commercial whaling, which is opposed by Japan, Russia, and other nations.
- It allows non-zero whaling quotas for aboriginal subsistence and member nations may issue 'Scientific Permits' to their citizens.
- In the recent meeting, Brazil pushed for "Florianopolis Declaration", which insists that commercial whaling is no longer a necessary economic activity and would allow the recovery of all whale population to pre-industrial whaling levels.
- The resolution banning the commercial whaling was vehemently opposed by Japan, Russia.
- Australia supported the resolution and opposed the attempts to undermine the moratorium.
- Iceland and Norway are the only countries that allow commercial whaling.
- Iceland has come under direct pressure to end whaling from the European Union.
- Aboriginal subsistence hunting is allowed in several countries including the US, Russia, Greenland, and Saint Vincent and the Grenadines in the Caribbean.
- Japan continued to hunt whales despite the moratorium, exploiting a loophole allowing "scientific research"

38. B

39. A

40. A



41. C

UN chief has recently reiterated his appeal to 8 nations, including India and the US, to ratify the Comprehensive Nuclear-Test-Ban Treaty.

- CTBT is a multilateral treaty that bans all nuclear explosions, for both civilian and military purposes, in all environments.
- It was adopted by the United Nations General Assembly on 10 September 1996.
- It can only enter into force after it is ratified by eight countries with nuclear technology capacity, namely China, Egypt, India, Iran, Israel, North Korea, Pakistan and the United States.
- China, Egypt, Iran, Israel and the United States have signed but not ratified the Treaty.
- India, North Korea and Pakistan have not signed it.
- According to CTBT, each State Party undertakes not to carry out any nuclear weapon test explosion or any other nuclear explosion, and to prohibit and prevent any such nuclear explosion at any place under Its jurisdiction or control.
- The Preparatory Commission for the Comprehensive Test Ban Treaty Organization (CTBTO), an international organization headquartered in Vienna, Austria, was created

42. B

India Post Payment Bank (IPPB) was recently launched with an intention to make banking facility available at the doorstep of citizens and leverage the workforce of 300,000 postmen.

- It will be a 100% government owned entity.
- It will act as a bank, allowing accounts to be opened. It will offer zero-balance savings accounts with multiple benefits, including unlimited withdrawals and deposits besides doorstep banking.

- A customer can make deposits into the account but the total amount is limited to Rs 1 lakh.
- Amounts deposited in excess of Rs 1 lakh will get automatically transferred to the savings bank account.
- Other normal services offered by banks like payments and remittance services, mobile payments, transfers, purchases, ATM cards, net banking and third-party fund transfers will all be made available.
- It can issue debit cards but not credit cards.
- However, it cannot lend loans to customers.
- The interest on the IPPB savings account will be the same as what the banks offer, which is 4% per annum

43. B

It is an initiative by Ministry of Petroleum and Natural Gas.

- It is aimed at providing a Sustainable Alternative Towards Affordable Transportation (SATAT)
- It will promote the use of Compressed Bio-Gas (CBG) production plants and make available CBG in the market for use in automotive fuels.
- It will be launched in association with PSU oil marketing companies, which invites potential entrepreneurs to set up CBG plants

44. A

It is a Space mission by UAE which planned to send an unmanned probe to orbit Mars by 2021.

- It has become the first Arab Country to do so.
- The hope spacecraft will be a compact, hexagonal section spacecraft weighing approx. 1500 kg.
- The launching of the spacecraft is going to be coincided with the 50th anniversary of the founding of the UAE

45. D

It is a joint-annual military exercise between Ukraine and NATO.

- It will be held in western Ukraine region and it is seen as a response to Russia's biggest military exercise Vostok.
- Ukraine's tension with Russia remain high over the Kremlin-backed insurgency in its eastern region.
- NATO is an Alliance that consists of 28 independent member countries across North America and Europe, then west of which, Albania and Croatia.
- It is an intergovernmental political and military alliance, committed to the Principle of collective defence.
- NATO's headquarters is in Brussels, Belgium

46. D

Name from Latin word 'Later' which means Brick.

Become so soft when wet and so hard when dried.

In the areas of high temperature and high rainfall.

Formed as a result of high leaching.

Lime and silica will be leached away from the soil.

Organic matters of the soil will be removed fast by the bacteria as it is high temperature and humus will be taken quickly by the trees and other plants. Thus, humus content is low.

Rich in: Iron and Aluminum

Deficient in: Nitrogen, Potash, Potassium, Lime, Humus

Colour: Red colour due to iron oxide.

Rice, Ragi, Sugarcane and Cashew nuts are cultivated mainly

47. C

Red soil:

- Seen mainly in low rainfall area.
- Also known as **Omnibus group**.
- Porous, friable structure.
- Absence of lime, kankar (impure calcium carbonate).
- **Deficient in:** lime, phosphate, manganese, nitrogen, humus and potash.
- **Colour:** Red because of Ferric oxide. The lower layer is reddish yellow or yellow.
- **Texture:** Sandy to clay and loamy.
- Wheat, cotton, pulses, tobacco, oilseeds, potato etc are cultivated.

Black soil:

- Regur means **cotton** – best soil for cotton cultivation.
- Most of the Deccan is occupied by Black soil.
- Mature soil.
- High water retaining capacity.
- Swells and will become sticky when wet and shrink when dried.
- **Self-ploughing** is a characteristic of the black soil as it develops wide cracks when dried.
- **Rich in:** Iron, lime, calcium, potassium, aluminum and magnesium.
- **Deficient in:** Nitrogen, Phosphorous and organic matter.
- **Colour:** Deep black to light black.
- **Texture:** Clayey

48. A

- In India, soil had been classified from the ancient period itself even though it was not as detail as the modern classifications.
 - In the **ancient period**, the classification was based on only two things; whether the soil is fertile or sterile. Thus the classification were:
1. Urvara [fertile]
 2. Usara [sterile]

Alluvial soil:

- Mostly available soil in India (about 43%) which covers an area of 143 sq.km.
- Widespread in northern plains and river valleys.
- In peninsular-India, they are mostly found in deltas and estuaries.
- Humus, lime and organic matters are present.
- Highly fertile.
- Indus-Ganga-Brahmaputra plain, Narmada-Tapi plain etc are examples.
- They are depositional soil – transported and deposited by rivers, streams etc.
- Sand content decreases from west to east of the country.
- New alluvium is termed as **Khadar** and old alluvium is termed as **Bhangar**.
- **Colour:** Light Grey to Ash Grey.
- **Texture:** Sandy to silty loam or clay.
- Rich in: potash
- Poor in: phosphorous.
- Wheat, rice, maize, sugarcane, pulses, oilseed etc are cultivated mainly

49. C



Different types of vegetation in India

Tropical evergreen rain forests

The Tropical Evergreen rain forests are found in the areas where precipitation is more than 200 cm. They are largely found in the Northeastern regions of Arunachal Pradesh, Meghalaya, Assam, Nagaland, the Western Ghats, the Tarai areas of the Himalayas and the Andaman groups of Islands. They are also found in the hills of Khasi and Jaintia. The trees in this area have intense growth. The major trees found in this area are Sandal Wood, Rosewood, Garjan, Mahogany, and bamboo. It has a copious vegetation of all kinds – trees, shrubs, and creepers giving it a multilayered structure. The elephants, monkey, lemur are the common animals found in these areas.

Deciduous or Monsoon type of forests

The Deciduous forests are found on the lower slope of the Himalayas, West Bengal, Chhattisgarh, Bihar, Orissa, Karnataka, Maharashtra Jharkhand and the adjoining areas. The precipitation in this area is between 100 cm and 200 cm. The Teak is the dominant species seen in the area. Along with that Deodar, Blue Gum, Pal Ash, Sal, Sandalwood, Ebony, Arjun, Khair, and Bamboo are also seen. The trees in this forest shed their leaves during dry winter and dry summer. On the basis of the availability of water, these forests are again divided into moist and dry deciduous.

Dry deciduous forests

These forests grow in areas where the precipitation is between 50 cm and 100 cm. These are mainly seen in the areas of the Central Deccan plateau, Punjab, Haryana, parts of Uttar Pradesh, Madhya Pradesh and South-east of Rajasthan.

Mountain forests

Mountain forests differ significantly along the slopes of the mountain. On the foothills of the Himalayas until a height of 1500 meters, evergreen trees like Sal, teak, and bamboo grow copiously. On the higher slope, temperate conifer trees like pine, fir, and oak grow. At the higher elevation of the Himalayas, rhododendrons and junipers are found. Further, than these vegetation zones, alpine grasslands appear up to the snowfield.

Tidal or Mangrove forests

The tidal or mangrove forests grow by the side of the coast and on the edges of the deltas e.g., the deltas of the Cauvery, Krishna, Mahanadi, Godavari, and Ganga. In West Bengal, these forests are known as 'Sundarbans'. The 'sundari' is a most major tree in these forests. The important trees of the tidal forests are hogla, garan, pasur etc. This forest is an important factor in the timber industry as they provide timber and firewood. Palm and coconut trees beautify the coastal strip.

Semi-deserts and Deserts vegetations

This area receives a rainfall less than 50 cm. Thorny bushes, acacia, and Babul are found in this vegetation region. The Indian wild date is generally found here. They have long roots and thick flesh. The plants found in this region store water in their stem to endure during the drought. These vegetations are found in parts of Gujarat's, Punjab and in Rajasthan.

50. D

Tropical evergreen forest are found in the western slope of the Western Ghats, hills of the northeastern region and the Andaman and Nicobar Islands. Depending upon the variations in the climate and the soil, the vegetation of India changes from one region to another.

51. C

The establishment of the CBI was recommended by the Santhanam Committee on Prevention of Corruption (1962 -1964).

The CBI is not a statutory body. It derives its powers from the Delhi Special Police Establishment Act, 1946. The CBI is the main investigating agency of the Central Government. It plays an important role in the prevention of corruption and maintaining integrity in administration. It also provides assistance to the Central Vigilance Commission.

The Director of CBI as Inspector-General of Police, Delhi Special Police Establishment, is responsible for the administration of the organisation. With the enactment of CVC Act, 2003, the superintendence of Delhi Special Police Establishment vests with the Central Government save investigations of offences under the Prevention of Corruption Act, 1988, in which, the superintendence vests with the Central Vigilance Commission.

The Director of CBI has been provided security of two-year tenure in office by the CVC Act, 2003.

52. D

The Lokpal Act allows setting up of anti-corruption ombudsman called Lokpal at the Centre and Lokayukta at the State-level.

The Lokpal will consist of a chairperson and a maximum of eight members. The Lokpal will cover all categories of public servants, including the Prime Minister.

But the armed forces do not come under the ambit of Lokpal. The Act also incorporates provisions for attachment and confiscation of property acquired by corrupt means, even while the prosecution is pending.

The States will have to institute Lokayukta within one year of the commencement of the Act.

It has been made mandatory for public servants to declare their assets and liabilities along with that of their spouse and dependent children. The Act also ensures that public servants who act as whistleblowers are protected. A separate Whistle Blowers Protection Act was passed for this purpose.

The Lokpal will have the power of superintendence and direction over any investigation agency including

CBI for cases referred to them by the ombudsman.

As per the Act, the Lokpal can summon or question any public servant if there exists a prima facie case against the person, even before an investigation agency (such as vigilance or CBI) has begun the probe. Any officer of the CBI investigating a case referred to it by the Lokpal, shall not be transferred without the approval of the Lokpal.

An investigation must be completed within six months. However, the Lokpal or Lokayukta may allow extensions of six months at a time provided the reasons for the need of such extensions are given in writing.

The Lokpal can award fine up to Rs. 2 lakh for false, frivolous or vexatious complaints.

53. A

A State Human Rights Commission can inquire into violation of human rights only in respect of subjects mentioned in the State List (List-II) and the Concurrent List (List-III) of the Seventh Schedule of the Constitution.

The Commission can inquire into any violation of human rights or negligence in the prevention of such violation by a public servant, either suo motu or on a petition presented to it or on an order of a court.

54. A**55. B****56. B**

Ishwar Chandra Vidyasagar believed in the ideas of both Western and Indian Culture. He allowed western thoughts to enter education especially as a principal of Sanskrit College. He opened the gates of Sanskrit college to non-Brahmins for he was opposed to the monopoly of Sanskrit to only Brahmins.

57. D

Vedanta College was established by Raja Ram Mohan Roy in 1825 in Calcutta.

Swami Vivekananda was a follower of Ramakrishna who started the Ramakrishna Movement which was a reformist movements.

"Go back to Vedas" was the idea proposed by Arya Samaj which was a revivalist movement.

58. D

Atmiya Sabha was started by Ram Mohan Roy but not for abolition of Sati and widow remarriage, rather for debate and discussion.

Tatvabodhini Patrika was a Bengali journal started by Debendranath Tagore wherein he promoted systematic study of India's past.

59. C

60. A

Statement 1: Dadabhai Naoroji initiated establishment of East India Association, at London. It was one of the predecessor organizations of the Indian National Congress in 1867.

Statement 2: Over the course of its existence, the Association would listen to lectures from a wide range of Indian and British men and women on matters ranging from the economic development of India to literature to suffrage.

It superseded the London Indian Society and was a platform for discussing matters and ideas about India, and to provide representation for Indians to the Government.

Statement 3: The East India Association incorporated the National Indian Association in 1949 and became the Britain, India and Pakistan Association. In 1966 it amalgamated with the former India Society, now Royal India, Pakistan and Ceylon Society, to become the Royal Society for India, Pakistan and Ceylon.

61. C

Statement 1 and 2: As per 73rd and 74th CA, under Part XI and XII and Article 243(I) and 243 (Y) of the Constitution, a State Finance Commission (SFC), is to be appointed after every 5 years, to;

Recommend devolution of tax funds from the Consolidated Fund of State Government (not Union government, which makes statement 2 incorrect) to Local Bodies

Suggest measures for augmenting their Own Resources by determining which Taxes, Duties, Tolls and Fees which may be assigned to or appropriated by PRIs and ULBs

The Grants-in-Aid to Local Bodies from the consolidated fund of the state

The measures needed to improve the financial position of the Local Bodies

Estimation of Revenue Gap of Local Bodies, separately for PRIs and ULBs,

Statement 3: The Union FC does not play any role with respect to either constitution or working of the SFCs. It may only help guide the overall functioning of the SFCs by specific recommendations (that are not binding on the SFCs).

Statement 4: The Governor constitutes them. President constitutes the UFC

62. C

In India, the Prime Minister enjoys a pre-eminent place in the government. The Council of Ministers cannot exist without the Prime Minister. He has the central responsibility of steering the cabinet and ensuring consensus.

If a cabinet minister disagrees with the cabinet frequently and even speaks out about the differences in public, he may have to resign, or the PMY may dismiss him. So, 1 is correct.

The Prime Minister is involved in all crucial decisions of the government and decides on the policies of the government. Since he appoints the council of ministers, he can override their decisions. So, 2 is correct

63. A

Statements 1 and 2 are correct as the President can exercise these powers without the aid and advice of the council of ministers.

Statement 3 is incorrect as the President is not free to appoint anyone as the Pm, but only the leader of the majority party/coalition.

Statement 4 is correct as it is the President's obligation to maintain political order in our Parliamentary democracy. To ensure this, he must dissolve the Lok Sabha when it fails to represent the will of the people.

64. C**65. D****66. C**

The Faraizi Movement was founded by Haji Shariatullah, which became very popular among the Muslim peasantry in various districts of Bengal during the British Rule.

After the death of Shariatullah, his son, Dudu Miyan became the leader of Faraizi Movement. Oppressive Policy of the Company towards Muslim Tenants was the major reason behind the eruption of Faraizi Movement.

67. C

The Tebhaga movement was an independence campaign initiated in Bengal by the Kisan Sabha in 1946–47. At that time sharecropping peasants or Barghadars had to give half of their harvest to the owners of the land. The demand of the Tebhaga movement was to reduce the share given to landlords to one third.

68. B

Parliament can extend Proclamation made under Article-356, about the failure of the constitutional machinery, for maximum 3 years, by extending it in every six months. But the condition is that this proclamation can be extended only when in the country or any part of it, proclamation of national emergency is in force and Election Commission certifies that conditions in the state are not conducive to an election.

69. D**70. C****71. B**

The Election Commission shall consist of the Chief Election Commissioner and such number of other election commissioners as may be fixed by the President from time to time.

72. B: If approved by both the houses of Parliament, the President's Rules continue for six months. It can be extended for a maximum period of three years with the approval of the Parliament after every six months.

73. A: The conditions of service of persons serving in the Indian Audit and Accounts department are prescribed by the President after consultation with the CAG.

74. D: There is no bar to the appointment of a person from outside the Legislature as Minister but he cannot continue as Minister for more than 6 months unless he secures a seat in either house of Parliament.

75. C: The bill was introduced for allowing an Indian judge to sit before the trial of a white accused. It happened during the viceroyalty of Lord Ripon.

Though the bill was passed, but with an amendment where the 'trial by jury' provision was introduced with half of the jury consisting of white men.

76. B: These were the special privileges given to imports from Britain, to encourage British trade and industries. Indians opposed it vehemently.

77. C

Mysticism is a negative contribution.

78. D: Prime Minister of India allocates portfolios among the ministers but the rules regarding the business will be decided by the president. He advises the president in the appointment of Chairman and members of UPSC. He is officio chairman of NITI AAYOG.

79. A

80. A: As long as emergency is there, Lok Sabha can prolong its term by passing an act year after year. President's decision of dissolution of Lok Sabha can not be questioned in any court of law.

81. A: Though Attorney General is not a member of the Cabinet he has the right to speak in both the Houses of Parliament and any committee thereof, but he has no right to vote. In the performance of his official duties the Attorney General shall have a right of audience in all the courts in the territory of India.

82. C: The constitution lays down three conditions without fulfilling which "No money out of the Consolidated Fund of India shall be appropriated" or withdrawn. These conditions are:
The appropriation must be in accordance with a law authorising appropriation of money from the Consolidated Fund; and

The appropriation should be for a "purpose provided in this Constitution"; and

The appropriation must be made "in the manner provided in this Constitution" as the manner for appropriation of money from the Consolidated Fund of India (which is that of a regular budget)

83. C:

NASA's Fermi (formerly Gamma-ray Large Area Space Telescope, or GLAST) is a powerful space observatory (from 2008) that has started to:

Explore the most extreme environments in the Universe, where nature harnesses energies far beyond anything possible on Earth.

Search for signs of new laws of physics and what composes the mysterious Dark Matter.

Explain how black holes accelerate immense jets of material to nearly light speed.

Help crack the mysteries of the stupendously powerful explosions known as gamma-ray bursts.

Answer long-standing questions across a broad range of topics, including solar flares, pulsars and the origin of cosmic rays.

84. C

85. D

Statement 1: Indian rulers were not allowed to have their independent armed forces. But, they could keep forces within their Kingdom, so 1 is incorrect.

They were to be protected by the Company, but had to pay for the "subsidiary forces" that the Company was supposed to maintain for the purpose of this protection.

Statement 2: If the Indian rulers failed to make the payment, then part of their territory was taken away as penalty. It was not a mandatory clause. So, 2 is also wrong.

Learning: When Richard Wellesley was Governor General (1798-1805), the Nawab of Awadh was forced to give over half of his territory to the Company in 1801, as he failed to pay for the "subsidiary forces".

Hyderabad was also forced to cede territories on similar grounds.

86. B

Statement 1: The Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC) was launched by the United Nations Environment Programme (UNEP) and six countries—Bangladesh, Canada, Ghana, Mexico, Sweden and the United States— in 2012.

The CCAC aims to catalyze rapid reductions in short-lived climate pollutants to protect human health, agriculture and the environment.

87. B

88. A

The Despatch had the following objectives in view:

To impart Western knowledge, information about the western culture to the Indians.

- To educate the natives of India so that a class of public servants could be created.

- To promote intellectual development and also raise the moral character of the young generation.
- To develop practical and vocational skills of the Indians people so that more and more articles could be produced and also to create a good market for consumption of those goods.

So, clearly statement 1 is wrong.

Statement 4: The Wood's Despatch recommended the sanction of a grant-in-aid system in the Indian educational system and argued that schools must charge fees from their students. So, 4 is also incorrect.

89. C

Statement 1 is correct: Imposition of martial law affects only Fundamental Rights. Imposition of National emergency affects not only Fundamental Rights but also Centre-state relations, distribution of revenues and legislative powers between centre and states and may extend the tenure of the Parliament.

Statement 2 is correct: Martial law suspends the government and ordinary law courts whereas National Emergency continues the government and ordinary law courts.

90. C

Statement 1 is correct. The National Disaster Management Plan (NDMP). This is the first ever national plan for disaster management prepared in the country. It aims to make India disaster resilient and significantly reduce the loss of lives and assets.

Statement 2 is correct. The plan is based on the four priority themes of the "Sendai Framework," namely: understanding disaster risk, improving disaster risk governance, investing in disaster risk reduction (through structural and non-structural measures) and disaster preparedness, early warning and building back better in the aftermath of a disaster.

The Plan covers all phases of disaster management: prevention, mitigation, response and recovery. It provides for horizontal and vertical integration among all the agencies and departments of the Government. The plan also spells out the roles and responsibilities of all levels of Government right up to Panchayat and Urban Local Body level in a matrix format. The plan has a regional approach, which will be beneficial not only for disaster management but also for development planning.

91. D

92. B

93. A

Statement is not correct: The expression "office of profit" has not been defined in the Constitution or in the Representation of the People Act, 1951. They have been mentioned in the Article 102 and 191 of the Constitution

According to Article 102 (1) (a), a person shall be disqualified as a member of Parliament for holding any office of profit under the government of India or the government of any state, "other than an office declared by Parliament by law not to disqualify its holder". Article 191 (1) (a) has a similar provision for the members of state assemblies.

However, based on past judgments, the Election Commission has noted five below tests for what constitutes an office of profit:

Whether the government makes the appointment

Whether government has the right to remove or dismiss the holder.

Whether the government pays remuneration.

What the functions of the holder are.

Does the government exercise any control over the performance of these functions.

Statement 2 is not correct. Articles 102 and 191 clarify that "a person shall not be deemed to hold an office of profit under the government of India or the government of any state by reason only that he is a minister".

Statement 3 is correct. Under Article 102 and Article 191 of the Constitution both parliament and state legislatures have the power to exempt an office from the purview of the office of profit.

94.C

Statement 1 is not correct: It was Charter Act of 1813 that allowed the Christian missionaries to travel to India. Prior to the 1813 Act, the Christian missionaries were banned from entering India for the fear of arousing political unrest due to their proselytisation activity. Despite the ban, the missionaries continued to use various ingenuous means to arrive in India and work for the dissemination of the Western education and the consequent proselytisation.

Statement 2 is not correct: The early policy of the East India Company was that of non intervention in Indian social matters. Along with pragmatism that demanded continuation of existing systems, there was also a respect for traditional Indian culture that expressed itself in Warren Hasting's policy of Orientalism. The result of this endeavour was the establishment of the Asiatic Society of Bengal, the Calcutta Madrasa and the Sanskrit College of Benaras. Knowledge about the subject population, their social customs, manners and codes were regarded as a necessary prerequisite for developing permanent institutions of rule. However, with the end of the Hasting's tenure, there began cautious intervention in the Indian social institutions under the ideological influences from the Britain such as Evangelicalism, Utilitarianism and free trade thinking.

Statement 3 is correct: The beginning of western education in India can be dated from Charter Act of 1813, which provided for the allocation of one hundred thousand rupees per year for two specific purposes: first, —the encouragement of the learned natives of India and the revival of and improvement of literature; secondly, the promotion of a knowledge of the sciences amongst the inhabitants of that country.

The Act did not provide for the medium of instruction. The provision that the teaching of western sciences and literature through the medium of English language was provided by Lord Macaulay's minute, 1835.

95.B

Statement 1 is correct. Though caste was not a major criteria for membership, most of the members of the movement belonged to the three higher castes, Brahmans, Kayastha and Baidya. The Brahmo movement was almost patronised by these groups and although it spread from Calcutta to district towns and to other provinces, it remained alienated from the masses. The reformers never even tried to take the reform to the people, as the language of reform, the chaste Sanskritised Bengali prose of Rammohan Roy for example, remained incomprehensible to the uneducated masses and artisans. Similarly in western India, the members of the Prarthana Samaj were the English educated Chitpavan and Saraswat Brahmans, some Gujarati merchants and a few members of the Parsi community. The general high caste character of the reform movements of the early 19th century explains to a large extent the relative silence on the caste question.

Statement 2 is correct. Lacking in a broad social base, the reformers of the early nineteenth century exhibited an intrinsic faith in the benevolent nature of colonial rule and relied more on legislation for imposing reforms from above. For example, Abolition of Sati by 1829 Regulation, Hindu Widows Remarriage Act, 1856, Age of Consent Act, 1891 etc.

Statement 3 is not correct. There was very little or no attempt to create a reformist social consciousness at the grass-root level, where religious revivalism later found a fertile ground. These movements remained confined to a narrow social space, as the reformist spirit only appealed to a small elite group, who were primarily the economic and cultural beneficiaries of colonial rule.

96. D

All the statements are correct.

The Shyama Prasad Mukherji Rural Mission (SPMRM) is a scheme launched by Government of India in 2016 to deliver integrated project based infrastructure in the rural areas, which will also include development of economic activities and skill development. The preferred mode of delivery is through Public Private Partnerships (PPPs) while using various scheme funds for financing.

The Mission aims at development of rural growth clusters which have latent potential for growth, in all States and Union Territories (UTs), which would trigger overall development in the region. These clusters

would be developed by provisioning of economic activities, developing skills & local entrepreneurship and providing infrastructure amenities. The Rurban Mission will thus develop a cluster of Smart Villages. For the purposes of SPMRM, Rurban areas refer to a cluster of 15-20 villages having about 30 to 40 lakh population. The clusters will be geographically contiguous Gram Panchayats with a population of about 25000 to 50000 in plain and coastal areas and a population of 5000 to 15000 in desert, hilly or tribal areas. As far as practicable, clusters of village would follow administrative convergence units of Gram Panchayats.

97.D

98. A

Trojans are asteroids that are constant companions to planets in our solar system as they orbit the Sun, remaining near a stable point 60 degrees in front of or behind the planet. Since they constantly lead or follow in the same orbit, they will never collide with their companion planet. Thus statement 1 is correct. There are six planets in our solar system with known Trojan asteroids-Jupiter, Neptune, Mars, Venus, Uranus and Earth. The Earth Trojan is elusive; to date, scientists have only discovered one Earth Trojan asteroid-2010 TK7. Thus statement 2 is correct.

99.C

The SDGs are the result of a negotiation process that involved the 193 UN Member States and also saw unprecedented participation of civil society and other stakeholders. This led to the representation of a wide range of interests and perspectives. On the other hand, the MDGs were produced by a group of experts behind closed doors.

The SDGs are broad in scope because they address the interconnected elements of sustainable development: economic growth, social inclusion and environmental protection. The MDGs focused primarily on the social agenda. Hence Statement 1 is correct.

MDGs were intended for action in developing countries only, particularly the poorest, while the SDGs apply to all countries, developed and developing. Hence statement 2 is correct.

100. C

Ministry of Urban Development launched the National Heritage City Development and Augmentation Yojana (HRIDAY)(statement 3 is correct). The scheme aims to preserve and revitalise soul of the heritage city to reflect the city's unique character by encouraging aesthetically appealing, accessible, informative & secured environment.

The Scheme supports development of core heritage infrastructure projects which shall include revitalization of urban infrastructure for areas around heritage assets identified / approved by the Ministry of Culture, Government of India and State Governments(Statement 2 is not correct). These initiatives shall include development of water supply, sanitation, drainage, waste management, approach roads, footpaths, street lights, tourist conveniences, electricity wiring, landscaping and such citizen services.

The main objective of HRIDAY is to preserve character of the soul of heritage city and facilitate inclusive heritage linked urban development by exploring various avenues including involving private sector. (Statement 1 correct)

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