Q.1)

Solution (c)

Exp) Option c is the correct answer.

Biomass co-firing stands for adding biomass as a partial substitute fuel in high efficiency coal boilers.

Statement 1 is correct: Biomass co-firing stands for adding biomass as a partial substitute fuel in high efficiency coal based thermal power plants. Coal and biomass are cocombusted in boilers that have been designed to burn coal. For this purpose, the existing coal based thermal power plants have to be partly reconstructed and retrofitted.

Statement 2 is correct: By partially replacing fossil fuels with renewable biomass feedstocks, biomass cofiring can help reduce greenhouse gas emissions from power plants. Biomass co-firing is an effective way to curb emissions from open burning of crop residue, it also decarbonizes the process of electricity generation using coal.

Statement 3 is correct: Ministry of Power's policy on "Biomass Utilization for Power Generation through Cofiring in Coal based Power Plants" issued in October 2021 mandates all thermal power plants in the country to use 5 to 10% biomass along with coal for power production.

Q.2)

Solution (d)

Exp) Option c is the correct answer.

Statement 1 is incorrect: Ocean acidification leads to increase in the concentration of carbonic acid, bicarbonate ions and hydrogen ions. It leads to decrease in the concentration of carbonate ions.

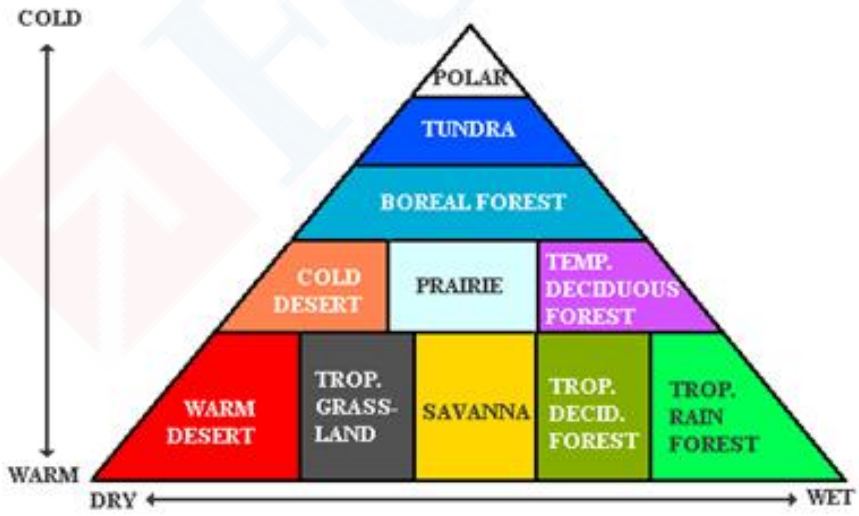
Statement 2 is incorrect: Saturation horizon of calcium carbonate is level below which calcium carbonate minerals undergo dissolution. Due to ocean acidification this horizon rises vertically in the water column. This leads more exposure of calcifying organisms to under saturated water.

Q.3)

Solution (d)

Exp) Option d is the correct answer.

A biome constitutes the **terrestrial segment of the biosphere**, distinguished by its climate, vegetation, animal life, and overall soil composition.



Pair 1 is correctly matched- The **taiga**, found in **Northern Europe, Asia, and North America**, is commonly referred to as **boreal forests**. These forests exhibit **lower productivity compared to other forest ecosystems**. Furthermore, the soils in boreal forests are marked by **thin podzols,** which possess a low pH (acidic) as a result of extensive leaching.
Pair 2 is correctly matched- The tundra encompasses the **northern and southernmost regions of the world,** adjacent to the **ice-bound poles**. In these regions, the **presence of permafrost leads to the absence of trees**. Instead, the landscape is characterized by sparse vegetation such as **mosses and lichens, primarily found on bare rocks.**
Pair 3 is correctly matched- Tropical rainforests, located in the **equatorial region**, are characterized by a complex structure comprising multiple layers of **broad-leafed, tall, closely spaced evergreen trees**. These trees form a **continuous canopy overhead**. However, the soil in rainforests tends to be **nutrient-poor due to the extensive leaching** caused by heavy rains. Despite this, these ecosystems support a diverse array of species, fostering the coexistence of numerous plant and animal life.
Pair 4 is correctly matched- Savanna regions experience **two clearly defined seasons**: **a wet season and a dry season.** The dry season is characterized by **minimal rainfall.** In contrast, during the wet season, there is **abundant vegetation growth, featuring lush green grasses and wooded areas**. **Moving away from the equator**, where rainfall is more pronounced, the grassland becomes **progressively drier, especially during the dry season**. The savanna's vegetation consists of **scrub, various grasses, and occasional trees, with the latter typically thriving near water holes, seasonal rivers, or aquifers**. Often referred to as **'Big Game Country,'** savannahs draw attention for being habitats where thousands of animals are **hunted for sports** and other recreational activities

Q.4)
Solution (b)
Exp) Option b is the correct answer.
Environmental Impact Assessment (EIA) aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers.
Statement 1 is incorrect: Origin of EIA lies in the enactment of the National Environmental Policy Act (NEPA) in the year 1969 in the USA. It not only introduced the concept of environmental impact assessment but also made it necessary for federal agencies to evaluate impact of environmental decisions. Hence, the concept of EIA was not originated from India.
Statement 2 is correct: Environment Impact Assessment in India is statutorily backed by the Environment Protection Act, 1986 which contains various provisions on EIA methodology and process. Statement 3 is correct: Under the Principle 17 of the Rio declaration of 1992, Environmental Impact Assessment (EIA), as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority. Hence, EIA is mentioned explicitly under Principle 17 of the Rio declaration on Environment and Development,1992.

Q.5)
Solution (c)
Exp) Option c is the correct answer.
Urea, also known as carbamide, is an organic compound with chemical formula $CO(NH_2)_2$. Urea is used as a fertiliser as Nitrogen is the major component of urea. Urea is also used as a raw material in the manufacturing of plastics.

Option 1 is correct: Indiscriminate use of Urea causes Global warming (rising temperature of Earth). The bulk overuse of Urea in the field, gives rise to emissions of the potent GHG nitrous oxide (N2O) into the atmosphere and results in Global warming.
Option 2 is correct: As Nitrogen is a major component (46% of total content of Urea), its overuse results in leaching of nitrate below the root zone and migrate to groundwater. This increases the nitrate contamination of groundwater, which leads to infant methemoglobinemia (commonly known as blue baby syndrome),
Option 3 is correct: Eutrophication is the process by which the water body becomes enriched with nutrients, particularly nitrogen and phosphorus. Nitrogen is the major component of Urea. Urea when used in excess lead to leaching of Nitrogen into soil and excess nitrogen can be washed from farm fields and into waterways causing Eutrophication of water bodies.
Option 4 is incorrect: Acidic soils are becoming an important issue worldwide, even in areas conventionally having high soil pH. One of the primary reasons for soils becoming more acidic (lower pH values) over time is through the use of nitrogen (N) fertilizers containing ammonium-N. As the ammonium-N in fertilizers undergoes nitrification (conversion of ammonium to nitrate in soils by bacteria), hydrogen (H+) is released, which can increase acidity. As the percentage of ammonium increases in a given fertilizer the acidifying potential will also be increased, thus reducing pH and increasing the soil acidification.

Q.6)
Solution (d)
Exp) Option d is the correct answer.
Forest Advisory Committee (FAC) is a specialized body under the administrative jurisdiction of the **Ministry of Environment, Forests, and Climate Change (MoEFCC)** to ensure the judicious use of forested lands.
Statement 1 is incorrect: The primary function of the Forest Advisory Committee is to review and advise the government on the proposals for the diversion of forest land for non-forest purposes. When any project or activity requires the use of forest land, such as for **mining, infrastructure development, or industrial projects,** a proposal is submitted to the FAC for examination. The committee assesses the environmental impact, biodiversity concerns, and other relevant factors before making recommendations or decisions regarding diversion. The **recommendations of FAC are put before the State Government and then the Central Government for final approval**.
Statement 2 is incorrect: The Forest Advisory Committee is **not incorporated under the Forest Rights Act of 2006**. Instead, it operates under the **Forest (Conservation) Act of 1980**. The Forest Rights Act of 2006 is a separate legislation that deals with the recognition and vesting of forest rights and responsibilities of local communities.
Statement 3 is incorrect: The **Director General of Forests**, Ministry of Environment and Forests is the chairperson of the Forest Advisory Committee. Other members in include:

- The Additional Director General of Forests, Ministry of Environment and Forests
- The Additional Commissioner (Soil Conservation), Ministry of Agriculture
- Three non-official members who shall be experts one each in Mining, Civil Engineering and Development Economics
- The Inspector General of Forests (Forest Conservation), Ministry of Environment and Forests

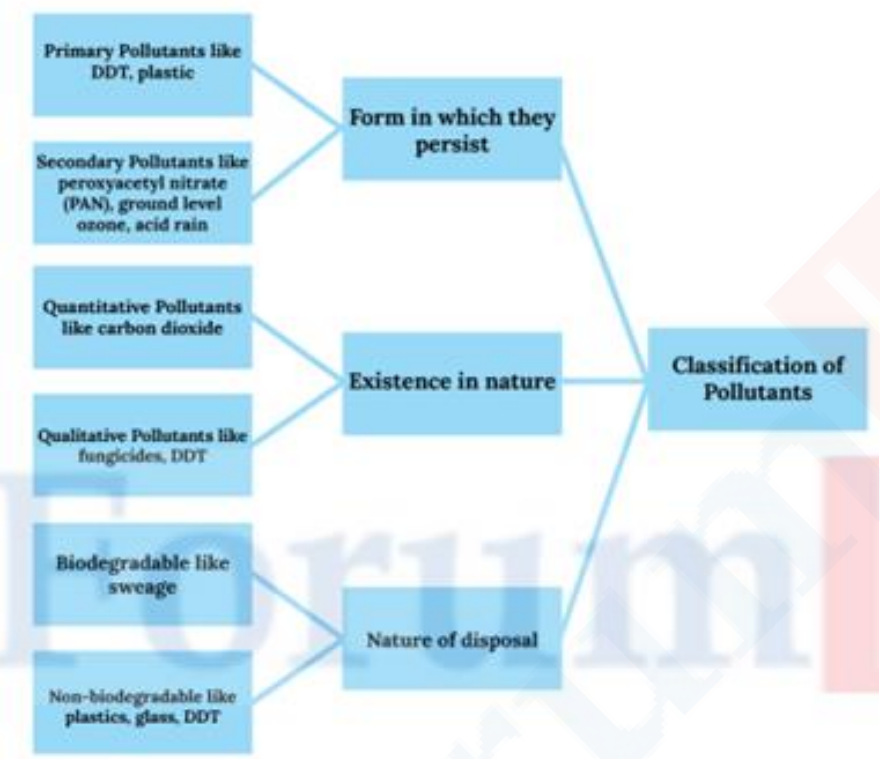
Hence, the statement given is incorrect.

Q.7)

Solution (d)

Exp) Option d is the correct answer.

Environmental pollution is defined as the introduction of harmful wastes into the environment, primarily originating from certain human activities. These pollutants can be classified into Quantitative and Qualitative categories based on their natural existence.



Option a is incorrect: Qualitative pollutants are not categorized based on their economic value in recycling.

Option b is incorrect: Quantitative pollutants are both naturally present and introduced by humans. They become **pollutants when their concentrations exceed a defined threshold in the environment**, such as Carbon dioxide (CO_2).

Option c is incorrect: Secondary pollutants are pollutants that are not directly emitted into the atmosphere but form as a result of complex **reactions between primary pollutants and their reaction with the environment.** Primary pollutants are substances released directly into the atmosphere from human activities or natural processes, while secondary pollutants are formed in the atmosphere through various chemical reactions.

Option d is correct: Qualitative pollutants are substances created by humans, not naturally present in the environment, and contribute to environmental pollution. Examples include **pesticides, fungicides, and herbicides.**

Q.8)

Solution (d)

Exp) Option d is the correct answer.

The Honolulu Strategy is a framework document to address marine debris issues globally. In 2011, the Fifth International Marine Debris Conference organized by the National Oceanic and Atmospheric

Administration (NOAA) in the United States and the United Nations Environment Programme (UNEP) catalyzed the development of the Honolulu Strategy.

The Honolulu Strategy aims to address the issue of marine debris. It provides a **comprehensive approach to reduce the ecological, human health, and economic impacts of marine debris worldwide**.

The strategy serves as a framework document that does not replace or override the efforts of national authorities, municipalities, industry, international organizations, or other stakeholders. Instead, it acts as a central reference for enhancing collaboration and coordination among the diverse global stakeholders dedicated to addressing marine debris.

The strategy aims to:

- **Minimize land-based litter and solid waste** entering the marine environment.
- **Minimize sea-based sources of marine debri**s, including solid waste, lost cargo, abandoned, lost, or otherwise discarded fishing gear(ALDFG) and abandoned vessels.
- Minimize the **accumulation of marine debris on shorelines**, in benthic habitats, and in pelagic waters.

Q.9)

Solution (b)

Exp) Option b is the correct answer.

When the **pH of the rainwater drops below 5.6**, it is called **Acid Rain**. **Acid rain occurs when acidic substances from the atmosphere are deposited onto the Earth's surface**. Oxides of nitrogen and Sulphur which are acidic in nature often transported by the wind along with solid particles in the atmosphere, eventually settle as either **dry deposition on the ground or as wet deposition in water, fog, and snow.**

Statement 1 is correct: The arrival of **acidic rainwater on the Earth's surface has the potential to extract aluminum from soil clay particles.** Subsequently, this leached aluminum can flow into streams and lakes. The greater the acidity introduced into the ecosystem, the more soil-bound aluminum is released into the aquatic environment. This escalation in aluminum levels can be detrimental to **aquatic organisms that cannot withstand the increased aluminum concentration, potentially leading to their death.**

Statement 2 is correct: The acidic elements of acid rain corrode metals, weaken stone, and harm paint, hastening the decay of historical buildings and monuments. For instance, **acid rain in the vicinity of the Taj Mahal** exacerbates this issue. The acid rain reacts with the marble of the Taj Mahal, causing damage to this magnificent monument that has drawn people from across the globe. Consequently, the monument is gradually losing its original form, with the marble becoming discolored and losing its luster.

Statement 3 is incorrect: The **deposition of acidic particles** on tree leaves doesn't enhance the tree's ability to absorb sunlight; instead, it **hinders the absorption process and inhibits growth.** In regions with high latitudes, acidic fog and clouds may strip nutrients from tree leaves, resulting in brown or dead leaves. Weakened by this process, the trees become **less capable of absorbing sunlight, making them vulnerable and less able to endure freezing temperatures.**

Q.10)

Solution (b)

Exp) Option b is the correct answer.

Indoor air pollution refers to the **contamination of indoor air with harmful pollutants** that can adversely affect the health of occupants. This type of pollution is commonly associated with the presence of various pollutants in enclosed spaces, such as homes, offices, schools, and other indoor environments.

Pair 1 is incorrect: Formaldehyde can be f**ound in building materials, furniture, and household products,** it can be released into the air and cause respiratory issues. Formaldehyde-based resins are

used as adhesives and impregnating resins in the manufacture of **particle-board, plywood, furniture and other wood products.**

Pair 2 is incorrect: Radon is a natural product of the environment that moves freely through the air, groundwater, and surface water. **The main source of indoor radon gas infiltration is from soil into buildings.** The burning of coal and other fossil fuels also releases radon.

Pair 3 is correct: Volatile Organic Compounds (VOCs) are emitted as gasses from solids or liquids and include various chemicals, some with potential short- and long-term health effects. **Indoors, VOC concentrations can be up to ten times higher than outdoors,** primarily originating from **paints, solvents, cleaning products, and certain building materials**.

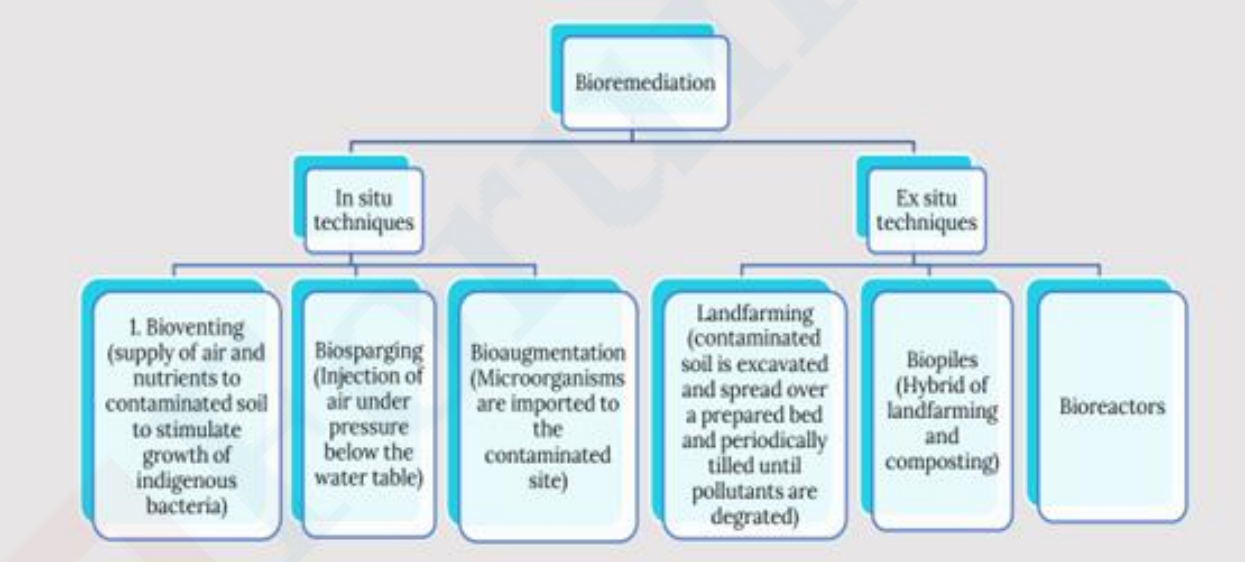
Pair 4 is correct: Carbon monoxide (CO) results from incomplete combustion of fossil fuels, including charcoal. Widely used in restaurant kitchens for cooking, charcoal combustion produces substantial CO. In **Japan**, cases of CO poisoning among cooks and waitstaff from burning charcoal occur annually. Determining the precise ventilation needed to prevent CO buildup is challenging due to the lack of established CO generation rates from burning charcoa

Q.11)

Solution (b)

Exp) Option b is the correct answer.

Bioremediation is a process that uses living organisms, such as bacteria or plants, to remove pollutants from a contaminated environment, typically soil or water. The organisms involved in bioremediation can break down or transform pollutants into less harmful substances through natural metabolic processes.



Pair 1 is correct: Biosparging involves injecting pressurized air into a contaminated zone. The pressurized air stimulates the biological activity of microorganisms already present in the environment. This technique is designed to boost the existing microbial community's capability to degrade pollutants, thereby facilitating the remediation process.

Pair 2 is incorrect: Bioaugmentation is a technique that introduces specialized microbes into contaminated environments. These microbes are selected for their ability to degrade specific pollutants. By introducing these tailored microorganisms, the process aims to enhance the natural degradation of targeted contaminants, especially in groundwater.

Pair 3 is incorrect: Bioventing involves the process of encouraging native microbes by supplying air or oxygen through low-pressure injection, favoring aerobic degradation of contaminants.

Pair 4 is correct: Biopiles involve combining soils with enhanced microorganism activity with the contaminated soil for treatment. The enriched soils typically contain beneficial microorganisms that can accelerate the degradation of pollutants. The contaminated soil is mixed with these biologically active materials in piles, creating conditions favorable for microbial remediation.

Q.12)
Solution (a)
Exp) Option a is the correct answer.
The National Air Quality Index simplifies air quality data into an easily understandable single index value with color-coded categories (Good, Satisfactory, moderately polluted, Poor, Very Poor, and Severe) based on pollutant concentrations and associated health impacts. The index is computed by the **Central Pollution Control Board (CPCB)** under power conferred to them by the **Air (Prevention and Control of Pollution) Act, 1981.**

Option 1,3 and 4 are correct: Following are air pollutants are included in the NAQI:
- Particulate Matter 10 (PM10)
- Particulate Matter 2.5 (PM2.5)
- Nitrogen Dioxide (NO2)
- **Sulphur Dioxide (SO2)**
- Carbon Monoxide (CO)
- **Ozone (O3)**
- **Ammonia (NH3)**
- Lead (Pb)

Option 2 is incorrect: Carbon dioxide (CO2) is not included in the NAQI. Unlike other pollutants, CO2 at typical ambient levels is essential for humans and to sustain the biodiversity of earth.
Option 5 and 6 are incorrect: Benzene, Benzopyrene, Arsenic and Nickel are included in the National Ambient Air Quality Standards (**NAAQS**), **but not in the National Air Quality Index (NAQI).** Ambient air quality refers to the condition or quality of air surrounding us in the outdoors. NAAQS are the standards for ambient air quality set by the Central Pollution Control Board (CPCB) that are applicable nationwide

Q.13)

Solution (b)

Exp) Option b is the correct answer.

A primary pollutant is an air pollutant emitted directly from a source. A secondary pollutant is not directly emitted as such, but forms when other pollutants (primary pollutants) react in the atmosphere.

Option 1 is correct: Peroxyacetyl nitrate (PAN) is secondary pollutant. PANs are also referred to as Acyl Peroxy Nitrates or APN. They are a component of photochemical smog, produced in the atmosphere when oxidized volatile organic compounds combine with nitrogen dioxide.

Option 2 is incorrect: Plastic is primary pollutant as it is directly emitted from source.

Option 3 is correct: Ozone is secondary pollutant. It is formed when hydrocarbons (HC) and nitrogen oxides (NOx) combine in the presence of sunlight.

Option 4 is incorrect: Dichloro-Diphenyl-Trichloroethane (DDT) is primary pollutant. DDT is considered a primary pollutant. It is a persistent organic pollutant that can bioaccumulate in the food chain and have harmful effects on both wildlife and humans

Option 5 is correct: Acid Rain is secondary pollutant. Acid rain is formed when sulfur dioxide or nitrogen oxides react with water.

Q.14)

Solution (d)

Exp) Option d is the correct answer.

Sand is a minor mineral under Section 3(e) of the **Mines and Minerals (Development & Regulation) Act, 1957 (MMDR Act).** Section 15 of the MMDR Act empowers the State Governments for making rules for regulating the grant of quarry leases, mining leases or other mineral concessions in respect of minor minerals and for purposes connected therewith. Hence, the regulation of minor minerals comes under the legislative and administrative domain of the State Governments.

Statement 1 is correct: Sand mining often happens alongside riverbeds and coastal areas, which are crucial zones for groundwater recharge. Extracting sand disrupts these areas, hindering their ability to store and replenish groundwater, leading to **depletion** over time.

Statement 2 is correct: As freshwater levels decrease due to sand mining; the pressure imbalance can draw in **saltwater from nearby oceans or deeper saline aquifers**. This contamination renders freshwater unsuitable for drinking, irrigation, and industrial purposes.

Statement 3 is correct: The removal of sand disturbs sediments at the bottom of rivers and coastal areas, causing them to become suspended in the water and **increasing turbidity. This reduces light penetration,** harms aquatic life, and negatively impacts water quality for human consumption.

Statement 4 is correct: Removing sand weakens the protective barriers like dunes and riverbanks. This allows for stronger erosive forces like waves and currents to **widen river mouths and coastal inlets,** increasing the risk of flooding and coastline changes.

Q.15)

Solution (b)

Exp) Option b is the correct answer.

Recently, the fire outbreak at the Kochi's dumping yard is feared to have exposed people in the city and suburbs to high levels of toxic dioxins.

Statement 1 is incorrect: Dioxins are **not classified as Volatile Organic Compounds** (VOCs). VOCs are organic compounds that have a high vapor pressure at room temperature, meaning they easily evaporate into the air. Dioxins are chemically stable, so they are **neither water-soluble nor volatile**. **Dioxins are Persistent Organic Pollutants** (POPs). Persistent organic pollutants (POPs) are chemical substances

sharing the combination of persistence and bioaccumulation. Dioxins are a **family of chemical compounds that share a similar structure and exhibit toxic effects on living organisms**. Dioxins are produced as byproducts of various industrial processes, combustion, and natural events.

Statement 2 is correct: More than 90% of human exposure to dioxins and furans occurs via food chain especially through **animal origin food samples**. Human exposure mainly occurs through the consumption of bio-magnified animal origin products such as eggs, milk, fish, and, meat. They tend to accumulate in the fatty tissue of animals and humans, and can stay in the body for 7 to 11 years.

Statement 3 is correct: Dioxins are highly toxic and can cause various health problems, such as **cancer, reproductive and developmental disorders, damage to the immune system, and interference with hormones.** They can enter the body through food, mainly meat and dairy products, fish and shellfish, as well as through breathing and skin contact.

Q.16)

Solution (b)

Exp) Option b is the correct answer.

Ionizing radiation and non-ionizing radiation refer to two broad categories of electromagnetic radiation based on their energy levels. The key distinction between the two lies in the ability of ionizing radiation to remove tightly bound electrons from atoms, leading to ionization, while non-ionizing radiation lacks this ability.

Statement I is correct: Ionizing radiation is more harmful to humans than non-ionizing radiation. Ionizing radiation, such as X-rays and gamma rays, has **higher energy levels and the ability to ionize atoms**, leading to potential damage to biological tissues, including DNA. This makes ionizing radiation more hazardous to human health compared to non-ionizing radiation.

Statement II is correct: Most of the ionizing radiation on **Earth comes from radioactive materials, either natural or manmade**. Ionizing radiation can be generated by natural sources such as radon gas, as well as by human-made sources such as nuclear power plants, X-ray machines, and certain medical procedures. Radioactive materials are a common source of ionizing radiation.

However, Statement-II is not the correct explanation for Statement-I. The harmfulness of ionizing radiation is not dependent on its origin, but on its energy and interaction with matter.

Q.17)

Solution (b)

Exp) Option b is the correct answer.

The Ministry of Environment, Forest and Climate Change (MoEFCC) has categorized industrial sectors into **White, Green, Orange and Red industries** based on the Pollution Index (PI).

Pair 1 is incorrectly matched: White category includes industrial sectors having PI score of 20 or less. These industries are **practically non-polluting and do not require Environment Clearance (EC) or Consent from the Central Pollution Control Board (CPCB) or the State Pollution Control Boards (SPCBs).** They also get financial benefits from lending institutions. There are 192 existing industries in this category, such as **solar power, wind power, mini hydel power**, etc. The **pair of White Category and Sugar and Dairy industries is incorrect,** because these industries have a higher pollution index score than 60 and belong to the **Red Category (Industrial sectors having PI score of 60 and above).**

Pair 2 is correctly matched: Green category includes industrial sectors having PI score of 21 to 40. These industries **do not require EC, but only Consent from the CPCB or the SPCBs**. There are 91 existing industries in this category, **such as food processing, printing, soap, Ayurvedic and homeopathic medicines etc.**

Pair 3 is correctly matched: **Orange category** includes industrial sectors having PI score of 41 to 59. These industries also require EC and Consent from the CPCB or the SPCBs, but with less stringent conditions than the Red category. There are 83 existing industries in this category, **such as automobile, textile, paper, Cotton spinning and weaving etc.**

Q.18)
Solution (d)
Exp) Option d is the correct answer.
An oil spill refers to any uncontrolled release of crude oil, gasoline, fuels, or other oil by-products into the environment. Oil spills can pollute land, air, or water, though it is mostly used for oceanic oil spills. Some of the methods to clean up oil spills are:
Option 1 is correct: In the method of Burning In-situ, the oil floating on the surface is ignited to burn it off. This in-situ burning of oil can effectively remove up to 98% of an oil spill, which is more than most other methods.
Option 2 is correct: Hot water and high-pressure washing is a **method of using hot water or high-pressure jets to remove oil** from rocks, beaches, or other surfaces. It can be effective in removing oil, but it can also damage the environment by eroding the soil, killing plants, or dispersing oil into the water.
Option 3 is correct: Oil spills can be cleared with the help of '**Bregoli' (a by-product of paper industry resembling saw dust).** It is capable of absorbing any oil or fluid spilled on hard or water surfaces. Sorbents are materials that absorb or adsorb oil, such as straw, peat moss, or synthetic fibers. They can be used as loose particles, mats, or booms.
Option 4 is correct: Dispersants are chemicals that **break down the oil into smaller droplets, making it easier for natural degradation by bacteria and waves.** They can be sprayed from planes, boats, or hoses, but they can also have negative effects on marine life and water quality.

Q.19)
Solution (c)
Exp) Option c is the correct answer.
Recently, Geological Survey of India (GSI) announced the discovery of 5.9 million tonnes of lithium in the Salal-Haimana area of Jammu and Kashmir. However, Lithium mining can have negative environmental impacts, including:
Option 1 is correct: Lithium mining involves the **use of toxic chemicals such as sulfuric acid and sodium hydroxide** to extract lithium from brine or ore. These chemicals can leak into **the groundwater and contaminate it**, posing a threat to the health and livelihood of the local communities. Moreover, lithium mining also requires a large amount of water, which can deplete the groundwater resources and create water scarcity in the arid regions.
Option 2 is correct: Lithium mining involves the removal of topsoil and vegetation to access the mineral deposits. This can **cause soil erosion and loss of biodiversity**, as well as increase the risk of landslides and floods. Additionally, lithium mining can also cause subsidence or sinking of land due to the extraction of brine or ore from underground. This can damage the infrastructure and property of the nearby areas.
Option 3 is correct: Lithium mining involves the mining and processing of lithium-bearing minerals, which can generate dust, carbon dioxide, and sulfur dioxide as by-products. Industry estimates suggest that this process consumes 170 cubic meters of water and **releases 15 tonnes of CO2 for every tonne of Li extracted.**

Q.20)

Solution (c)

Exp) Option c is the correct answer.

E-waste is electronic products that are unwanted, not working, and nearing or at the end of their "useful life." Computers, televisions, VCRs, stereos, copiers, and fax machines are everyday electronic products. Some of the common pollutants found in e-waste are:

Option 1 is correct: Mercury is used in some electronic devices such as switches, relays, and batteries. It can damage the nervous system, kidneys, and brain if ingested or inhaled.

Option 2 is incorrect: Nitrogen oxides are gases that are formed from the combustion of fossil fuels and can cause acid rain, smog, and respiratory problems, but they are **not a pollutant that is released from e-waste.**

Option 3 is correct: Polychlorinated Biphenyls (PCBs) are used in some capacitors, transformers, and circuit boards. They can disrupt the hormone system, affect the immune system, and cause cancer if accumulated in the body.

Option 4 is correct: Beryllium is used in some connectors, springs, and magnets for electronic devices. It can cause lung inflammation, chronic beryllium disease, and lung cancer if inhaled.

Option 5 is correct: Arsenic is used in some semiconductors, solar cells, and light-emitting diodes for electronic devices. It can cause skin lesions, cardiovascular disease, diabetes, and cancer if ingested or inhaled

Q.21)

Solution (b)

Exp) Option b is the correct answer.

Colony Collapse Disorder (CCD) is a phenomenon characterized by the **sudden disappearance of worker bees from a beehive**. The decline of honeybees due to Colony Collapse Disorder (CCD) is a significant worry for both the environment and agriculture, as honeybees play a crucial role in pollinating various crops.

Statement 1 is incorrect: Overpopulation of beehives is not linked to CCD. Instead, **underpopulation due to colony collapse is a characteristic of CCD.** Honeybee colonies are social structures with a delicate balance of worker bees, drones, and a single queen. Overpopulation could lead to increased competition for resources, but it is not a primary factor associated with CCD.

Statement 2 is correct: **Varroa mite infestation is a major factor linked to CCD.** Varroa mites are **external parasites that weaken honeybee colonies by feeding on the bodily fluids** of adult bees and transmitting harmful viruses. The impact of Varroa mites on individual bees and the colony's health contributes significantly to the phenomenon of CCD.

Statement 3 is incorrect: **CCD is known for the loss/ escape of worker bees**. The worker bees leave the beehive, **leaving behind the queen**, **plenty of food and a few nurse bees** to care for the remaining immature bees and the queen. So, the escape of the queen bee is not related to the phenomenon of CCD.

Statement 4 is correct: Alterations in the foraging habitat, such as **habitat loss or changes in land use**, can impact bee nutrition. **Nutritional stress** is one of several factors that may affect honeybee health which may lead to CCD.

Statement 5 is correct: Exposure to pesticides is a factor linked to CCD. Pesticides, especially neonicotinoids, can have harmful effects on honeybee health, affecting their behavior, navigation, and overall fitness. Pesticide exposure weakens colonies and can contribute to the onset and intensification of CCD.

Q.22)

Solution (c)

Exp) Option c is the correct answer.

Phytoremediation is an environmentally sustainable technique that **employs plants to mitigate and remediate soil contaminated by pollutants.** This approach harnesses the unique ability of certain plants to absorb, accumulate, or transform contaminants, contributing to the restoration of ecosystems.

Option a is incorrect: Phytoextraction involves the use of plants to **absorb and accumulate** pollutants, particularly metals, from the soil into their tissues. This process is often used for hyperaccumulating plants that have a **high capacity to accumulate specific contaminants**. The phytoextraction focuses on actively extracting metals from the soil, whereas, Phyto stabilization focuses on preventing leaching and dispersion of heavy metals rather than actively extracting them.

Option b is incorrect: Phytotransformation refers to the transformation or breakdown of contaminants by plants into less toxic forms. This involves uptake of organic contaminants from soil by plants and their transformation into less toxic forms. This process involves biochemical reactions within the plant tissues. However, the provided statements do not discuss the transformation of contaminants by plants; instead, they emphasize immobilization and containment to prevent environmental dispersion.

Option c is correct: Phytostabilization involves using metal-tolerant plant species, to immobilize and contain contaminants, particularly heavy metals, within the soil. The primary goal is to stabilize pollutants in place, **preventing their leaching into groundwater** and the **dispersion of contaminated soil**. One of the advantages of phytostabilization is that **disposal of hazardous biomass is not required** when compared with phytoextraction. Thus, the statements align with the characteristics of phytostabilization, including the use of metal-tolerant plants and the prevention of leaching and dispersion.

Statement d is incorrect: **Phytodegradation involves the breakdown or degradation of organic contaminants by plants**, often through the action of enzymes produced by plant roots or associated microorganisms. The provided statements do not focus on degradation but rather on the immobilization and containment of heavy metals. Hence, the given option is incorrect.

Q.23)

Solution (c)

Exp) Option c is the correct answer.

Torrefaction is a newly emerging technique **for biochar production**. The oxygen, moisture, and carbon dioxide present in the biomass are removed to produce biochar.

Statement 1 is correct: Torrefaction is a **thermal treatment process applied to biomass in the absence of oxygen.** It involves heating the biomass material at a moderate temperature (typically between 200-300°C) **to remove moisture and volatile organic compounds**. The goal is to enhance the physical and energy properties of biomass, making it more suitable for various applications, including energy production.

Statement 2 is correct: Torrefaction can be used to convert various types of biomass, **including rice stubble**, into a form often referred **to as 'bio-coal' or torrefied biomass**. The process **not only reduces moisture content but also increases the energy density** of the biomass.

Q.24)

Solution (d)

Exp) Option d is the correct answer.

Fly ash is primarily composed of fine particles that are carried away in the flue gas during the combustion of coal. It is generally composed of components like aluminum silicate, silicon dioxide, calcium oxide, and other trace elements.

Statement 1 is correct: **Dusting vegetables and rice with fly ash provides effective protection against chewing and sucking pests and insects**. It is especially useful in managing serious rice pests such as **leaf folder, yellow caterpillar, spiny beetle, ear head bug, brown bug, black bug, and grasshoppers.** Additionally, fly ash helps eliminate sucking pests like brown plant hopper (BPH) and green leafhopper (GLH) when incorporated into their diet in liquid form.

Statement 2 is correct: Fly ash bricks are **desirable because of their lightweight** as compared to the traditionally manufactured bricks. Apart from lightweight, these bricks possess high strength.

Statement 3 is correct: Fly ash is commonly used as a raw material in the production of **geopolymers**, which are **cement-like materials**. Geopolymers have applications in **construction**, serving as alternatives to traditional Portland cement.

Statement 4 is correct: **Fly ash can be used as a photocatalyst for the removal of dyes and other pollutants from wastewater**. The porous structure of fly ash can enhance its photocatalytic properties.

Q.25)

Solution (a)

Exp) Option a is the correct answer.

1) Option A is correctly matched: Tiger, Cheetah, Clouded Leopard, etc. Are under Schedule I of WPA and accorded the highest protection.
2) Option B is incorrectly matched: Flying squirrel, Himalayan Black Bear and King Cobra are part of Schedule II, but Blackbuck is part of Schedule I.
3) Option is C is incorrectly matched: Mice, Rats, Flying Fox, Common crow are part of Schedule V i.e. animals that are considered vermin and can be hunted under some circumstances.
4) Option D is incorrectly matched: Hyena, Hog Deer, Nilgai are part of Schedule III and IV i.e. species that are not endangered.
5) Option E is correctly matched: Schedule VI provides for regulations for cultivation for plant species mentioned under the schedule.

Q.26)

Solution (c)

Exp) Option c is the correct answer.

The Forest Rights Act (FRA), 2006 recognizes the rights of the forest dwelling tribal communities and other traditional forest dwellers to forest resources, on which these communities were dependent for a variety of needs, including livelihood, habitation and other socio-cultural needs.

Minor Forest Produce (MFP) defined under Section 2(i) of FRA Act **includes all non-timber forest produce of plant origin** and includes **bamboo, canes, fodder, leaves, gums, waxes, dyes, resins and many forms of food including nuts, wild fruits, honey, lac, tusser etc.**

The government has recently decided to include 14 new minor forest produce items under **the mechanism for marketing of minor forest produce through a minimum support price scheme**.

Newly included items are **Tasar Cocoon, elephant apple dry, Tree Moss (Bryophytes)**, bamboo shoot, malkangani seed and wild dry mushroom among others.

Mahuwa Flower is already an MFP.

Option 1 is correct. Elephant Apple is an evergreen large shrub or small to medium-sized tree growing to 15 m tall. The fruit pulp is used in Indian Cuisine in curries, jam, and jellies. Leaves are used to polish Ivory. Juice is applied to the scalp to prevent baldness and the bark is used medicinally to treat mouth infection. It is a MFP

Option 2 is correct. Mosses and liverworts, collectively called bryophytes, are small, simple, green plants that do not produce flowers or seeds and have no woody tissue. They lack true roots and complex

vascular systems; however, some mosses have a central strand of simple water conducting cells. Most bryophytes must absorb water and nutrients directly through their surface tissue and transport them directly from cell to cell. Many bryophytes have tiny, branched filaments called rhizoids, which function for anchoring, but not absorption. This is also an MFP.

Option 3 is incorrect. Congress grasses or parthenium, a native of tropical America, **is not an MFP**. A rapidly growing **invasive species**, this grass competes well for nutrients and space and reproduces fast. One of the world's seven most notorious weeds, parthenium has already taken over about five million hectares of the country's land.

Option 4 is correct. Tasar cocoon is a minor forest produce (MFP) and reared on Arjun, Asan and Sal plants or in block plantations in forest areas. Mostly tribals of Mayurbhanj, Keonjhar, Sundargarh, Deogarh, Dhenkanal, Kalahandi, Nuapada, Phulbani, Nabarangpur and Sonepur are involved in the rearing activity which is carried out for two to three months in a year.

Option 5 is correct. Mahua Flower (Madhuca Indica is an important MFP with varied utility for tribal collectors. It is a food item for the forest dwelling population and is also used for brewing alcohol. Mahua flower grows in all districts except the coastal area. It is a seasonal forest produce that sheds its corollas during March-April. Though it is classified as a forest produce, most of the production comes from non-forest land in the agricultural fields and uplands.

Q.27)

Solution (c)

Exp) Option c is the correct answer.

The United Nations Convention to Combat Desertification (UNCCD) was established in 1994 to protect and restore our land and ensure a safer, just, and more sustainable future.

Statement 1 is correct: The Global Land Outlook (GLO) is the UNCCD's flagship publication which showcases new and transformative policies and provides guidance for planning land management at global and national level.

Statement 2 is correct: The UNCCD is the only legally binding international agreement linking environment and development to sustainable land management.

Statement 3 is incorrect: There are 197 countries and European Union are Parties to the UNCCD Convention. The Convention unites governments, scientists, policymakers, the private sector and communities around a shared vision to restore and manage the world's land. Thus, non-sovereign entities or NGOs, corporate entities etc. are not parties to the convention but rather are development partners.

Statement 4 is correct: The UNCCD is particularly committed to a bottom-up approach, encouraging the participation of local people in combating desertification and land degradation.

Q.28)

Solution (a)

Exp) Option a is correct.

The **Islands of the Nicobar group** are characterised by Grasslands and evergreen forests that are dominant in the Central & Southern parts. The Nicobar group of islands are inhabited by **Nicobarese and Shompen tribes** belonging to Mongoloid race. The traditional craft of these tribe is the **Hodi (Canoe making).**

The Nicobarese tribal population dwells in **Nicobarese Hut**. It is located in the interior of the islands, far away from the coastline and is raised 6-8 feet above the ground. S` Agriculture is the main economic activity of the tribal society on the Nicobar Island which is entirely rain-fed and coconut occupies more than 80% of the agricultural area. Apart from this, banana, papaya, tapioca and sweet potato are also grown on the island.

Q.29)

Solution (c)

Exp) Option c is the correct answer.

Biofloc Technology (BFT) is considered a new "blue revolution" since nutrients can be continuously recycled and reused in the culture medium, benefiting by the minimum or zero-water exchange. Bio floc is a heterogeneous aggregate of suspended particles and various microorganisms associated with extracellular polymeric substances. It is composed of microorganisms such as bacteria, algae, fungi, invertebrates and detritus, etc. High density fish farming can be done as protein-rich live fish feed formed as a result of the conversion of unused feed and excreta into a natural food in a culture system on exposure to sunlight and vigorous aeration.

Options 1, 2 and 4 are correct. Advantage of BFT 1. Eco-friendly culture system. 2. It reduces environmental impact. 3. Judicial use of land and water 4. Limited or zero water exchange system 5. Higher productivity (It enhances survival rate, growth performance, better feed conversion in the culture systems of fish). 6. Higher biosecurity. 7. Reduces water pollution and mitigate the risk of introduction and spread of pathogens. 8. It reduces utilization of protein rich feed and cost of standard feed. 9. It reduces the pressure on capture fisheries i.e., use of cheaper food fish and trash fish for fish feed formulation.

Option 3 is incorrect. To Prepare the Inoculum fresh water is mixed with some inoculum for the floc development. Various materials like Ammonium sulphate /Urea and carbon source (Jagerry /Wheat flour /Tapioca flour) is required. In another method carbon source (Jagerry /Wheat flour /Tapioca flour) and probiotics (with Bacillus Sp., Aspergillus Sp. etc) are mixed in the water. Thus, zero usage of chemicals would be incorrect.

Q.30)

Solution (b)

Exp) Option b is the correct answer.

Tropical Semi-Evergreen Forests are classified as a transitional type of forest between tropical wet evergreen and tropical deciduous forests. In comparison to tropical wet evergreen forests, these are drier places.

Statement 1 is incorrect. The **average annual rainfall in tropical semi evergreen forests is 200-250 cm**, and the average yearly temperature ranges from 24 to 27 degrees Celsius.

Statement 2 is correct. Several commercially important tree species can be found in these forests and the tree trunks are frequently buttressed and covered in epiphytes. The laurel, rosewood, mesua, white cedar, Indian chestnut, and champa are significant tree species. Teak, Jamun, cashew, hog plum, coral tree, jasmine, and crossandra are some of the indigenous and exotic tree and plant species found in this forest.

Q.31)

Solution (c)

Exp) Option c is the correct answer.

Statement 1 is correct. **The temperate forests are characterised by a moderate climate and broad-leafed deciduous trees,** which shed their leaves in fall, are bare over winter and grow new foliage in the spring. These forests are characteristic of north America, Europe, Eastern Asia, and Chile, part of Australia and Japan, with a cold winter and an annual rainfall of 75-150 cm. and a temperature of 10-20 ° C. The precipitation may be fairly uniform throughout year**. In Himalayas occur Temperate vegetation including pines, fir and juniper trees** with an undergrowth of scrubby rhododendrons at elevations of 2743-3658 metres.

Statement 2 is correct. **Wet temperate forests are characterised by oak trees and chestnut trees**. The mean **annual rainfall here is 150 cm to 300 cm,** the mean annual temperature is about 11°C to 14°C and the average relative humidity is over 80 per cent. These forests can be found in the higher hilly areas of Kerala and Tamil Nadu, also in the region of Eastern Himalayas to the east of 88°E longitude including the hills of Assam, West Bengal, Sikkim, Arunachal Pradesh and Nagaland. Chilauni, Indian chestnut, Deodar, Machilus, Cinnamomum, Litsea, Plum, Blue pine, Birch, Oak, Hemlock, etc. are important species.

Statement 3 is correct. **Temperate forests cover the southern slopes of the Himalayas** and are characterised by **pine, deodar, silver fir, and spruce and cedar trees**. The overall length of mountain ranges in Kashmir, Uttaranchal, Himachal Pradesh Sikkim and Darjeeling are covered by Himalayan temperate forests. The annual rainfall varies from 150 cm to 250 cm. Fine wood is provided by them which is of great use for timber, construction and sleepers of railways. Oaks, laurels, rhododendrons and some kinds of bamboos are also found in these forests.

Q.32)

Solution (d)

Exp) Option d is correct

Reserved forest and Protected forests are **natural habitats which have a high degree of protection.** These are declared by the respective State Government. However, the land rights to forests are typically acquired and owned by the Government of India.

Reserved Forests are any forest land or waste land to which the **government has the ownership.** These forests are restricted as the **Government has proprietary rights** over the land.

Statement 1 is *incorrect*. The use of the reserved forests is **prohibited to the local people** unless they have a permission by the government. On the contrary, **protected forests** are looked after by the government, but the **local people are allowed to collect fuel-wood/timber** and graze their cattle without causing serious damage to the forests.

Statement 2 is *incorrect*. Both Reserved forests and Protected forests are **created by the State governments.** The State Government may **constitute any forest-land or waste-land** as reserved forest over which the Government has proprietary rights, or to the whole or any part of the forest-produce of which the Government is entitled. Similarly, the state government is empowered to **constitute any land other than reserved forests as protected forests** over which the Government has proprietary rights.

Knowledge Base: **Village forests:**

- When the Government assigns any reserved forest or any other land to the village community for their use that piece of land is classified under village forest lands.
- The State Government makes rules for regulating the management of these forests.
- The term village forest and forest village are different in their meaning. While village forest is a legal category under the Indian Forest Act, forest village is merely an administrative category.

Q.33)

Solution (b)

Exp) Option b is the correct answer.

Noise pollution, also known as environmental noise or sound pollution, is any unwanted or disturbing sound that has a harmful impact on the activity of human or animal life.

Statement 1 is correct: Noise can interfere with the **ability of animals to produce and perceive acoustic signals, such as vocalizations, echolocation, or sonar**. This can affect their social interactions, territorial defense, mating, and predator avoidance. For example, some birds and whales have been shown to change the frequency, amplitude, or duration of their songs in response to noise, which may reduce their attractiveness or recognition by conspecifics.

Statement 2 is incorrect: Increased noise levels **negatively impact the reproductive success of birds.** Noise may interfere with courtship displays, communication between mates, and the ability to hear predators, leading to disruptions in breeding behaviors.
Statement 3 is correct: Noise can induce **physiological and behavioral stress responses in animals,** such as increased heart rate, blood pressure, cortisol levels, and flight or avoidance reactions. Chronic exposure to noise can impair the immune system, reduce growth and reproduction, and increase the risk of disease and mortality

Q.34)
Solution: (c)
Exp) Option c is the correct answer.
Statement a is correct: Coral reefs are often referred to as the medicine chests of the sea. A number of creatures found on reefs produce chemical compounds that have been isolated to treat human diseases. Soft corals, in particular, have been found to possess compounds that could be used to treat various types of cancers.
Statement b is correct: Coral reefs serve as a natural barrier that helps protect coastlines from storms and erosion. They can also help reduce the impact of tsunamis and other natural disasters.
Statement c is incorrect: Exposing corals to small amounts of oil for an extended period can be just as harmful as large amounts of oil for a brief time.
Statement d is correct: Coral reefs are some of the most diverse ecosystems on Earth, supporting a vast array of plant and animal species. They are home to over 25% of all marine life, despite covering just 0.1% of the ocean floor. Coral reefs support an incredible diversity of fish. Algae, soft coral, sponges and invertebrates. From small herbivorous fish to large predatory fish, all find food and protection on the reef. These Reef animals are an important source of protein.

Q.35)
Solution (a)
Exp) Option a is the correct answer.
Option a is correct: Sacrifice zones are often defined as populated areas with high levels of pollution and environmental hazards, due to nearby toxic or polluting industrial facilities. These areas are called “sacrifice zones” because the health and safety of people in these communities is being effectively sacrificed for the economic gains and prosperity of others.
Option b is incorrect: Dead zones are low-oxygen, or hypoxic, areas in the world’s oceans and lakes. Because most organisms need oxygen to live, few organisms can survive in hypoxic conditions.
Option c is incorrect: Green zones (also known as “ecodistricts”) are stationary or floating districts created by a local government to promote sustainable practices, to help reduce environmental impacts, and to help revitalize an area.
Option d is incorrect: The Environment Ministry came up with the Coastal Regulation Zone rules (CRZ rules) in February 1991, under the Environment Protection Act in 1986. The rules were notified in 2011. As per the CRZ rules, the coastal areas of creeks, seas, bays, rivers and backwaters that get affected by tides up to 500 metres from the high tide line (HTL) and the land area between the low tide line (LTL) and the high tide line are declared as coastal regulation zone (CRZ).

Q.36)
Solution (b)
Exp) Option b is the correct answer.
DDT (dichloro-diphenyl-trichloroethane) was developed as the first of the modern synthetic insecticides in the 1940s. It was initially used with great effect to combat malaria, typhus, and the other insect-borne

human diseases among both military and civilian populations. However, in recent days various research and evidence raised concern about the impact of DDT on environmental and human health.
Statement 1 is correct: Dichloro-Diphenyl-Trichloroethane (DDT) is an Endocrine-disrupting chemicals (EDCs) that capable of altering hormonal and homeostatic systems of receiving organism including humans, animals and other living organism such as plants.
Statement 2 is incorrect: Ozone depleting substances are man-made gases that destroy ozone once they reach the ozone layer. Ozone substances contain chloride atoms. The Montreal protocol does not mention DDT as an Ozone Depleting substance.
Statement 3 is correct: It is true that DDT adversely affects the raptor population. Raptors are birds that feed on insects, fish etc. Owing to the biomagnification property of DDT, the level of DDT tends to increase as it moves to higher levels of food chains. Thus, raptors such as Eagle or hawk on consuming the contaminated (DDT) organism such as fish, insects will be severely affected.
Statement 4 is incorrect: The use of DDT for the domestic Public Health Programme is restricted up to 10,000 Metric Tonnes per annum, except in case of any major outbreak of epidemic (So the production and use are not strictly banned). Use of DDT in Agriculture is withdrawn. In very special circumstances warranting the use of DDT for plant protection work, the state or central Govt. may purchase it directly from M/s Hindustan Insecticides Ltd. to be used under expert Governmental supervision

Q.37)
Solution: (b)
Exp) Option b is the correct answer.
Statement 1 is incorrect: Recently the total number of Ramsar sites in India has reached to total of 75 sites. All these sites cover a total area of 13,26,677 hectares in the country. Bolivia has the largest area under Ramsar protection.
Statements 2 is correct: The oldest Ramsar sites for India are Chilika Lake in Odisha and Keoladeo Ghana National Park in Rajastan. They both were notified as Ramsar sites in 1981.
Statement 3 is correct: If a site is notified as Ramsar site, it will get access to financial assistance from the Ramsar Convention's Small Grant Fund (SFG). The SGF was established as a mechanism to assist developing countries in implementing the Convention and to enable the conservation and wise use of wetland resources.

Q.38)
Solution (c)
Exp) Option c is the correct answer.
Statement 1 is correct: Deep Water Circulation (DWC) refers to the movement of water in the deep ocean. It is driven by the density differences between water masses caused by variations in temperature and salinity. This process is known as thermohaline circulation. It helps to distribute heat around the globe, which helps to regulate the Earth's temperature and keep different regions from becoming too hot or too cold.
Statement 2 is correct: It plays a critical role in controlling atmospheric carbon dioxide levels by helping to transport carbon from the surface to the deep ocean, where it can be stored for long periods of time.
Statement 3 is correct: The Indian Ocean does not have any major deep-water formations of its own. It acts only as a host for Northern Component Water (NCW) and North Atlantic and Antarctic Bottom Water (AABW). Further, the northern parts of the Indian Ocean are located at one of the terminals ends of the Global Overturing Circulations (GOC), far away from the deep-water formation regions and oceanic seaways. These specific features could make the northern Indian Ocean an ideal basin to do this.

Q.39)
Solution: (c)
Exp) Option c is the correct answer.
Alpha diversity: It refers to diversity within a particular ecosystem.
Beta Diversity: It is a comparison of diversity between ecosystems.
Gamma Diversity: It is a measure of the overall diversity for the different ecosystem within the region
Species Evenness: It is a measure of the proportion of species at the given site

Q.40)
Solution: (d)
Exp) Option d is the correct answer.
Failure to value water in all its forms is considered a prime cause of the mismanagement of water, according to the UN World Water Development Report 2021, published by UNESCO on behalf of UN-Water. 'One water' approach reflects mindset for Shift needed from single-minded, linear water management to multi-dimensional integrated water management technique. It is an approach for a comprehensive, resilient, and sustainable management of water resources. It is the recognition that all water has value, regardless of its source.

Q.41)
Solution (b)
Exp) Option b is correct.
India is home to various types of biomes and forests with typical characteristics and features. One of these various types of forests is the Tropical Deciduous Forests. These are the most widespread type of forests found in India. They are known for their seasonal shedding of leaves.
Statement 1 is correct: Tropical Deciduous Forests are also known as **Monsoon Forests**. This is because one of their **main characteristics** is that they **shed all their leaves** for a few weeks to **survive dry conditions** (by minimising water loss through transpiration through leaves). They then **develop their foliage back** by the time of **monsoons**, at which time the t**ree cover is at its maximum,** due to good availability of water.
Statement 2 is *incorrect*: Tropical deciduous forests are found in the areas receiving annual rainfall between 75 to 200 cm. As far as the physical distribution of this type of forests is concerned, they are found in the entire country excluding some parts of Deccan Plateau, North-Eastern Region, Western Ghats and Eastern coast.
Moist Deciduous Forests - in areas with rainfall between **100 cm - 200 cm annually**
Dry Deciduous Forests - in areas with rainfall between **70 cm to 100 cm annually.**
Statement 3 is correct: On the basis of the **geographical area** covered by them, the **Tropical Deciduous Forests** are the **most widespread variety** of forest type in **India.** They cover approximately an area of **4,23,414 square kilometres (around 65.6%)** in India. They are of two types
Distribution:

- **Moist** Deciduous Forest - **Northeastern states** along the **foothills of Himalayas**, **eastern slopes** of the **Western Ghats** and **Odisha**.
- **Dry** Deciduous Forest - **rainier areas** of the **Peninsula** and the **plains of Uttar Pradesh** and **Bihar.**

Q.42)
Solution: (a)
Exp) Option a is the correct answer.

CITES stands for Convention on International Trade in Endangered Species of Wild Fauna and Flora, is a global agreement among governments (intergovernmental agreement) to regulate or ban international trade in species under threat.

Statement 1 is incorrect: CITES is legally binding on the Parties which means parties have to implement the Convention. However, CITES does not take the place of national laws.

Statement 2 is incorrect: Appendix 1 includes the world's most endangered plants and animals, such as tigers and gorillas. International commercial trade in these species, or even parts of them, is banned, except in rare cases such as scientific research. Thus, it is not true that these species cannot be traded under any circumstances.

Statement 3 is correct: It is true that Secretariat service for CITES is provided by the United Nations Environment Programme (UNEP) and UNEP secretariat is located at Geneva, Switzerland.

Q.43)

Solution: (c)

Exp) Option c is the correct answer.

Statement 1 is correct: Methane (CH_4) is a hydrocarbon that is a primary component of natural gas.

Statement 2 is correct: Wetland methane (CH_4) emissions are the largest natural source in the global CH_4 budget, contributing to roughly one third of total natural and anthropogenic emissions. As the second most important anthropogenic greenhouse gas in the atmosphere after CO_2, CH_4 is strongly associated with climate feedbacks.

Statement 3 is correct: Methane is the primary contributor to the formation of ground-level ozone (by oxidizing), a hazardous air pollutant and greenhouse gas, exposure to which causes 1 million premature deaths every year

Q.44)

Solution: (b)

Exp) Option b is the correct answer.

E-Fuel production involves the process of breaking a water molecule (H_2O) into hydrogen (H_2) and oxygen using an electrolysis process and combining hydrogen with CO_2 synthesised from the atmosphere. As this process involves the use of electricity to make carbon- hydrogen synthesised fuels, these fuels are called e-fuels.

Q.45)

Solution: (b)

Exp) Option b is the correct answer.

The Commission for Air Quality Management has been set up for Air Quality Management in the National Capital Region and Adjoining Areas for better coordination, research, identification and resolution of problems surrounding the air quality index and for matters connected to air quality.

Statement 1 is correct: Commission for Air Quality Management is a statutory body and it was established under the Commission for Air Quality Management in National Capital Region and Adjoining Areas act, 2021.

Statement 2 is incorrect: Although the act originally provides for imprisonment up to 5 years if anyone acts against the directions of this commission later farmers were excluded from this provision. Hence now the Commission can collect only environmental compensation from farmers causing pollution by stubble burning. This compensation amount will be prescribed by the central government.

Statement 3 is correct: The Commission for Air Quality Management enjoys power to impose fines and collect compensation from those who cause environmental pollution. Given the quasi-judicial power

enjoyed by the Commission, all appeals against the Commission's orders will lie with the National Green Tribunal (NGT).

Q.46)
Solution: (b)
Exp) Option b is the correct answer
The Global Warming Potential (GWP) measures how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO2).
Statement 1 is correct: Nitrous Oxide (N2O) has a GWP 265–300 times that of CO2 for a 100-year timescale. N2O emitted today remains in the atmosphere for more than 100 years, on average.
Statement 2 is correct: Nitrous oxide emission from agricultural soil is due to the natural biochemical process in the nitrogen cycle.
Statement 3 is incorrect: Nitrous oxide has the third highest concentration – after CO2 and methane – in the atmosphere among greenhouse gases responsible for global warming.

Q.47)
Solution: (d)
Exp) Option d is the correct answer.
Option a is incorrect: The United Nation Charter does not explicitly mention the environment or sustainable development. The United Nations Environment Programme (UNEP) and Commission on Sustainable Development are UN bodies which deal with global environmental questions.
Option b is incorrect: The International Union for Conservation of Nature (IUCN) was established in 1948 and it is an international Non-Governmental Organisation (NGO) working in the field of nature conservation and sustainable use of natural resources. IUCN is not a special arm of the United Nations.
Option c is incorrect: The United Nations Commission on Sustainable Development (CSD) was established by the UN General Assembly in 1992 itself. The Commission works under the UN Economic and Social Council (UN-ECOSOC) to oversee the outcomes of the 1992 Earth summit also known as the United Nations Conference on Environment and Development.
Option d is correct: It is true that the First United Nations Conference on the Environment held in Stockholm in 1972 led to the formation of the United Nation Environment Programme (UNEP). This conference is also called the Stockholm conference and it was the first world conference to make the environment a major issue.

Q.48)
Solution: (a)
Exp) Option a is the correct answer.
The percentage of usable chemical energy transferred as biomass from one trophic level to the next is called ecological efficiency.

- Ecological efficiency depends on the proportion of assimilated energy incorporated in growth, storage and reproduction. Put simply, it depends on the total amount of energy an organism needs to survive and thrive.
- Depending on what types of species an ecosystem is involved, the Ecological efficiency ranges from 2-40% with a loss of 60-98% of the original energy. This energy is generally lost as heat to metabolism.
- Since each trophic level only receives an average of 10% energy from previous trophic levels, there won't be more than 4-5 trophic structures.

Q.49)

Solution: (d)

Exp) Option d is the correct answer.

Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, virus, fungi etc. It can be categorized as:

1) Microbial pesticides: microorganisms that control pests.
2) Biochemical pesticides: naturally occurring substances that control pests
3) Plant-incorporated protectants: pesticidal substances produced by plants containing added genetic material

Option 1 is correct: Viruses can be used as biopesticides. Viruses which are generally used as biopesticides include Garnulovirus, Nucleopolyhedrovirus, Helicoverpa zea etc. These are largely used to target 'Lepidopetra'. Lepidopetra is an order of insects that includes butterflies, moths etc.

Option 2 is correct: Bacteria can be used as biopesticides. The bacterial control agent includes Bacillus thuringiensis, Paenibacillus popilliae etc. B. thuringiensis (Bt) is effective when eaten in sufficient quantity by specific insects with alkaline gut pH (typically butterflies, moths, beetles, flies and mosquitoes). Affected insects stop feeding and die from the combined effects of starvation, tissue damage and gastrointestinal infections by other pathogens like bacteria and fungi.

Option 3 is correct: Fungi can be used as biopesticides. They are capable of infesting insect pests and are thus a potential source of mycoinsecticides. The fungi which help control plant disease include Trichoderma harzianum, T. polysporum, M. flavoviride, B. brongniari, etc. Germinating spores produce fungicidal compounds which suppress other soil-borne pathogens.

Option 4 is correct: Protozoans can be used as biopesticides. They are commonly known as microsporidians. Examples of protozoan biopesticides include N. locustae, Nosema pyrausta, etc. They are generally hosting specific and slow acting, producing chronic infections with general debilitation of the host. The spore formed by the protozoan germinates in the midgut and sporoplasm is released invading the target cells causing infection of the host. The infection results in reduced feeding, vigour, fecundity and longevity of the insect host.

Q.50)

Solution (c)

Exp) Option c is the correct answer.

The Tal Chhapar Sanctuary is situated on the border of the Great Indian Thar Desert. Tal Chhapar is a distinctive shelter of the most graceful Antelope seen in India, "the Blackbuck". It was given the status of a sanctuary in 1966. • Tal Chhapar was a hunting reserve of the erstwhile royal family of Bikaner. The "Tal" word is Rajasthani word means plane land. This Sanctuary has nearly flat territory and combined thin low-lying region. • The Sanctuary has open and wide grasslands with trees and plants like Acacia and Prosopis that offer it a look of a characteristic Savanna. • Tal Chhapar is an ideal place to see Blackbucks which are more than a thousand in number here. It is a good place to see the desert animals and reptile species. • The sanctuary is host to about 4,000 blackbucks, over 40 species of raptors and more than 300 species of resident and migratory birds. Migratory birds in the sanctuary are harriers, eastern imperial eagle, tawny eagle, short-toed eagle, sparrow, and little green beeeaters, black ibis and demoiselle cranes. Other than that, skylarks, crested larks, ring doves, and brown doves can be seen throughout the year.

Q.51)

Solution: (b)

Exp) Option b is the correct answer.

Statement 1 is correct: A carbon credit is a permit allowing the emission of predetermined amount (one ton) of greenhouse gases per permit. They are periodically awarded to companies in order to limit their emissions while allowing them to sell the extra credits to another company that needs them.
Statement 2 is correct: Section 14(w) of the Energy Conservation (Amendment) Act, 2022 mandates the Central Government for notifying a 'carbon credit trading' scheme in India. Bureau of Energy Efficiency (BEE) has been designated to formulate the complete framework. It will prepare a framework for both- voluntary carbon market and compliance carbon market
Statement 3 is incorrect: A carbon trading certificate is not issued under the 'Perform Achieve and Trade (PAT)' scheme. Perform, Achieve and Trade (PAT) is a regulatory instrument to reduce specific energy consumption in energy intensive industries. Under this scheme 'Energy Saving Certificates' are issued to the compliant industries.

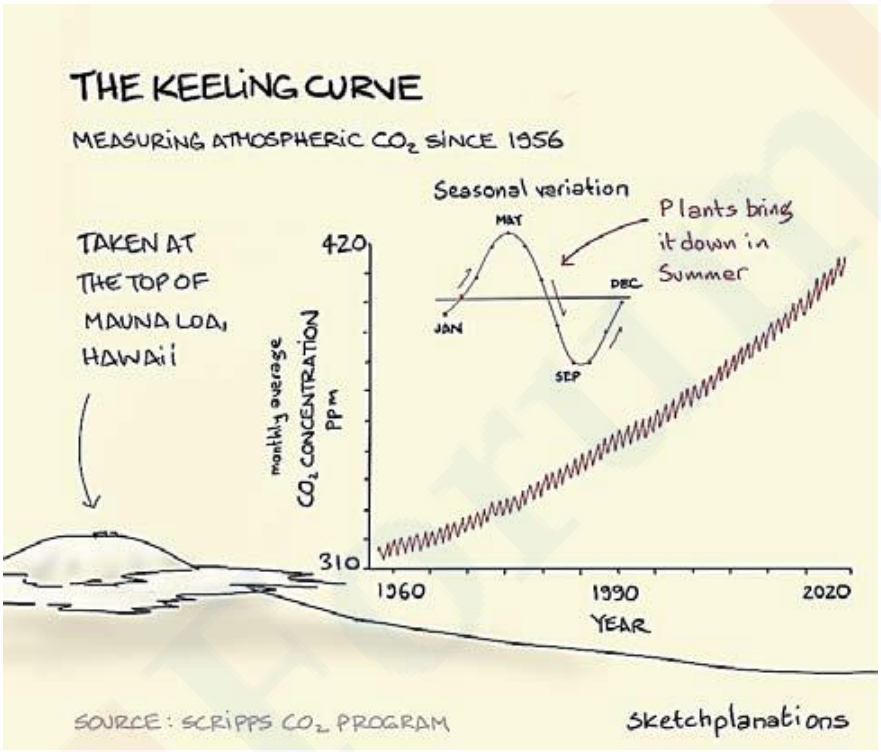
Q.52)
Solution: (b)
Exp) Option b is the correct answer.
The 1972 United Nations Conference on the Environment in Stockholm was the first world conference to make the environment a major issue. The participants adopted a series of principles for sound management of the environment.
This includes the Stockholm Declaration and Action Plan for the Human Environment.
Statement 1 is incorrect: The term 'sustainable development' was not defined in the Stockholm Declaration. It was not even mentioned in the declaration. The Report by the World Commission on Environment and Development (Brundtland Commission Report) of 1987 defined and conceptualized the term sustainable development.
Statement 2 is correct: The principle of "the polluter must pay" was highly endorsed during the Stockholm Conference. While supporting the proposed environment fund during the Conference, many speakers endorsed the idea of "the polluter must pay" as mentioned in Chapter VIII of the report- Brief Summary of the General Debate. However, the final declaration did not adopt this principle.

Q.53)
Solution: (d)
Exp) Option d is the correct answer.
Indoor air pollution is the degradation of indoor air quality by harmful chemicals and other materials; it can be up to 10 times worse than outdoor air pollution. The principal sources of indoor air pollution are: Combustion, building material, and bioaerosols. While radon, asbestos, pesticides, heavy metals, volatile organic matter, and environmental tobacco smoke are considered major indoor pollutants in developed countries, the combustion products of biomass fuels contribute most to indoor air pollution in developing nations.
The incomplete combustion products of biomass fuels include suspended particulate matter, carbon monoxide, polyaromatic hydrocarbons, polyorganic matter, formaldehyde, etc., which have adverse effects on health. The combustion of coal results in production of oxides of sulphur, arsenic, and fluorine. Pollutants such as aldehydes, volatile, and semi volatile organic compounds are produced from resins, waxes, polishing materials, cosmetics, and binders. Lastly, biological pollutants like dust mites, molds, pollen, and infectious agents produced in stagnant water, mattresses, carpets, and humidifiers too pollute indoor air.

Q.54)
Solution: (b)
Exp) Option b is the correct answer.

Statement 1 is incorrect. Biogas is the mixture of gases produced by the breakdown of organic matter in the absence of oxygen (anaerobically), primarily consisting of methane and carbon dioxide. Biogas can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. Biogas is a renewable energy source. High levels of methane are produced when manure is stored under anaerobic conditions.
Statement 2 is correct. The byproduct of the biogas generation process is enriched organic (digestate), which is a perfect supplement to, or substitute for, chemical fertilizers.
Statement 3 is correct. Biogas can be used to replace natural gas in many applications including cooking, heating, steam production, electrical generation, vehicular fuel, and as a pipeline gas.

Q.55)
Solution: (c)
Exp) Option c is the correct answer.
The Keeling Curve is a graphic representation of the concentration of carbon dioxide (CO2) in Earth's atmosphere. It is named after its creator - Dr. Charles David Keeling.



Q.56)
Solution: (a)
Exp) Option a is the correct answer.
Biodiversity is closely linked to ecological security and therefore, human welfare. Biodiversity Heritage Sites (BHS) are declared to strengthen the biodiversity conservation in traditionally managed areas. BHS are well defined areas that are unique, ecologically fragile ecosystems - terrestrial, coastal and inland waters and marine having rich biodiversity.
Statement 1 is incorrect: Section 37 of the Biological Diversity Act, 2002 empowers the State Government to declare BHS. State governments declare these sites in consultation with local bodies. The State Government may also frame rules for the management or conservation of the heritage sites. However:

(a) State government is mandated to consult central government before notifying the rules for management and conservation of BHS.
(b) The Central Government (through National Biodiversity Authority) can advise state government(s) regarding selection of areas of biodiversity importance as BHS (Section 18(3)(b)).
Statement 2 is incorrect: BHS are established as per the provisions of the Biological Diversity Act, 2002. The Act does not define BHS and has empowered National Biodiversity Authority (NBA) to frame detailed guidelines regarding the BHSs. Accordingly, NBA has defined the term 'BHS' in its detailed guidelines.
Statement 3 is correct: As per the NBA guidelines, "The creation of BHS may not put any restriction on the prevailing practices and usages of the local communities, other than those voluntarily decided by them. The purpose of declaring BHS is to enhance the quality of life of the local communities through conservation of such sites."

Q.57)
Solution: (b)
Exp) Option b is the correct answer.
The Coral Triangle is a geographic region in the western Pacific Ocean. It is named for its high levels of biodiversity, particularly in terms of coral species, and is often referred to as the "Amazon of the Seas." It spreads across the 6 countries (CT6) of – Indonesia, Malaysia, Papua New Guinea, the Philippines, the Solomon Islands and Timor Leste.
The Coral Triangle is home to over 600 species of reef-building corals, which is more than 75% of all known coral species in the world. It is also home to thousands of species of fish, mollusks, and other marine organisms, making it one of the most diverse marine ecosystems on the planet.

Q.58)
Solution: (c)
Exp) Option c is the correct answer.
Statement 1 is correct: Under Basel Convention plastics are considered as hazardous waste. Plastics exposed to sea water tends to concentrate toxic and non-toxic organic compounds present in the sea water at low concentrations. These, including PCBs, DDT, and nonylphenols, have very high partition coefficients and are very efficiently concentrated in the plastic material.
Statement 2 is correct: The United Nations Environment Programme (UNEP) defines microplastics as plastic particles smaller than 5 millimeter. Microplastics are intentionally added in primary sources such as personal care products and clothing products; or secondary sources that are formed by fragmentation of plastic over a period of time.
Statement 3 is correct: It was estimated that global production of plastics is approximately 250mt/yr. Their abundance has been found to transport persistent organic pollutants, also known as POPs. These pollutants have been linked to an increased distribution of algae associated with red tides.

Q.59)
Solution: (c)
Exp) Option c is the correct answer.
Carbon leakage is a term used to denote the movement of carbon-intensive businesses out of developed economies. They shift their production to economies with less stringent carbon rules. This means that instead of getting sequestered, carbon emissions end up happening in another place.

Q.60)
Solution (b)
Exp) Option b is the correct answer.

Option b is correct: Nongkhnum River Island is the biggest river island in Meghalaya and the second biggest river island in Asia, after Majuli Island in Assam. The island is formed by the rivers Wah Kynshi and Namiliang. There are also many rare species of plants and insects that are found on Nongkhnum River Island. Apart from its rather special topography, Nongkhnum Island is surrounded by breathtaking waterfalls – the Weinia Falls, Thum Falls, and Langshiang Falls. The island has a beautiful sand beach and the place offers a lot of different activities for the visitors ranging from basking in the sun, boating, fishing, camping etc.

Q.61)

Solution (a)

Exp) Option a is the correct answer.

The United Nations REDD+ program is a multipurpose initiative, intended to curb deforestation in tropical nations, sequester forest carbon, combat climate change, protect biodiversity, and aid poor rural communities.

Statement 1 is incorrect: REDD+ mechanism was developed by Parties to the United Nations Framework Convention on Climate Change (UNFCCC).

Statement 2 is correct: REDD+ goes beyond merely checking deforestation and forest degradation, and includes incentives for positive elements of conservation, sustainable management of forests and enhancement of forest carbon stocks. REDD+ conceptualizes flow of positive incentives for demonstrated reduction in deforestation or for enhancing
quality and expanse of forest cover.

Statement 3 is incorrect: The incentives so received from REDD+ would be passed to the local communities involved in protection and management of the forests. This will ensure sustained protection of our forests against deforestation.

Comparison between the REDD and REDD+

- REDD+ builds upon the foundational concepts of the REDD program and expands the scope to address the broader dimensions of sustainable forest management and climate change mitigation.
- The REDD program concentrates on reducing emissions by targeting deforestation and forest degradation activities. The REDD+ program expands the focus to include conservation efforts, sustainable forest management practices, and actions to enhance forest carbon stocks.
- The REDD program primarily provides financial incentives for developing countries to reduce emissions from deforestation and forest degradation. The REDD+ program offers a broader range of benefits and incentives. In addition to financial support, it aims to provide social, environmental, and sustainable development co-benefits.

Q.62)

Solution (d)

Exp) Option d is the correct answer.

Statement d is incorrect. The chloroplasts contain chlorophyll and carotenoid pigments which are responsible for trapping light energy essential for photosynthesis. In plant cells, chloroplasts are responsible for trapping light energy essential for photosynthesis.

Statement a is correct. Algae contain chlorophyll which gives them the green colour. All algae contain chlorophyll. But not all algae are green. Some algae have pigments that mask the green chlorophyll. Algae exhibits different color variations because of the other photosynthetic pigments they contain.

Statement b is correct. The leaves other than green also have chlorophyll. The large amount of red, brown and other pigments masks the green colour. Photosynthesis takes place in these leaves also.

Statement c is correct. The plants respond to higher CO2 concentration by showing increased rates of photosynthesis leading to higher productivity has been used for some greenhouse crops such as tomatoes and bell.

Q.63)
Solution (b)
Exp) Option b is the correct answer.
The National Biodiversity Act,2002 has made it mandatory for every local self-governing institution in rural and urban areas to constitute a Biodiversity Management Committee (BMC) within their area of jurisdiction. Once constituted, the BMC must prepare a Peoples' Biodiversity Register (PBR) in consultation with local people.
Statement 1 is correct: People Biodiversity Registers are defined under the National biodiversity Act, 2002. The act observed that the register shall contain comprehensive information on availability and knowledge of local biological resources, their medicinal or any other use or any other traditional knowledge associated with them.
Statement 2 is incorrect: The Biological Diversity Act, 2002 excluded human genetic material from the definition of biological resources, thus the register may not contain information about human genetic material in the local areas. The act defined Bio-resources as plants, animals and microorganisms or parts thereof, their genetic material with actual or potential use or value but does not include human genetic material.
Statement 3 is correct: Every local body shall constitute a Biodiversity Management Committee within its area for the purpose of promoting conservation, sustainable use and documentation of biological diversity (Peoples Biodiversity Registers) including preservation of habitats, conservation of land races, folk varieties and cultivars, domesticated stocks and breeds of animals and microorganisms and chronicling of knowledge relating to biological diversity. The main function of the BMC is to prepare People's Biodiversity Registers in consultation with local people. The Register shall contain comprehensive information on availability and knowledge of local biological resources, their medicinal or any other use or any other traditional knowledge associated with them.

Q.64)
Solution: (b)
Exp) Option b is the correct answer.
Bioremediation can either be done "in situ", which is at the site of the contamination itself, or "ex situ," which is a location away from the site.
Statement 1 is correct: Bioremediation is a branch of biotechnology that employs the use of living organisms, like microbes and bacteria, in the removal of contaminants, pollutants, and toxins from soil, water, and other environments.
Statement 2 is incorrect: Bioaugmentation is the type of in-situ bioremediation while Land farming is a type of exsitu bioremediation.
Statement 3 is correct: Oil seepage and spills have lasting detrimental effects on the environment, especially on nearby marine ecosystems. Bioremediation of petroleum contaminated environments is a process in which the biological pathways within microorganisms or plants are used to degrade or sequester toxic hydrocarbons, heavy metals, and other volatile organic compounds found within fossil fuels

Q.65)
Solution: (c)
Exp) Option b is the correct answer.

Climate change is said to bring wide-ranging changes across socio-economic factors.
Option 1 is correct: Climate change may affect the production of maize (corn) and wheat as early as 2030 under a high greenhouse gas emissions scenario, according to a new NASA study published in the journal, Nature Food. Maize crop yields are projected to decline 24%, while wheat could potentially see growth of about 17%. Using advanced climate and agricultural models, scientists found that the change in yields is due to projected increases in temperature, shifts in rainfall patterns, and elevated surface carbon dioxide concentrations from human-caused greenhouse gas emissions. These changes would make it more difficult to grow maize in the tropics but could expand wheat's growing range.
Option 2 is correct: Many studies have shown that labour productivity starts to decline above a temperature threshold of around 25°C. Therefore, the higher temperatures projected with climate change pose a risk of decreased human labour productivity.
Option 3 is correct: Warmer temperatures can cause the expansion of disease-carrying vectors like mosquitoes and ticks into new areas, leading to a rise in vectorborne illnesses such as dengue fever, malaria, and Lyme disease. This can have significant public health implications, especially in developing countries with weak health systems.
Option 4 is correct: Climate change can cause habitat loss, fragmentation, and degradation, leading to a decline in the number of species and loss of genetic diversity. This can have a significant impact on ecosystems and their ability to adapt to changing conditions. Additionally, as species are lost, genetic diversity may be reduced, further limiting the ability of ecosystems to cope with change.
Option 5 is incorrect: Earthquakes are not influenced by global warming, although plate tectonics, of which earthquakes are a manifestation, can impact climate over vast periods of geological time. Earthquakes are caused by tectonic processes – forces within the solid Earth that drive changes in the structure of Earth's crust, primarily the rupture of underground rock masses along faults (linear zones of weakness)

Q.66)
Solution (a)
Exp) Option a is the correct answer.
Sources of underwater noise include intense active midrange and low frequency sonar, ship traffic, use of explosives, underwater construction, offshore oil drilling, and seismic testing for oil and other related activities. Anthropogenic noise levels in the marine environment are increasing at an alarming rate. Ocean noise levels in some areas have doubled every decade for the past 60 years.
Statement 1 is incorrect: Acoustic Masking is not the phenomenon of permanent loss of hearing ability of organism, but it is the phenomenon where organisms' perception of one sound is affected by the presence of another sound. Many marine organisms depend on the interpretation of acoustic information of their surrounding environment for their survival. Noise pollution affects marine organisms' acoustic communication through auditory masking which ultimately affects their survival rate.
Statement 2 is correct: A new study has found that noise generated by human activity makes it harder for dolphins to communicate and coordinate with each other. As the levels of underwater noise increase, these mammals have to "shout" to each other. The latest study, 'Anthropogenic noise impairs cooperation in bottlenose dolphins', was published in the journal Current Biology.
Statement 3 is incorrect: The International Ocean Noise Coalition (IONC) is a partnership of over 150 nongovernmental organisations (NGOs) from around the world, hence, it is not an intergovernmental body. The IONC was created to address the need for a global approach to combat human-generated ocean noise.

Q.67)

Solution (a)

Exp) Option a is the correct answer.

Precautionary principles are landmark principles used by the policy makers around the world to save human life and to prevent human sufferings. The principle first found acceptance in Germany in the 1970s and 80s. In 1992, the UN Rio Declaration on Environment and Development incorporated the strategy in dealing with environment matters. The Rio Declaration defines the principle as: 'Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation'.

Statement 1 is incorrect: Precautionary Principle is not related to framing of domestic laws in congruence with the international treaties.

Statement 2 is incorrect: In India, the Precautionary Principle is not only used in the field of environmental laws but also in dealing with public health emergencies, food safety, approval of drugs/vaccines etc. For instance, the Indian Government decided to impose restrictions on movement of people in the wake of Covid 19 pandemic.

Statement 3 is correct: The precautionary principle is accepted in India as a fundamental tool to promote sustainable development. The Supreme Court of India has also recognized precautionary principle as an essential feature of sustainable development.

Q.68)

Solution (b)

Exp) Option b is the correct answer.

Carbon Capture, Utilisation, and Storage (CCUS) programme aims to reduce carbon emissions by either storing or reusing it so that captured carbon dioxide does not enter the atmosphere.

Statement 1 is correct: Enhanced oil recovery (EOR) is the extraction of crude oil from an oil field that cannot be extracted otherwise. EOR is a proven technology for increasing oil production and safely transporting and storing carbon dioxide permanently in underground reservoirs. In EOR, Carbon dioxide will be injected underground to extract oil and to store CO2 in the underground reservoirs.

Statement 2 is incorrect: Green hydrogen is produced by splitting water into hydrogen and oxygen via a process of electrolysis powered by renewable energy. While blue hydrogen is produced utilising carbon capture and utilization technique.

Statement 3 is correct: Carbon Dioxide captured using CCUS technique can be used directly in fire extinguishers, pharma, food and beverage industries as well as the agricultural sector. Further the captured CO2 can be converted into fuel (methane and methanol), refrigerants, building materials etc.

Q.69)

Solution (c)

Exp) Option c is the correct answer.

The Wildlife (Protection) Amendment Act 2022, amended the Wildlife Protection Act (WLPA), 1972 to incorporate more species protected under the law. The amendment act reduced the number of schedules from six to four. The schedule IV of the act contains species which are listed in the Appendices under CITES.

Option a is incorrect: The Wildlife protection amendment act removed Schedule V which contains vermin species. Vermin species can be hunted freely by people.

Option c is correct: Species included in schedule IV of the Wildlife Protection Amendment act, 2022 are species listed under CITES. The act mandates every person possessing a living specimen of an animal species listed in Schedule IV to report such details to the Government ie. to the Management Authority or the authorised officer for this purpose.

The Management Authority or the authorised officer can issue a registration certificate allowing the owner to retain specimens of such species, if he/she satisfied that such specimens had not been obtained in contravention of any law relating to protection of fauna and flora.
Option b and d are incorrect: Schedule IV is not related to invasive species and also schedule IV does not deal with animals being used for religious purposes. It must be noted here that the Wildlife Protection Amendment act, 2022 permits elephants (Schedule I animal) to be used for religious or any other purpose.

Q.70)
Solution (c)
Exp) Option c is the correct answer.
Biodynamic farming is a method which is similar to organic farming, but it involves some kind of natural forces which increase the vitality of the soil.
Statement 1 is correct: The Biodynamics Farming is being introduced to maintain the fertility of the soils and save them from being destroyed. In this method, the plants get to use the nutrients from the soil to the maximum and hence the fertility of the soil increases.
Statement 2 is correct: Methods unique to the biodynamic approach include its treatment of animals, crops, and soil as a single system, an emphasis from its beginnings on local production and distribution systems, its use of traditional and development of new local breeds and varieties.
Statement 3 is incorrect: It is not based on the utility of monocropping in agriculture. Rather diversification of crops is the main factor of biodynamic farming. The farmer will produce crops which are different from each other instead of going with monoculture. This is because growing of only one crop in a farm causes a decrease in the soil nutrients.
Statement 4 is correct: Biodynamics has much in common with other organic approaches – it emphasizes the use of manures and composts and excludes the use of synthetic (artificial) fertilizers, pesticides and herbicides on soil and plants. It uses various herbal and mineral additives for compost additives and field sprays.

Q.71)
Solution (a)
Exp) Option a is the correct answer.
Soil is a mixture of minerals, dead and living organisms (organic materials), air, and water.
Statement a is correct. The buffering capacity of a soil indicates the capacity of the soil to resist the change in its pH value. Hydrogen ions in soil are present both in the soil solution and adsorbed onto the soil surfaces. pH measures the concentration of hydrogen ions in the soil solution. Soils differ in the number of surface sites able to accommodate hydrogen ions. Soils with large number of sites able to hold hydrogen ions can resist change in the concentration of hydrogen ions in the soil solution and therefore have a high buffering capacity.
Statement b is incorrect. Soil Porosity is the ability of soil to maintain its porous structure. Soil can maintain its porous structure and regulate passage of air, gases, and water, withstand erosive forces, support heavy loads, and provide a medium for plant roots which is one of the major functions of soil.
Statement c is incorrect. The Soil Science Society defines soil health as the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality and support human health and habitation.
Statement d is incorrect. The ability of soil to absorb adequate amount of moisture and allow flow of water through it is called as permeability of soil.

Q.72)

Solution (d)

Exp) Option d is the correct answer.

Statement 1 is incorrect: The 33 elephant reserves in India put together cover a total area of nearly 80,000 sq km. Tamil Nadu and Assam have the highest number of elephant reserves with five each in both the states followed by four in Kerala, three in Odisha, two each in Uttar Pradesh, Arunachal Pradesh, Chhattisgarh, Karnataka, Nagaland and West Bengal, and one each in Andhra Pradesh, Jharkhand, Meghalaya and Uttarakhand.

Statement 2 is incorrect: Eastern Dooars Elephant Reserve is situated in the state of West Bengal and not the state of Assam.

Statement 3 is incorrect: Unlike the Protected Areas, elephant habitats are not secure and their land can easily be diverted. Elephant reserves or corridors are not covered under the WLPA or (as eco-sensitive zones) under the Environment Protection Act.

Q.73)

Solution (b)

Exp) Option b is the correct answer.

In May 2019, 187 countries decided to significantly restrict international trade in plastic scrap (recyclables) and waste to help address the improper disposal of plastic waste and reduce its leakage into the environment. As a result of these changes, transboundary shipments of most plastic scrap and waste are controlled, or regulated, for the first time under a treaty called the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, effective January 1, 2021. Moving forward, international shipments of most plastic scrap and waste are allowed only with the prior written consent of the importing country and any transit countries.

Q.74)

Solution (b)

Exp) Option b is the correct answer.

There are a total of 54 Tiger reserves in India. The Latest 54th Tiger reserve of India is the Ranipur Tiger Reserve in the Chitrakoot district of Uttar Pradesh.

Statement 1 and 2 are correct: Critical 'tiger' habitats (CTHs), also known as core areas of tiger reserves are identified under the Wildlife Protection Act (WLPA), 1972 based on scientific evidence that "such areas are required to be kept as inviolate for the purpose of tiger conservation.

Statement 3 is incorrect: The notification of Critical 'tiger' habitats (CTHs) is done by the state government in consultation with the expert committee constituted for the purpose. The consultation of Gram Sabha is not required for the notification of CTH. Unlike Critical 'tiger' habitats, the notification of Critical 'wildlife' habitats (CWLHs) can only be done with the consent of the Gram Sabhas and affected stakeholders.

Q.75)

Solution (a)

Exp) Option a is the correct answer.

Statement 1 is incorrect: At present, one-horned rhinos are restricted to small patches in the Indo-Nepal Terai, northern parts of West Bengal, and Assam. Formerly they were extensively distributed in the Brahmaputra and Gangetic valley. The Indian state of Assam is home to the largest population of greater-one horned rhinos, with more than 90% in Kaziranga National Park. The Government along with WWF has translocated rhinos from Kaziranga National Park and Pobitora Wildlife Sanctuary to Assam's Manas National Park.

Statement 2 is incorrect: Great Indian Bustard is found in states of Rajasthan and Gujarat prominently. Small populations occur in Maharashtra, Karnataka and Andhra Pradesh (and not only in Rajasthan).
Statement 3 is correct: The Sangai is an endemic species of deer found only in Manipur in India. It is also the state animal of Manipur. Its common English name is Manipur brow-antlered deer. It faces threat from steadily degenerating habitat of phumdi as a result of continuous inundation and flooding caused due to artificial reservoirs. Manipur Forest department and the Wildlife Institute of India are focusing on conservation of Sangai in Keibul Lamjao National Park.

Q.76)
Solution (b)
Exp) Option b is the correct answer.
The Montreal Protocol is one of the most successful and effective environmental treaties ever negotiated and implemented. It is ratified or accepted by all 197 UN member states, a world first for any treaty and highlighting the strong global commitment to this treaty. Phasing out ozone depleting substances has also benefited the environment more broadly, as many ozone-depleting substances also have high global warming potential. Many factors have led to its success along with the unprecedented level of cooperation being one.
Option a is incorrect: In the Montreal Protocol, under the Kigali amendment another group of substances, hydrofluorocarbon (HFC) was added to the list of controlled substances. Hydro Floro Carbon is a non-ozone depleting substance.
Option b is correct: The Multilateral Fund for the Implementation of the Montreal Protocol was established in 1991 under Article 10 of the treaty. The Fund's objective is to provide financial and technical assistance to developing country parties to the Montreal Protocol whose annual per capita consumption and production of ODS is less than 0.3 kg to comply with the control measures of the Protocol.
Option c is incorrect: An important reason for the protocol's successful implementation has been its compliance procedure. This was designed from the outset as a nonpunitive procedure. Due to prioritizing help developing countries to prepare an action plan, all 142 developing countries were able to meet the 100% phase-out mark for CFCs, halons and other ODS in 2010. So, option c is incorrect.
Option d is incorrect: It is important to note that ODC phase-out schedules differ between developed and developing countries. The period for developing countries to come into compliance is slightly longer, owing to the fact that they have fewer technical and financial resources to introduce substitutes.

Q.77)
Solution (a)
Exp) Option a is the correct answer.
- The Nilgiri Biosphere Reserve falls under the biogeographic region of the Malabar rain forest.
- The Mudumalai Wildlife Sanctuary, Wayanad Wildlife Sanctuary, Sathyamangalam wildlife sanctuaries, Bandipur National Park, Nagarhole National Park, Mukurthi National Park and Silent Valley National Park are the protected areas present within this reserve. So, option a is correct.
- It was the first biosphere reserve which was established in the year 1986. It falls within the state boundaries of Karnataka, Kerala, and Tamil Nadu, along the western ghats.
- It was declared as a world Heritage site by UNESCO in 2012.

Q.78)
Solution (c)
Exp) Option c is the correct answer.
The National Parks in India from North to South are as follows:

Option 4. Madhav National Park is situated in Shivpuri District of Gwalior division in northwest Madhya Pradesh and is a part of the upper Vindhyan hills. .
Option 1. Bhitarnika National Park is nestled in the estuarial Brahmani-Baitarani region of the north-eastern Kendrapara district of Odisha, .
Option 2. The name of Kanger Ghati National Park is derived from the Kangar river, which flows in its length. Kanger Valley is spread over 200 square kilometers. It is situated in Chattisgarh.
Optio 3. Bandipur national park in the Indian state of Karnataka. It was established as a tiger reserve under Project Tiger in 1973. It is part of the Nilgiri Biosphere Reserve. The park has the Kabini river in the north and the Moyar in the south. The Nugu river runs through the park.

Q.79)
Solution (c)
Exp) Option c is the correct answer.
Option a is incorrect: Sudd is Africa's largest freshwater wetland in an otherwise dry region of South Sudan.
Option b is incorrect: The Wetland of Kakadu National Park is a living cultural landscape with exceptional natural and cultural values. It is a protected area in the Northern territory of Australia.
Option c is correct: The Pantanal is the world's largest tropical freshwater wetland, and largest flooded grasslands fed by the tributaries of the Paraguay River. The Pantanal is also one of the world's most productive habitats and attracts a great influx of birds and other animals. It is in the upper Paraguay River basin, Brazil (80 percent), Bolivia and Paraguay. Parts of it fall under the Ramsar agreement and some areas are declared UNESCO World Heritage Sites and Biosphere Reserves. Around 95% of the Pantanal is under private ownership. Unsustainable infrastructure development, untreated waste pollution and cattle grazing threaten to destabilize the regional ecosystem.
Option d is incorrect: The Everglades is a natural tropical wetland in the southern portion of the USA. The system begins with the Kissimmee River, which discharges into Lake Okeechobee.

Q.80)
Solution: (d)
Exp) Option d is the correct answer.
Genome editing is a type of genetic engineering technology that enables precise modification of an organism's DNA, including its genes, by inserting, deleting or replacing specific DNA sequences.
Statement 1 is correct: The Environment (Protection) Act, 1986 is the overarching law for environmental protection in India. The regulatory framework for genome editing in India is provided by the Guidelines for Research in Transgenic Plants and Guidelines for Safety Assessment of Foods derived from Genetically Engineered Plants and Animals. It is issued by the Ministry of Environment, Forest and Climate Change (MoEFCC) from the powers granted under this Act.
Statement 2 is correct: The Genetic Engineering Appraisal Committee (GEAC) is a statutory body constituted under the 'Rules for the Manufacture, Use /Import / Export and Storage of Hazardous Microorganisms/ Genetically Engineering Organisms or Cells, 1989' notified under the Environment (Protection) Act, 1986. It is responsible for the appraisal of activities that involve the large-scale use of hazardous microbes and recombinants in research and industrial production from the point of view of the environment. The Committee has the power to take punitive action against people/body under the Environment (Protection) Act.
Statement 3 is correct: Indian laws prohibit human germline editing and reproductive cloning, as detailed in the National Guidelines for Stem Cell Research by the Indian Council of Medical Research.

Q.81)

Solution (d)

Exp) Option d is the correct answer.

Statement a is correct. The ocean plays a vital dominant role in the Earth's carbon cycle. The total amount of carbon in the ocean is about 50 times greater than the amount in the atmosphere and is exchanged with the atmosphere on a timescale of several hundred years.

Statement b is correct. Blue carbon refers to carbon dioxide removed from the atmosphere by the world's ocean ecosystems. It constitutes mostly algae, mangroves, salt marshes, seagrasses and macroalgae, formed through plant growth and the accumulation and burial of organic matter in the soil.

Statement c is correct. The total amount of carbon in the ocean is about 50 times greater than the amount in the atmosphere and is exchanged with the atmosphere on a timescale of several hundred years. Currently, 48% of the carbon emitted to the atmosphere by fossil fuel burning is sequestered into the ocean.

Statement d is incorrect. Most of Earth's carbon—about 65,500 billion metric tons—is stored in rocks. The rest is in the ocean, atmosphere, plants, soil, and fossil fuels.

Q.82)

Solution (b)

Exp) Option b is the correct answer.

Nitrogen makes up 79 percent of Earth's atmosphere and is an essential element for the growth of plants and animals. Nitrogen availability can limit growth of primary producers across most of the world's aquatic and terrestrial ecosystems.

Statement 1 is correct: Decline in the nitrogen in natural ecosystems will lead to less availability of nitrogen to trees and grassland. Plants that are deficient in nitrogen have stunted growth, depending on the severity of the deficiency. Leaf growth is inhibited; younger leaves are inhibited in particular. Longitudinal shoot growth is inhibited, as is the increase in thickness.

Statement 2 is incorrect: In an ecosystem of little nitrogen, plants cannot thrive, and it will lead to low crop yields. Plants that do not have enough nitrogen become yellowish and do not grow well and may have smaller flowers and fruits.

Statement 3 is correct: When nitrogen is less available, every living thing holds on to the element for longer, slowing the flow of nitrogen from one organism to another through the trophic interaction in the food chain. Reduced availability of Nitrogen will make leaves of plants less nutritious to insects, potentially reducing growth and reproduction of insects. It will also reduce growth of the birds and bats that feed on them. Reduction in forage quality may result in reduced herbivore body size and reproduction because herbivore growth rates and populations are often limited by protein availability.

Statement 4 is incorrect: Declining nitrogen availability is also likely constraining the ability of plants to remove carbon dioxide from the atmosphere. Currently, plant biomass stores nearly as much carbon as is contained in the atmosphere, and biomass carbon storage increases each year as carbon dioxide levels increase. However, declining nitrogen availability reduces the annual increase in plant carbon storage by imposing limitations to plant growth.

Q.83)

Solution (b)

Exp) Option b is the correct answer.

Statement 1 is incorrect. The reserve mainly lies in Garhwal Himalaya in the upper watershed of right bank tributaries of river Alaknanda, i.e., Rishi Ganga, Dhauli Ganga, Girthi Ganga, Ganesh Ganga, while rest of the part lies in Kumaon Himalaya; in the Pindar river and Gori Ganga catchment. Ramganga river flows through Corbett national park.

Statement 2 is correct. It has been included in both UNESCO's world heritage list in 1988. Nanda Devi Biosphere Reserve including Nanda Devi National Park and the Valley of Flowers National Park was declared as Biosphere Reserve under the UNESCO's Man and Biosphere (MAB) programme.
The NDBR has been included in the World Network of Biosphere Reserves.

Q.84)
Solution (c)
Exp) Option c is the correct answer.
In 2023, India launched the International Big Cat Alliance (IBCA), to commemorate 50 years of Project Tiger, for conservation of seven big cats. The International Big Cats Alliance is being launched which will focus on the protection and conservation of seven major big cats of the world, viz. Tiger, Lion, Leopard, Snow Leopard, Puma, Jaguar and Cheetah, with a membership of the range of countries harbouring these species. Hence, option 4 (Clouded Leopard) and option 7 (Eurasian lynx) are not included under seven big cats under IBCA.

Q.85)
Solution (a)
Exp) Option a is the correct answer.
Antipatharians, also known as black corals or thorn corals, are an order of soft deep-water corals.
Statement 1 is incorrect: Black corals are rarely black, but rather vary in color from white to red, green, yellow, or brown. They also range in shape from small bushes to bottle brushes to fans to single stalks. They get their name because of their black skeleton.
Statement 2 is correct: The black corals do not have symbiotic algae associated with them, and they do not require light which enables them to extend into depths where light is not present.
Statement 3 is incorrect: Black corals are found from shallow to deep ocean depths. Some species of antipatharians can be found living at depths of only a few meters and others as deep as 8600 m, but most occur at depths ranging from about 20 to 1000 m. Antipatharians are exclusively marine and are found in all oceans from the Arctic to the Antarctic.

Q.86)
Solution (a)
Exp) Option a is the correct answer
The passage highlights several challenges in India's healthcare system, including inadequate funding, limited access to healthcare services, and a shortage of healthcare professionals. These challenges have contributed to poor health outcomes for many Indians, with high rates of mortality and morbidity from infectious and non-communicable diseases. The passage also mentions significant disparities in health outcomes across different regions and socio-economic groups, which suggests that the healthcare system is not providing equitable access to healthcare services.

Q.87)
Solution (d)
Exp) Option d is the correct answer
Statement 1 is incorrect: The passage mentions that the emergence of the Jharkhand movement reflected a growing sense of frustration and marginalization among Adivasi communities who had long been excluded from the benefits of development and democracy. However, the passage does not suggest that there is resistance in Adivasi communities to join the mainstream. The passage instead highlights the movement's demand for greater control over the region's resources and development priorities.

Statement 2 is incorrect: While the movement has faced a range of challenges, including the co-option of its leadership by mainstream political parties, and the ongoing impact of neoliberal economic policies on the region's social and environmental fabric, the passage does not imply that these challenges are insurmountable.

Q.88)
Solution (c)
Exp) Option c is the correct answer
The study of the state of being in its whole is the subject matter of philosophy. The passage states that philosophy is an ontological inquiry into the meaning of being, and it seeks to uncover the fundamental structures that underlie our experience of the world. It is not concerned with objects or entities in isolation, but with the Being of beings as a whole. The passage further explains that engaging in philosophical inquiry involves questioning the meaning of Being itself and exploring the ways in which our existence is intertwined with the existence of the world around us.

Q.89)
Solution (b)
Exp) Option b is the correct answer
Statement 1 is incorrect: The passage suggests that in the post-historical period, art and philosophy will be replaced by economic calculation, technical problem-solving, environmental concerns, and consumer demands. This implies that art and philosophy may not be necessary for economic calculation.
Statement 2 is correct: The passage clearly outlines that people remembering history i.e. in the nostalgia of history may create conflict. It is clearly given in the lines, "I can feel in myself, and see in others around me, a powerful nostalgia for the time when history existed. Such nostalgia, in fact, will continue to fuel competition and conflict even in the post-historical world for some time to come."

Q.90)
Solution (b)
Exp) Option b is the correct answer
Let's assume the daughter's age is x.
Since the mother's age is twice the daughter's age, the mother's age is 2x.
The father is 1 year older than the mother, so his age is 2x +1
The son is 3 years older than the daughter, so his age is x +3
The sum of all their ages is 100 years
so we can write an equation:
⇨ x + 2x + (2x + 1) + (x + 3) = 100
⇨ 6x+4 = 100
⇨ 6x = 96
Solving this equation, we get x = 16.
So the son's age is x+3 = 19

Q.91)
Solution (d)
Exp) Option d is the correct answer
Statement-1: If z^2 - z is divisible by 4,
then z(z-1) is divisible by 4.
Since z and (z-1) are consecutive integers, one of them must be even (divisible by 2).
Therefore, their product must be divisible by 2*2 = 4

This statement implies that z is either even or odd.
If z is even, then (z+3) is odd and not divisible by 4.
If z is odd, then (z+3) is even, but we still cannot confirm if it is divisible by 4.
So, Statement-1 alone is not sufficient to answer the Question.
Statement-2: If the square of (z+3) is divisible by 4, then $(z+3)^2$ is divisible by 4.
This implies that (z+3) is even, as the square of an odd number is always odd, and the square of an even number is always even and divisible by 4.
However, we still cannot confirm if (z+3) is divisible by 4.
So, Statement-2 alone is not sufficient to answer the Question.
Combining both statements, we know that z(z-1) is divisible by 4 and $(z+3)^2$ is divisible by 4. However, we still cannot confirm if (z+3) is divisible by 4.
Thus, both Statement-1 and Statement-2 combined are not sufficient to answer the Question.

Q.92)
Solution (a)
Exp) Option a is the correct answer
We need to find a common multiple for a set of numbers, i.e., LCM of the numbers.
This is followed by division with the smallest four-digit number and addition of the remainder.
LCM of 6, 7, and 9 = 126
Smallest four-digit number = 1000
Smallest four-digit number that is exactly divisible by 126 = 1008 (126 × 8 = 1008)
Smallest four-digit number that would leave remainder 4 when divided by 126 = 1008 + 4 = 1012
The smallest four-digit number that would leave remainder 4 when divided by 6, 7, and 9 is 1012.

Q.93)
Solution (d)
Exp) Option d is the correct
A number is said to be divisible by 9, only and if its sum of digits is divisible by 9.
Calculation:
1+1+1+Y+0+5=8
Minimum 1 should be added to make this number divisible by 9.
= 1 + 1 + 1 + 1+ 0 + 5 = 9
(8 + 1 = 9)
Y = 1
The correct answer is 1.

Q.94)
Solution (d)
Exp) Option d is the correct answer.
25200= 7x 3x3x2x2x2x2x5x5 = 7x(3^2)x(2^4)x(5^2)
The value of n will depend on which number of 7s and number of 5s is lower in 50!
Number of 7s in 50! = 49(7x7), 42(7x6), 35(5x7), 28(4x7), 21(3x7), 14(2x7),7⇒ { picking only those terms which have 7 in it}
⇒ total eight 7s
Number of 5s in 50! = 50(5x5x2), 45(9x5), 40(5x8),35(5x7), 30(6x5), 25(5x5), 20(5x4), 15(5x3),10(5x2), 5(1x5) ⇒ picking only those terms which have 5 in it, ⇒ total twelve 5s
Number of 5^2 = 12/2 = 6
So, the number of (5^2) is more than the number of 7s.

Hence the maximum value of n for which 50! is perfectly divisible by 25200^n is 6.

Q.95)
Solution (d)
Exp) Option d is the correct answer
the price of petrol for the first car = x rupees per liter
the price of petrol for the second car = y rupees per liter
the total cost of petrol for the trip = ₹10550.
So as per the given info:
75x + 55y = 10550.
Second, we know that the price of petrol for the first car was ₹2 more per liter than the price of petrol for the second car.
This means that x = y + 2.
Now we can use these two equations to solve for x and y.
Substituting y + 2 for x in the first equation,
we get: 75(y + 2) + 55y = 10550.
Solving for y, we find that y = 80. Since x = y + 2, we find that x = 82

Q.96)
Solution (a)
Exp) Option a is correct answer.
Statement 1 is correct: The passage explicitly states that major cities in India have experienced loss of life and property, disruption of transport and power, and incidence of epidemics due to urban flooding. Additionally, the passage notes that urbanization and development of catchments can increase flood peaks and volumes, making urban areas more vulnerable to flooding. Therefore, it can be inferred that poor urban planning in Indian cities may contribute to their increased susceptibility to urban flooding.
Statement 2 is incorrect: While the passage does state that urban flooding can be particularly devastating due to factors such as faster flow times and the presence of vital infrastructure, it does not make a direct comparison between urban and rural flooding to conclude that one is always more destructive than the other.

Q.97)
Solution (a)
Exp) Option a is correct answer
Statement 1 is correct: The passage highlights that urban areas have vital infrastructure that needs to be protected 24x7, and damage to this infrastructure can have global implications. Therefore, it is important to manage urban floods to protect the infrastructure and maintain the economic activities in urban areas.
Statement 2 is incorrect: The passage highlights the need to accord top priority to managing urban flooding but does not comment on the current priority status of urban local governments in India. Therefore, this assumption cannot be deemed valid based on the given passage alone.
Source: https://ndma.gov.in/Natural-Hazards/Urban-Floods

Q.98)
Solution (d)
Exp) Option d is the correct answer
Original expression: 56 : (18 − 8 × 4) + 27 × 3 - 14 × 2
As per the given info:
The modified expression would be

56 × (18 + 8 : 4) - 72 : 3 + 14 : 7
We can solve this,
⇨ 56 × 20 - 72 : 3 + 14 : 7
⇨ 1120 - 24 + 2
⇨ 1096 + 2 = 1098

Q.99)
Solution (b)
Exp) Option b is the correct answer
Pipe A and B together can fill the tank in 3 hours.
So their combined work rate = 1/3 of the tank per hour (filling)
Pipe C can empty the tank in 6 hours.
So its work rate = 1/6 of the tank per hour (emptying).
Since Pipe C is emptying the tank,
we subtract its work rate from the combined work rate of Pipe A and B.
Net work rate = (1/3) - (1/6)
= (2/6) - (1/6)
= 1/6 of the tank per hour (filling)
If the network rate is 1/6 of the tank per hour
then the time it takes to fill the empty tank = 6 hours

Q.100)
Solution (d)
Exp) Option d is the correct answer.
Percentage increase in population from 2017-18
= ((22-21)/1223 * 100)% = 100/21% = 4.76%
Hence, option (a) is incorrect.
Percentage increase in income from 2018-19
= ((1345 - 1225)/1225 * 100)% = (120/1225 * 100)% = 9.79%
Hence, option (b) is incorrect.
The Per Capita income in each of the 4 years is shown below in the table:

Years	2017	2018	2019	2020
Per Capita Income	Rs. 5050	Rs. 5290	Rs. 5568	Rs. 5847

The Per Capita income has been obtained by dividing the income (in Crore) in a year by the population (in lakhs) for that year.
Per capita income was highest in 2020; hence option (c) is incorrect.
Per capita income remains above 5000 [5050, 5290, 5568 and 5847], hence, only option d is correct.