IAS BABA

60 DAY RAPID REVISION (RARE) SERIES Prelims 2025

UPSC/IAS Prelims 2025

RaRe Notes Compilations

Environment Part 1

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SYLLABUS

ENVIRONMENT

1. Basics of Environment and Ecology

- Meaning of Environment
- Jargons on Environment and Ecology
- Ecosystem and its Components, Functions, Types - Terrestrial and Aquatic, Ecotone and Ecological niche, Effects of Environmental Deterioration
- Difference between Ecology, Environment and Ecosystem

Ecosystem and its dynamics

- Ecosystem Definitions
- Functions and Properties of Ecosystem
- Ecological successions
- The Structure/Components of Ecosystem - Abiotic Components and Biotic Components
- Ecosystem Dynamics – Flow of Energy in Ecosystem, Trophic Levels, Food Chain, Types and Significance of Food Chain, Food Web
- Models for Energy Flow, Ecological Productivity and Ecological Pyramid
- Ecological adaptations
- Biotic interactions
- Biomagnifications
- Biological Control
- Organic Farming

Biogeochemical Cycles

- Parts of a Bio Geochemical Cycle
- Types of Biogeochemical Cycle
- Carbon Cycle
- Nitrogen Cycle
- Phosphorus Cycle
- Sulphur Cycle

2. Biomes: Forest, Grassland, Mountain, and Desert Ecosystems

- Biome
- Grasslands

- Tundra
- Deserts
- Thar desert
- Mountain biome

Aquatic Life Zones: Ocean, Rivers, Lakes, and Wetlands

- Aquatic ecosystems
- Basic facts about the ocean
- Importance of the ocean
- Zones of the ocean- Marine life
- Eutrophication
- Coral reefs
- Coral reefs in India
- Conserving coral reefs
- Mangroves and Wetlands –Definition and its importance
- Mangroves and Wetlands in India
- Freshwater in India, Importance of lakes and National Lake Conservation Plan
- Ramsar Convention, Ramsar Sites, Montreux Record
- Extent and distribution of wetlands in India
- Conserving the wetlands of India

Biodiversity and Conservation – India and World

- Meaning and Benefits of Biodiversity
- Levels and Measurement of Biodiversity, Biodiversity in India and threats to it, Biodiversity Hotspots, Causes of biodiversity loss
- Modes of Conservation, Conservation efforts
- National and International- Biodiversity, Wildlife, Flora and Fauna, Conservation measures
- Eco Tourism, Protected Area Network (National Park, Wildlife Sanctuaries and biosphere reserves), National and Global Initiatives
- Forest and Wild Life Resources, Ecologically Sensitive areas: Western Ghats, Himalayas etc., Environmental Impact Assessment.

3. Climate change, impact, institution and measures

- Global warming
- Climate forcings
- Receding glaciers and impacts
- Institutions and measures

Environmental Pollution and issues, Degradation of Land and Water Resource Degradation

- Air, Water, Soil, Noise, Radioactive, E waste, Solid Waste
- Pollution and related issues - Acid rain, Photochemical smog, Green House Gases (GHGs), Ozone hole, Algal bloom
- Environmental issues due to urbanisation – e-waste Management and Handling, Disposal of untreated sewage, Real estate boom and environment degradation, Haphazard construction in hilly areas and impact, Polythene bags and pollution, Impact of tower radiation etc
- Water Pollution and National River Conservation Plan
- Environmental Issues and health effects
- Agriculture and environment – GM food and its impact, Contamination of land and water

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4. **Environmental Laws, Regulatory Bodies, Organisations, Acts and Policies - National and International**
   - National conservation efforts and programmes: Example – Environment Protection Act, Forest Right Act, National Biodiversity Authority
   - International conservation programmes, Worldwide initiatives, Mitigation Strategies Conventions and Protocols
   - Important Protocols and Summits, Intergovernmental Organizations, Treaties and Conventions related to climate change, biodiversity, Ramsar Convention, Montreux Record, the Rio Conventions etc, Organisations like UNEP, FAO, UNESCO etc.
   - Bonn Convention, Washington and the Ramsar Convention
   - The Convention on Biological Diversity (CBD) - Cartagena Protocol, Nagoya Protocol, Aichi Biodiversity Targets
   - The International Convention for the Regulation of Whaling
   - The Montreal Protocol and the Vienna Convention
   - United Nations Conference on Sustainable Development (UNCSD)
   - United Nations Framework Convention on Climate Change, related Conference of Parties and National Action Plan on Climate Change (NAPCC)
   - Paris Climate Agreement and other Climate related agreements

5. **Disaster Management**

   - Hazard, Disaster and Emergency
   - Types of Hazards – Atmospheric, Geological, Hydrological, and Biological (eg.

Ebola), Technological (eg: Bhopal Gas Tragedy)

- Vulnerability – Institutional factors, Economic factors, Socio-cultural factors
- Total Disaster Risk Management, Stages of Disaster Management, Disaster

Assessment: Sustainable Development and related issues like Agriculture etc

- Sustainable Development, Renewable energy, Bioremediation etc
- Concept of Modern Agriculture, Sustainable Agriculture
- Climate change and its impacts

Q.1) Consider the following population interactions:

1. Mutualism
2. Amensalism
3. Commensalism
4. Parasitism

In how many of the above interactions, at least one species benefits?

a) Only one
b) Only two
c) Only three
d) All four

Q.1) Solution: (c)

Statement Analysis:

- Both species benefit from mutualism in their interactions with each other. For instance, plants need the help of animals for pollinating their flowers and dispersing their seeds. In return for the service provided by animals, plants offer rewards or fees in the form of pollen and nectar for pollinators and juicy and nutritious fruits for seed dispersers. **Hence, Statement 1 is correct.**
- In **Amensalism** on the other hand one species is harmed whereas the other is unaffected. **Hence, statement 2 is incorrect.**
- The interaction where one species is benefitted and the other is neither benefited or harmed is called **commensalism**. For instance, an orchid growing as an epiphyte on a mango branch, and barnacles growing on the back of a whale benefit while neither the mango tree nor the whale derives any apparent benefit. **Hence, statement 3 is correct**.
- **Parasitism** is a kind of relationship between two species, where the parasite gains benefits that come at the expense of the host member. In parasitism, only one species benefits, that is, parasites and the interaction is detrimental to the other species, that is, the host. **Hence, statement 4 is correct.**

Q.2) Consider the following statements:

1. Plants comprise more than 60% of the recorded species.
2. The number of fungi species in the world is more than the combined total of species of fish, plants, mammals, reptiles and amphibians.
3. Species diversity in Western Ghats is less than that of Eastern ghats.

Which of the statements given above are *incorrect*?

a) 1 and 2 only
b) 2 and 3 only
c) 1 and 3 only
d) 1, 2 and 3

Q.2) Solution: (c)

Statement Analysis:

Statement 1 is incorrect: More than **70 per cent** of all the species recorded on the earth are **animals**, while plants (including algae, fungi, bryophytes, gymnosperms and angiosperms) comprise not more than **22 per cent** of the total. **Among animals, insects are the most species-rich taxonomic group, making up more than 70 per cent of the total.**
Statement 2 is correct: The number of fungi species in the world is more than the combined total of the species of fishes, amphibians, reptiles and mammals.
Statement 3 is incorrect: The diversity at the species level of the Western Ghats is more than the Eastern Ghats.

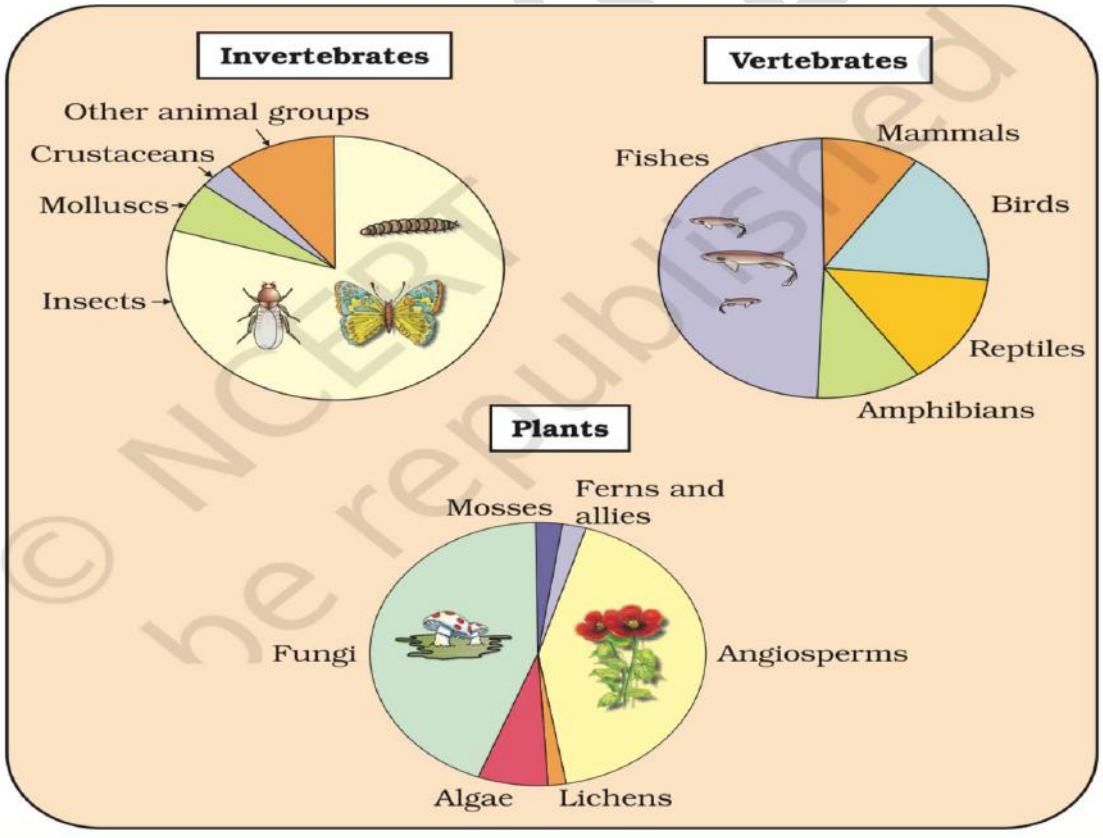


Figure 13.1 Representing global biodiversity: proportionate number of species of major taxa of plants, invertebrates and vertebrates

Q.3) The term 'The Evil Quartet' corresponds to which of the following?

a) Loss of biodiversity
b) Species richness
c) Groundwater pollution
d) Ecosystem diversity

Q.3) Solution: (a)

Statement Analysis:

Loss of biodiversity refers to the disappearance or decline of the biological diversity on the planet. It is accelerated by a variety of factors. However, the accelerated rates of species extinctions that the world is facing nowadays are largely due to human activities. Four major causes have been identified for the same, which are referred to as The Evil Quartet. It includes - Habitat loss and fragmentation, over-exploitation, invasive alien species and co-extinctions. **Hence, option (a) is correct**.
Invasive alien species are usually animals, plants or organisms which are introduced to a place outside of their native range.
Species richness is the number of species within a defined region.
Ecosystem diversity is the study of different ecosystems like deserts, lakes, ponds, temperate, tropical etc in a certain location and its effects on environment and humans.

Q.4) Consider the following statements:

1. Net primary productivity is the rate of production of organic matter through photosynthesis.
2. Net primary productivity plus respiration losses forms gross primary productivity.

Which of the statements given above is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.4) Solution: (b)

Statement Analysis:

- **Statement 1 is incorrect**: **Primary production** is defined as the amount of biomass or organic matter produced per unit area over a time period by plants during photosynthesis.
- The rate of biomass production is called productivity.

- Gross primary productivity of an ecosystem is the rate of production of organic matter during photosynthesis.
- **Statement 2 is correct:** A considerable amount of Gross primary productivity (GPP) is utilised by plants in respiration. Gross primary productivity minus respiration losses (R), is the net primary productivity (NPP).
- GPP – R = NPP GPP = NPP + R
- Net primary productivity is the available biomass for the consumption of heterotrophs.

Q.5) Which of the following are the sites for the Ex-situ method of conservation of biodiversity?

1. Biosphere Reserve
2. Botanical Garden
3. National Park
4. Zoological Park

Select the correct answer using the codes given below:

a) 1 and 3 only
b) 2 only
c) 2 and 4 only
d) 1, 2, 3 and 4

Q.5) Solution: (c)

Statement Analysis:

- **Statement 2 and 4 are correct: Ex situ Conservation**– In this approach, threatened animals and plants are taken out from their natural habitat and placed in special settings where they can be protected and given special care. **Zoological parks, botanical gardens and wildlife safari parks serve this purpose.** There are many animals that have become extinct in the wild but continue to be maintained in zoological parks.

Q.6) Consider the following statements:

1. The Tundra region is found in the higher latitudes near the polar regions only.
2. Cotton grass and lichens are the vegetation found in the arctic Tundra region.
3. Mammals in the tundra region have small tails and small ears.

How many of the statements given above are correct?

a) Only one
b) Only two
c) All three
d) None

Q.6) Solution: (b)

Statement Analysis:

- Tundra ecosystem is the ecosystem that is devoid of trees and covered with snow for most of the year. They are found in cold climates and in regions with limited or scarce rainfall.
- **Statement 1 is incorrect:** There are two types of tundra: arctic and alpine. Arctic tundra occurs below the polar ice cap. It occupies the northern fringe of Canada, Alaska, European Russia, Siberia and the island group of the Arctic Ocean. Alpine tundra occurs at high mountains at all latitudes.
- **Statement 2 is correct:** Typical vegetation of arctic tundra is cotton grass, sedges, dwarf heath, willows, birches and lichens. Animals of tundra are reindeer, musk ox, arctic hare, caribou, lemmings and squirrels.
- **Statement 3 is correct:** Organisms in Tundra have evolved to withstand extreme environments. Mammals of the tundra region have large body size, small tail and small ear to avoid the loss of heat from the surface.

Q.7) With reference to the various examples of food chain, consider the following statements:

1. At the lowest trophic level, the grazing Food Chain starts with plants whereas the Detritus Food Chain starts with dead organic matter.
2. Instead of Grazing Food Chain, the Detritus food chain acts as a major conduit of energy flow in an aquatic ecosystem.

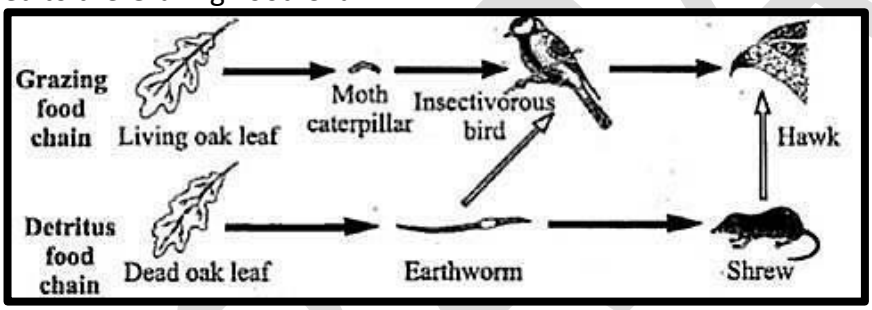
Which of the statements given above is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.7) Solution: (a)

Statement Analysis:

- A food chain represents the **sequential transfer** of **matter and energy** in the form of **food** from **one organism to another.** It consistently **begins with producers and concludes with the apex** predator. Two primary types of food chains exist: The **Grazing Food Chain and the Detritus Food Chain.**
- **Statement 1 is correct-** The **Grazing Food Chain** starts with **living producers (plants).** However, the Detritus food chain begins with the decomposition of dead organic matter by microorganisms, including bacteria and fungi.
- **Statement 2 is incorrect-** In **aquatic ecosystems**, the **Grazing Food Chain serves as the primary pathway for energy flow**. In contrast, in **terrestrial ecosystems**, a significantly greater proportion of energy flows through the **detritus food chain** compared to the Grazing Food Chain.



Q.8) Consider the following statements:

1. The pioneer species are those species which initiate the development of an ecological community in an area with currently no life form‟s existence.
2. Pioneer species can tolerate harsh environmental conditions.
3. In pioneer communities, the plants and animals are in balance with each other and their environment.

How many of the statements given above are *incorrect*?

a) Only one
b) Only two
c) All three
d) None

Q.8) Solution: (a)

Statement Analysis:

- Succession is when one community of plants and animals replaces another in an ecosystem. During succession some species colonise an area and their population

become more numerous whereas populations of other species decline and even disappear. The entire sequence of communities that successively change in a given area are called sere(s).

- **Statement 1 is correct.** The **pioneer species** are those species which initiate the development of an ecological community in an area with **currently no life form's existence**. In primary succession on rocks these are usually lichens which are able to secrete acids to dissolve rock, helping in weathering and soil formation.
- **Statement 2 is correct. Pioneer species** can **tolerate** and trade through most of the prevailing **harsh environmental** conditions.
- **Statement 3 is *incorrect*.** In a **climax community (not in pioneer community)**, the plants and animals are in **balance with each other** and their environment. A climax community refers to a stable ecosystem in its final stage of ecological succession. The climax community remains stable as long as the environment remains unchanged

Q.9) Consider the following statements:

1. Eurythermal organisms cannot tolerate any change in the temperatures.
2. Hydrophytes are the plants that are able to survive in anaerobic environments.
3. Epiphytes are the plants that use the supporting plants for shelter and not for water or food.

How many of the statements given above are correct?

a) Only One
b) Only two
c) All three
d) None

Q.9) Solution: (b)

Statement Analysis:

- Adaptation is any attribute of the organism (morphological, physiological, and behavioural) that enables the organism to survive and reproduce in its habitat. Many adaptations have evolved over a long evolutionary time and are genetically fixed.
- **Statement 1 is incorrect: Eurythermal organisms** can **tolerate and thrive in a wide range of temperatures. Stenothermal organisms are restricted to a narrow range of temperatures**.
- **Statement 2 is correct: Hydrophytes are plants that are adapted to live in water or moist environments.**
- **Adaptations include:**
    a. In submerged forms, the stem is long, thin, porous, and bendable.
    b. Either the cuticle is completely absent or, if present, it is narrow and poorly formed.
    c. Hydrophytes are able to survive in anaerobic environments.

d. They have specialized aerating organs.

- **Statement 3 is correct: Epiphytes** are plants that grow by perching on other plants. They solely **use the supporting plants for shelter and not for water or food.** These epiphytes can be found in tropical rainforests. Orchids and Hanging Mosses are examples. **Adaptations** include:
    a. Aerial roots (for respiration) and clinging roots (which hold the epiphytes firmly to the surfaces of the supporting structures).
    b. In some, the stems are succulent (they store water) and produce pseudo-bulbs or tubers.
    c. The occurrence of a thick cuticle and depressed stomata slows transpiration significantly.

Q.10) Which of the following statements best describes the term Standing Crop in the context of Ecology?

a) It is the biomass of all primary producers in a unit area at a specific moment in time.
b) It is the total biomass of crops sown in a hectare at a specific moment in time.
c) It is the biomass of all trees in a forest ecosystem at a specific moment in time.
d) It is the biomass of all living organisms in a unit area at a specific moment in time.

Q.10) Solution: (d)

Statement Analysis:

- The standing crop of an ecosystem includes all living organisms, regardless of their position in the food chain. Standing crops can be measured for different levels of organization within an ecosystem, from individual organisms to populations, communities, and entire ecosystems.
- In ecology, standing crop refers to the total amount of living biomass present in a given area at a specific moment in time. This includes all organisms, from producers like plants and algae to consumers like animals and bacteria. Standing crop is an important metric for understanding the productivity and functioning of an ecosystem. It can be used to assess the carrying capacity of an environment, track changes over time, and compare different ecosystems. The biomass of a species is expressed in terms of fresh or dry weight.

Q.11) Consider the following statements regarding the shola forests:

1. These are categorized as montane wet temperate forests.
2. These forests can be found in the Nilgiris ranges of Tamil Nadu and Kerala.

Which of the statements given above is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.11) Solution: (c)

Statement Analysis:

- **Statement 1 is correct:** The shola forests are characterized as **'Southern Montane Wet Temperate Forest'** by various experts like Harry George Champion and SK Seth. These forests are found in valleys with sufficient moisture and proper drainage, **generally at an altitude of more than 1500 meters.** The top regions of these forests are **covered with grasslands**, known as Shola grasslands.
- **Statement 2 is correct:** Shola forests are distributed across various parts of the Western Ghats. **Shola forests are found in the Nilgiris,** located in the states of Tamil Nadu and Kerala. These forests are also found in the **Anamalais, Palni hills, Kalakadu, Mundanthurai and Kanyakumari in the states of Tamil Nadu and Kerala.**

Q.12) In the context of Banni Grasslands, consider the following statements:

1. It is found in Kachchh district in the state of Gujarat.
2. It represents the combination of wetland and grassland ecosystem at the same place.
3. Bhutia tribe dominate the Banni grassland area.
4. It has been approved to host a Cheetah conservation breeding center.

How many of the statements given above are correct?

a) Only two
b) Only three
c) All four
d) None

Q.12) Solution: (b)

Statement Analysis:

- **Statement 1 is correct:** Banni grasslands lie in the Kutch district of Gujarat, India. It forms a transitional zone between the Thar Desert to the north and the Arabian Sea to the south, creating a mosaic of arid and semi-arid ecosystems. The Banni grassland in Gujarat‟s Kachchh district is one of the largest grasslands in the Indian subcontinent with an area of over 2500 sq.km

- **Statement 2 is correct**: Banni grasslands cover 2,497 square kilometers and account for over 45% of Gujarat's pastures. Bannis is classified as a Dichanthium-Cenchrus-Lasiurus grass cover because it **combines two ecosystems: wetlands and grasslands**. These grasslands support a diverse range of flora and wildlife, including plants, birds, animals, reptiles, and amphibians. A huge freshwater lake locally known as Chhari-Dhand (Dhand means a shallow lake) is a prominent feature of the Banni grassland.
- **Statement 3 is incorrect**: Maldharis tribe breed cattle, camels and smaller ruminants like goats and sheep. They are concentrated mainly in the eastern Kutch as well as in western Kutch which includes **Banni, Asia's largest grassland**. Maldharis dominates the banni grassland.
- **Statement 4 is correct:** The Central government has approved a proposal to set up a cheetah conservation breeding center in Kutch district. Banni grassland used to be the habitat of cheetahs, which became extinct over time.

Q.13) With reference to the Phosphorous cycle, consider the following statements:

1. It is a sedimentary biogeochemical cycle.
2. Unlike the Carbon cycle, there is no respiratory release of Phosphorus into the atmosphere.
3. Phosphorus is added to the environment by weathering rocks.

How many of the above statements are correct?

a) Only one
b) Only two
c) All three
d) None

Q.13) Solution: (c)

Statement Analysis:

- A **bio-geo-chemical cycle** denotes the route through which a **chemical substance** travels across the **biotic and abiotic components of the Earth**. It is divided into three parts: **Nutrient Cycle, Gaseous Cycle, and Sedimentary Cycle**. The **Phosphorus cycle and Sulphur cycle** fall under the classification of **sedimentary cycles**.
- **Statement 1 is correct-** The phosphorus cycle is a **sedimentary biogeochemical process** that illustrates the **transfer of phosphorus** across the **lithosphere, hydrosphere, and biosphere**. The cycle encompasses the flow of phosphorus through **rocks, water, soil, sediments, and organisms.**
- **Statement 2 is correct-** Phosphorus primarily circulates in its **solid forms (phosphates)** and **doesn't readily enter the atmosphere through respiration like carbon dioxide does.**
- **Statement 3 is correct: Phosphorus is naturally stored in rock as phosphates.** Weathering rocks release small amounts of phosphates into the soil, which plants

take through roots. **Herbivores and other animals** acquire **phosphorus** from plants. **Phosphate-solubilizing bacteria decompose waste products** and **deceased organisms,** releasing **phosphorus** into the environment.

Q.14) With reference to Ecological diversity, consider the following statements:

1. It includes the variation in both terrestrial and aquatic ecosystems.
2. It is the largest scale of biodiversity.
3. It excludes human-altered ecosystems such as agricultural landscapes.

How many of the statements above is/are correct?

a) 1 only
b) 1 and 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.14) Solution (b)

Explanation:

- Ecological diversity refers to the variety of ecosystems in a given region, including both terrestrial (land) and aquatic (water) ecosystems. It encompasses the different habitats, ecological processes, and species interactions within these environments. **(Statement 1 is correct)**
- Ecological diversity operates on a broader scale compared to genetic and species diversity. It encompasses different ecosystems and their complex interactions across landscapes and regions, making it the largest scale of biodiversity. **(Statement 2 is correct)**
- Ecological diversity does not exclude human-altered ecosystems. In fact, it includes the variation in all ecosystems, including those modified by human activities, such as agricultural and urban landscapes. These systems are considered part of ecological diversity as they host distinct ecological processes and species interactions. **(Statement 3 is incorrect)**

Q.15) Consider the following statements:

1. Stenothermal organisms are capable of living only at a certain temperature.
2. The temperature to which stenothermal organisms are adapted are similar for all the species.

Which of the statements given above is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.15) Solution (a)

Explanation:

- Stenothermal organisms are the types of animals which are capable of living only at a certain temperature or within a very narrow range of temperatures. Unlike eurythermal organisms, which can tolerate a broad range of temperatures, stenothermal organisms have limited thermal tolerance. This means they are highly sensitive to changes in temperature, making them vulnerable to temperature fluctuations in their environment. **(Statement 1 is correct)**
- The temperature range that stenothermal organisms are adapted to varies significantly across different species. For example, some stenothermal organisms thrive in cold environments (like polar regions), while others are adapted to warmer tropical conditions. Therefore, the temperature tolerance is species-specific and not uniform across all stenothermal organisms. **(Statement 2 is incorrect)**

Q.16) Consider the following statements:

Statement-I: A flagship species acts as an ambassador, icon or symbol for a defined habitat.
Statement-II: Conservation of flagship species benefits the vulnerable species of that habitat.

Which one of the following is correct in respect of the above statements?

a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
b) Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I
c) Statement-1 is correct Statement-II is incorrect
d) Statement-1 is incorrect but Statement-II is correct

Q.16) Solution (a)

Explanation:

- A flagship species is often chosen to represent an environmental cause, campaign, or habitat. These species are charismatic and have strong public appeal, making them

ideal ambassadors for conservation efforts. They symbolize the ecological health of their habitat and play a crucial role in raising awareness for conservation initiatives. **(Statement 1 is correct)**

- he protection of flagship species often results in broader conservation efforts that benefit the entire ecosystem. By preserving the habitat of a flagship species, other species, including those that are vulnerable or less well-known, also receive protection. This creates a cascading effect of conservation for multiple species sharing the same habitat. **(Statement 2 is correct)**

Since the protection of a flagship species often leads to broader conservation efforts benefiting the entire ecosystem, Statement-II is the correct explanation for Statement-I

Q.17) Ecosystem services provided by wetlands include the following:

1. Water purification
2. Flood control
3. Carbon sequestration
4. Generation of tidal energy

Select the correct answer using the code given below:

a) 1 and 2 only
b) 2 and 3 only
c) 1, 2 and 3 only
d) 2, 3 and 4 only

Q.17) Solution (c)

Explanation:

- Wetlands play a critical role in water purification by filtering pollutants, sediments, and nutrients from the water before it reaches rivers, lakes, or oceans. Wetland plants and microorganisms break down contaminants, improving water quality. The Ramsar Convention on Wetlands recognizes wetlands' role in water purification and maintaining water quality. **(Statement 1 is correct)**
- Wetlands act as natural buffers against flooding by absorbing excess water during heavy rainfall or storm surges. Their ability to store and slowly release water helps reduce the severity of floods and protects surrounding areas. **(Statement 2 is correct)**
- Wetlands are significant carbon sinks, particularly peatlands, which store large amounts of carbon in the form of organic matter. By sequestering carbon, wetlands help mitigate climate change by reducing the amount of carbon dioxide in the atmosphere. **(Statement 3 is correct)**
- Wetlands are not typically associated with tidal energy generation. While tidal energy is a renewable resource harnessed from ocean tides, it requires specific coastal infrastructures like tidal turbines. Wetlands, though vital for other ecosystem services, do not directly contribute to energy generation. **(Statement 4 is incorrect)**

Q.18) Identify the *incorrect* statement from the statements given below:

a) Stoneflies can assess the amount of oxygen in rivers.
b) Butterflies can accurately determine the health of plants in certain environment.
c) Changes in salmon populations can be used to indicate the presence of disease.
d) Presence of Grizzly Bears can help assess both health and diversity of species in tropical regions.

Q.18) Solution (d)

Explanation:

- Stoneflies are sensitive to changes in water quality, particularly oxygen levels. They are bioindicators of clean, well-oxygenated water, as they require high dissolved oxygen concentrations to survive. Their presence or absence can indicate the ecological health of river systems. **(Option a is correct)**
- Butterflies are excellent bioindicators of habitat health and the quality of plant life. They are sensitive to environmental changes and plant health, which affects their population and reproduction. Their presence often indicates a well-functioning ecosystem with healthy vegetation. **(Option b is correct)**
- Salmon populations are often used as indicators of ecosystem health. Changes in their populations can reflect the presence of diseases, water pollution, and other environmental stressors that affect aquatic ecosystems. **(Option c is correct)**
- Grizzly Bears (Ursus arctos horribilis) are not native to tropical regions. Grizzly bears are typically found in temperate regions of North America, particularly in the western United States, Canada, and Alaska. They inhabit forests, mountain ranges, and meadows but are absent from tropical ecosystems such as rainforests or tropical savannas. Grizzly bears play a significant role as keystone species in temperate ecosystems, but their presence does not serve as an indicator of biodiversity or ecosystem health in tropical regions. **(Option d is incorrect)**

Q.19) Consider the following statements:

1. They have high population density.
2. They can be any organism, from animals and plants to bacteria and fungi.
3. Role is same across different ecosystems.

Which of the statement/s above correctly describe a Keystone species?

a) 1 and 2 only
b) 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.19) Solution (b)

Explanation:

- Keystone species do not necessarily have a high population density. In fact, many keystone species have relatively low population numbers but exert a disproportionate influence on their ecosystem. The impact of keystone species comes from the critical role they play in maintaining the structure and function of an ecosystem, not from their abundance. E.g.: Gray wolf in Yellowstone National Park **(Statement 1 is incorrect)**
- Keystone species can be found across all types of organisms, from animals and plants to microorganisms like bacteria and fungi. Their critical ecological roles can range from top predators that regulate prey populations to plants that provide essential resources for other species. E.g.: Sea otters, Beavers and certain Mangrove plants. **(Statement 2 is correct)**
- The role of a keystone species is not the same across different ecosystems. A species' role is specific to the ecosystem it inhabits. In one ecosystem, a species may function as a predator, while in another, it may be an ecosystem engineer or primary producer. Keystone species' roles vary based on the structure and needs of the ecosystem they support. **(Statement 3 is incorrect)**

Q.20) Consider the following:

1. Allopatric
2. Peripatric
3. Sympatric

Which of the above is/are geographic modes of speciation in nature?

a) 1 only
b) 1 and 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.20) Solution (d)

Explanation:

- Allopatric speciation occurs when populations of the same species are geographically isolated, leading to the evolution of distinct species. The physical separation of populations prevents gene flow, causing genetic differences to accumulate over time, eventually resulting in speciation. The formation of new species on islands or in geographically separated regions. Darwin's finches on the Galapagos Islands are a classic example of allopatric speciation. **(Statement 1 is correct)**

- Peripatric speciation is a subtype of allopatric speciation where a small, isolated population at the edge of a larger population undergoes speciation due to geographic isolation. It is characterized by the smaller population size, which accelerates genetic drift and the accumulation of unique traits. Speciation in isolated island populations or small groups at the edges of the species' main range. **(Statement 2 is correct)**
- While sympatric speciation does not require geographic separation, it is still classified as a geographic mode of speciation because it occurs within the same geographic area. It happens when new species evolve from a single ancestral species while inhabiting the same geographic region. This speciation process often involves changes in behavior, niche differentiation, or genetic mutations that reduce gene flow between subpopulations. **(Statement 3 is correct)**

Q.21) Which one of the following is the best description of the term 'Estuary'?

a) A region where a river meets the sea, with a mix of freshwater and saltwater, supporting diverse species
b) A coastal region where the sea intrudes deeply into the land, forming a large bay
c) A freshwater body that is surrounded by land on all sides and supports aquatic life
d) A part of the ocean that remains unaffected by river water and supports marine life exclusively

Q.21) Solution (a)

Explanation:

- An estuary is a body of water formed where a river flows into the sea or ocean, mixing freshwater with saltwater. This unique environment creates a brackish water ecosystem, which supports a wide variety of species, including fish, birds, and plants. Estuaries act as nurseries for many marine species and are rich in biodiversity. **(Option (a) is correct)**
- While estuaries involve the meeting of fresh and saltwater, a bay is typically a large body of saltwater encroaching into the land but lacks the specific freshwater influence that defines an estuary.
- Estuaries are characterized by the mixing of freshwater and saltwater, while lakes are purely freshwater systems surrounded by land.
- Marine ecosystem, such as coral reefs or the open ocean, has no significant freshwater input.

Q.22) Consider the following regions:

1. Tundra
2. Taiga
3. Amazon

Which of the above regions are usually associated with the phenomenon of Winterkill?

a) 1 only
b) 1 and 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.22) Solution (b)

Explanation:

- Winterkill refers to the phenomenon where cold temperatures, ice, or snow cover can kill plants, fish, and other organisms. It occurs when long winters with freezing temperatures or ice cover lead to depletion of oxygen in water bodies or cause direct freezing damage to organisms.
- The Tundra is characterized by extreme cold and long winters, making it highly prone to the Winterkill phenomenon. Due to the harsh conditions, plants and animals in the tundra may face death due to freezing temperatures, snow cover, and ice formation. The lack of sunlight and extreme cold can lead to depletion of oxygen, especially in aquatic ecosystems, causing fish and other organisms to die during winter.
- The Taiga, also known as the boreal forest, experiences long, cold winters and is another region where Winterkill can occur. The cold temperatures, snow, and ice during winter can cause damage to aquatic life and plants. Frozen water bodies and limited oxygen during winter can result in fish and other aquatic organisms dying off in Taiga lakes and rivers. **(Option (b) is correct)**
- The Amazon is a tropical rainforest with a warm and humid climate throughout the year. It does not experience the cold temperatures required for winterkill to occur. Therefore, this region is not associated with the phenomenon of winterkill.

Q.23) The terms 'limnetic and littoral zones' are generally associated with which of the following?

a) Marine ecosystems
b) Ecology of lake
c) Desert ecosystems
d) Mountain ecosystems

Q.23) Solution (b)

Explanation:

- Marine ecosystems, which include oceans, seas, and coastal areas, have different zonal classifications such as intertidal zone, neritic zone, and benthic zone, but limnetic and littoral zones are specific to freshwater ecosystems like lakes.
- Limnetic and littoral zones are terms used to describe different parts of a lake's ecosystem. The littoral zone is the shallow, nearshore area where sunlight can penetrate, allowing for plant growth and providing habitat for various organisms. The limnetic zone is the open water area of a lake where light can still reach, supporting phytoplankton and other free-floating organisms. **(Option (b) is correct)**
- Desert ecosystems are characterized by arid conditions and have zones such as the xeric environment but do not include limnetic or littoral zones, as these are specific to aquatic ecosystems like lakes.

- Mountain ecosystems have different ecological zones, such as alpine and subalpine zones, depending on altitude. They don't have limnetic or littoral zones, which are specific to aquatic environments, particularly lakes.

Q.24) These have low primary productivity, and low biomass associated with low concentrations of nitrogen and phosphorous. They tend to be saturated with oxygen. They are commonly found in cold regions.

Based on the description given above, identify the type of lake from below:

a) Eutrophic Lake
b) Mesotrophic Lake
c) Oligotrophic Lake
d) Hypereutrophic Lake

Q.24) Solution (c)

Explanation:

- Eutrophic lakes are characterized by high primary productivity and high nutrient concentrations, especially nitrogen and phosphorus. These lakes often suffer from algal blooms due to excessive nutrients and may have low oxygen levels in their deeper layers due to the decomposition of organic matter. Eutrophic lakes are usually found in warmer regions with high nutrient runoff from agriculture or urban areas.
- Mesotrophic lakes are intermediate in terms of nutrient levels and productivity. They have moderate concentrations of nitrogen and phosphorus, which support a balanced amount of aquatic plants and animals. Mesotrophic lakes have moderate oxygen levels and are neither too rich nor too poor in nutrients. They do not exhibit the characteristics of low primary productivity and low nutrient concentrations typical of oligotrophic lakes.
- Oligotrophic lakes are characterized by low primary productivity, low nutrient levels (especially nitrogen and phosphorus), and high oxygen content. These lakes are often found in cold regions and have clear water with few aquatic plants and animals. The low availability of nutrients limits the growth of algae and other plants, making these lakes less productive compared to eutrophic lakes. Oligotrophic lakes are typically found in high-altitude or high-latitude areas. **(Option (c) is correct)**
- Hypereutrophic lakes are lakes that have extremely high nutrient levels, leading to excessive algal blooms and very low oxygen levels in deeper waters. These lakes are highly productive but often suffer from poor water quality and are at risk of eutrophication. They are not typically found in cold regions, and their characteristics are the opposite of those described for oligotrophic lakes.

Q.25) Consider the following statements with reference to Bogs:

1. They are more common in tropical areas of Asia and Africa.
2. They are often called moors or fens.
3. They are agriculturally fertile.

How many of the statements above are correct?

a) Only one
b) Only two
c) All three
d) None

Q.25) Solution (a)

Explanation:

- Bogs are not common in tropical regions like Asia and Africa. They are typically found in cold temperate climates such as northern Europe, Canada, and parts of the United States. Tropical climates do not favour the formation of bogs due to their high temperatures and fast drainage.
- In Europe, bogs are often referred to as moors or fens. In Canada, they are sometimes called muskegs. However, there are distinctions between bogs and fens based on their water chemistry. While both are wetlands, fens are alkaline and fed by groundwater, while bogs are acidic and fed by rainwater. **(Option (a) is correct)**
- Bogs are not fertile. The acidic, waterlogged conditions of bogs make them poor in nutrients. The lack of oxygen slows down decomposition, resulting in the accumulation of peat, which is not conducive for agriculture. These ecosystems are typically dominated by mosses and other plants that can survive in such nutrient-poor conditions.

Q.26) Animals in this ecosystem are fast runners. Herbivorous animals get water from the seeds which they eat. Animals here have nocturnal habit. They conserve water by excreting concentrated urine.

Based on the description given above, identify the ecosystem from below:

a) Grassland ecosystem
b) Tundra ecosystem
c) Desert ecosystem
d) Wetland ecosystem

Q.26) Solution (c)

Explanation:

- While some grassland animals may also be fast runners, the description about water conservation and nocturnal habits does not match grassland ecosystems. Grasslands typically have more water available than deserts, and herbivores in grasslands often rely on open water sources like rivers or lakes.
- The tundra is a cold, harsh environment with permafrost, where the primary challenge for animals is surviving extreme cold rather than conserving water. The animals here often have thick fur and hibernate during the harshest winter months. The description of fast runners and nocturnal behaviour does not fit tundra animals, which often conserve energy rather than exhibit speed.
- The desert ecosystem is characterized by extreme temperature variations, sparse vegetation, and limited water availability. Animals have developed several adaptations to conserve water, such as being nocturnal to avoid the daytime heat and excreting concentrated urine to minimize water loss. Herbivores like kangaroo rats extract moisture from seeds, which is typical of desert environments. Fast running animals like gazelles and lizards are also commonly found in deserts. **(Option (c) is correct)**
- Wetlands are ecosystems with abundant water, such as marshes, swamps, and riverbanks. Animals in these areas are adapted to aquatic or semi-aquatic life and do not need to conserve water. Therefore, traits like extracting water from seeds and concentrated urine do not apply.

Q27) In which of the following regions of India are you most likely to come across the Indian Giant Squirrel in its natural habitat?

a) Mangrove forests of Sundarbans
b) Tropical rainforests of Western Ghats
c) Grasslands of Central India
d) Arid regions of Rajasthan

Q.27) Solution (b)

Explanation:

- The Sundarbans are famous for their mangrove forests and the Bengal tiger, not the habitat of the Indian Giant Squirrel. The dense mangroves do not support the type of arboreal life that the Indian Giant Squirrel thrives in.
- The Indian Giant Squirrel (Ratufa indica) is native to the Western Ghats, a biodiversity hotspot. It is an arboreal species that lives in the dense tropical rainforests of the region, where it can find food, shelter, and protection in the thick forest canopy. **(Option (b) is correct)**

- Grasslands are not suitable habitats for the Indian Giant Squirrel, which requires tall trees and dense forests for survival. Central Indian grasslands are home to species like the blackbuck, but not the Indian Giant Squirrel.
- The arid regions of Rajasthan are home to species adapted to dry, desert conditions, such as the Indian desert fox and the Great Indian Bustard. These regions lack the dense forests required by the Indian Giant Squirrel.

Q.28) Consider the following statements with respect to Indian Grasslands:

1. Phumdis are floating grasslands of north eastern India.
2. Shola grasslands are encountered in the Himalayan region.
3. Alpine moist meadows are grasslands not found in India.

Which of the statements above is/are correct?

a) 1 only
b) 2 only
c) 2 and 3 only
d) 1 and 3 only

Q.28) Solution (a)

Explanation:

- Phumdis are a unique type of floating vegetation found primarily in the Loktak Lake in Manipur, northeastern India. These floating masses of vegetation, soil, and organic matter support grasslands and play a significant role in the local ecology. **(Statement 1 is correct)**
- Shola grasslands are unique to the Western Ghats of southern India, especially in the Nilgiri and Anamalai Hills. These grasslands are usually interspersed with patches of Shola forests, and they exist in tropical montane regions, not the Himalayan region. **(Statement 2 is incorrect)**
- Alpine moist meadows are found in India, particularly in the Himalayan region. These grasslands are present in high-altitude areas above 3,000 meters and are characterized by moist soils, short grasses, and alpine flora. Examples include Valley of Flowers in Uttarakhand. **(Statement 3 is incorrect)**

Q.29) Consider the following:

1. Rubber tree
2. Orchids
3. Passion Fruit
4. Okapi

Which of the above are considered as flora of rain forest?

a) 1 and 2 only
b) 1, 2 and 3 only
c) 2, 3 and 4 only
d) 1, 2, 3 and 4

Q.29) Solution (b)

Explanation:

- The Rubber tree (Hevea brasiliensis) is native to tropical rainforests, particularly in the Amazon Basin. It is one of the most important commercial plants from rainforests, as its latex is used to produce natural rubber.
- Orchids are a diverse family of flowering plants that thrive in tropical rainforests around the world. They are often found as epiphytes, growing on trees without harming them, and are well-adapted to the moist, humid environment of rainforests.
- The Passion fruit (Passiflora edulis) is a tropical vine that grows in rainforests. It is native to South America and thrives in the warm, humid conditions typical of tropical rainforests. **(Option (b) is correct)**
- Okapi (Okapia johnstoni) is not a plant but an animal, specifically a mammal, found in the rainforests of the Congo in Africa. It is related to the giraffe and is one of the unique animals of the rainforest, but it cannot be considered part of the flora.

Q.30) Consider the following pairs:

Place	Name of the grassland
1. Africa	Pampas
2. South America	Savannas
3. Eurasia	Prairies

Which of the pairs given above are correct?

a) Only one pair
b) Only two pairs
c) All three pairs
d) None of the pairs

Q.30) Solution (d)

Explanation:

- The Pampas are grasslands found in South America, particularly in Argentina, Uruguay, and parts of Brazil. Pampas are known for their fertile soils and are ideal for agriculture. Africa has Savannas, not Pampas. **(Pair 1 is incorrect)**
- Savannas are tropical grasslands found mostly in Africa, not in South America. The major grasslands of South America are the Pampas, found in the southern part of the continent. **(Pair 2 is incorrect)**
- Prairies are temperate grasslands found in North America (USA and Canada), not in Eurasia. The major grasslands of Eurasia are the Steppes, which are expansive plains across Eastern Europe and Central Asia, including Russia and Kazakhstan. **(Pair 3 is incorrect)**

Q.31) Consider the following:

1. Tropical Rainforest
2. Grassland Ecosystem
3. A Decaying Log in a Forest

Which of the above is/are considered as major community in ecology?

a) 1 only
b) 1 and 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.31) Solution (a)

Explanation:

- In ecology, a community refers to all the populations of different species that live and interact within a particular area. Communities can be classified as major or minor based on their size, complexity, and relative independence.
- A tropical rainforest is considered a major community because it is a large, self-sustaining ecosystem characterized by high biodiversity and complex interactions among organisms. It includes multiple trophic levels and a wide variety of species, both flora and fauna. The tropical rainforest functions relatively independently, with its own nutrient cycles and energy flows. **(Statement 1 is correct)**
- A grassland ecosystem is also a major community. It spans large areas and includes diverse species of grasses, herbivores, carnivores, and decomposers. Grasslands have their own climatic conditions and ecological processes, making them self-regulating and relatively independent ecosystems. **(Statement 2 is correct)**

- A decaying log in a forest represents a minor community or micro-community. While it hosts a variety of organisms like fungi, insects, and microorganisms, it is not large or complex enough to be considered a major community. It depends on the larger forest ecosystem for its existence and does not function independently. **(Statement 3 is incorrect)**

Q.32) The "Seagrass Restoration" technique is well known for the:

a) Promotion of algae cultivation for biofuel production
b) Restoration of coastal ecosystems and marine biodiversity
c) Creation of artificial coral reefs for tourism
d) Development of aquaculture zones for commercial fish farming

Q.32) Solution (b)

Explanation:

- Seagrass restoration is not related to the promotion of algae cultivation for biofuel production. While algae can be cultivated for biofuels, this is a separate process from seagrass restoration, which is focused on enhancing marine ecosystems. **(Option (a) is incorrect)**
- Seagrass restoration is a conservation technique aimed at restoring seagrass meadows, which are critical for maintaining marine biodiversity, improving water quality, and protecting coastal ecosystems. Seagrass beds serve as nurseries for various marine species and play a significant role in carbon sequestration, making them important for both ecological and climate health. **(Option (b) is correct)**
- Artificial coral reef creation is a separate conservation effort aimed at enhancing coral habitats, primarily for boosting biodiversity and sometimes for tourism. However, this is unrelated to seagrass restoration, which specifically focuses on seagrass meadows rather than coral reefs. **(Option (c) is incorrect)**
- Aquaculture refers to the breeding and harvesting of fish and other aquatic species for commercial purposes. While aquaculture is important for food security, it does not relate to seagrass restoration, which is focused on ecosystem recovery rather than commercial fish farming. **(Option (d) is incorrect)**

Q.33) Which one of the following best describes the term "red tides"?

a) The phenomenon of seasonal algae blooms that are harmful to marine life
b) The rise in sea levels due to global warming, causing floods in coastal regions
c) The occurrence of high tides caused by the gravitational pull of the moon during a red moon period.
d) The appearance of red-coloured corals due to increased temperatures in coral reefs

Q.33) Solution (a)

Explanation:

- Red tides are caused by the rapid growth of certain types of algae, mainly dinoflagellates, which produce toxins. These algal blooms can give the water a reddish or brownish color and are harmful to marine life due to the toxins produced, leading to mass fish deaths, shellfish poisoning, and even harm to humans in some cases. These events are often related to changes in water temperature, nutrient availability, or other environmental factors. **(Option (a) is correct)**
- Rising sea levels are a consequence of global warming but are unrelated to the phenomenon of red tides. Rising sea levels are caused by the melting of polar ice caps and the thermal expansion of water due to global temperature increases, but they do not cause discoloration of water or toxic algal blooms. **(Option (b) is incorrect)**
- High tides caused by the gravitational pull of the moon are known as spring tides, and while these tides can be stronger during specific lunar events, they are unrelated to the concept of red tides, which are algal blooms, not tidal phenomena. **(Option (c) is incorrect)**
- Increased temperatures in coral reefs lead to coral bleaching, where corals expel the symbiotic algae living in their tissues, causing the corals to turn white. This is unrelated to red tides, which involve the discoloration of water due to algal blooms, not changes in coral colour. **(Option (d) is incorrect)**

Q.34) They are marine animals which live in the ocean. Most of them have arms or spines that radiate from the center of their body. They are also often featured in aquariums.

Based on the description given above, identify the fauna from the following options:

a) Mollusks
b) Crustaceans
c) Protozoa
d) Echinoderms

Q.34) Solution (d)

Explanation:

- Mollusks are a diverse group of invertebrates that include species such as snails, clams, octopuses, and squids. While some mollusks, like octopuses and cuttlefish, are often featured in aquariums, they do not have arms or spines radiating from the center of their bodies. Instead, they typically have a soft body, and many possess a hard shell. Mollusks are found both in marine and freshwater environments, and some are even terrestrial. **(Option (a) is incorrect)**
- Crustaceans are a large group of arthropods that include species like crabs, lobsters, shrimp, and barnacles. While they are marine animals, they do not have arms or spines

radiating from the center of their body. Crustaceans are characterized by their segmented bodies, hard exoskeletons, and jointed appendages. They are also commonly found in marine environments and are often featured in aquariums, but their body structure does not match the description provided. **(Option (b) is incorrect)**

- Protozoa are single-celled microscopic organisms, usually found in water or soil. They do not have complex body structures like arms or spines, nor are they typically featured in aquariums. Protozoa are a diverse group of organisms that are part of the broader category of protists, and they do not exhibit the physical traits described in the question. **(Option (c) is incorrect)**
- Echinoderms are a group of marine animals that include species such as starfish (sea stars), sea urchins, sand dollars, and sea cucumbers. They are known for their radial symmetry, where their body parts (arms or spines) radiate from a central point, typically in multiples of five. Echinoderms are often featured in aquariums and are easily recognizable due to their unique body structure. They play significant roles in marine ecosystems and are exclusively found in marine environments. **(Option (d) is correct)**

Q.35) In the context of Banni Grasslands, consider the following statements:

1. It is found in Kachchh district in the state of Gujarat.
2. It represents the combination of wetland and grassland ecosystem at the same place.
3. Bhutia tribe dominate the Banni grassland area.
4. It has been approved to host a Cheetah conservation breeding center.

How many of the statements given above are correct?

a) Only two
b) Only three
c) All four
d) None

Q.35) Solution: (b)

Statement Analysis:

- **Statement 1 is correct:** Banni grasslands lie in the Kutch district of Gujarat, India. It forms a transitional zone between the Thar Desert to the north and the Arabian Sea to the south, creating a mosaic of arid and semi-arid ecosystems. The Banni grassland in Gujarat‟s Kachchh district is one of the largest grasslands in the Indian subcontinent with an area of over 2500 sq.km
- **Statement 2 is correct**: Banni grasslands cover 2,497 square kilometers and account for over 45% of Gujarat's pastures. Bannis is classified as a Dichanthium-Cenchrus-Lasiurus grass cover because it **combines two ecosystems: wetlands and grasslands**. These grasslands support a diverse range of flora and wildlife, including plants, birds,

animals, reptiles, and amphibians. A huge freshwater lake locally known as Chhari-Dhand (Dhand means a shallow lake) is a prominent feature of the Banni grassland.

- **Statement 3 is incorrect**: Maldharis tribe breed cattle, camels and smaller ruminants like goats and sheep. They are concentrated mainly in the eastern Kutch as well as in western Kutch which includes **Banni, Asia's largest grassland**. Maldharis dominates the banni grassland.
- **Statement 4 is correct:** The Central government has approved a proposal to set up a cheetah conservation breeding center in Kutch district. Banni grassland used to be the habitat of cheetahs, which became extinct over time.

Q.36) In the context of Ocean Acidification, consider the following factors:

1. Increased eutrophication process in the Ocean.
2. Increased Sulphur dioxide (SO2) emissions from ships.
3. Increased rate of Volcanic activity.
4. Change in ocean circulation patterns.

How many of the factors given above tend to increase the Ocean Acidification?

a) Only one
b) Only two
c) Only three
d) All four

Q.36) Solution: (d)

Statement Analysis:

- Ocean acidification refers to the **process of decrease in pH level of the oceans**, primarily driven by the increased uptake of Carbon Dioxide (CO2) gasses from the atmosphere. When CO2 is absorbed by seawater, a series of chemical reactions occur resulting in the increased concentration of hydrogen ions. This process has far reaching implications for the ocean and the creatures that live there.
- **Statement 1 is correct:** Eutrophication process in the Ocean can increase the acidity of the Ocean. Eutrophication leads to **large algal blooms and the algae eventually dies and sinks to the bottom of the oceans**. Bacteria which feed on these dead algae consume oxygen and release CO2 into the Ocean. This increase in CO2 causes an increase in hydrogen ions and decrease in pH level of the ocean thus causes ocean acidification.
- **Statement 2 is correct:** The **Sulphur dioxide (SO2) emissions from ships can further ocean acidification** with a rate that is twofold with respect to that caused by carbon dioxide (CO2) emissions.
- **Statement 3 is correct:** Over extended periods, gradual changes in the carbon cycle can impact ocean acidity across thousands to millions of years. For instance, a **sustained rise in volcanic activity will elevate atmospheric CO2 levels, consequently**

intensifying ocean acidity.

- **Statement 4 is correct:** Changes in ocean circulation patterns can affect the pH of surface waters. Upwelling, for example, transports water from deep inside the ocean to the top. Deep waters are more acidic than surface waters because the CO2 produced by deep-sea organisms during respiration is not used by photosynthesis due to the lack of sunlight in the deep.

Q.37) Which of the following are the examples of Biomes?

1. Grasslands
2. Desert
3. Estuaries
4. Coral reefs
5. Tropical Rainforest
6. Mangroves

How many of the above is/are correct?

a) 1, 2 and 5 only
b) 1, 4 and 6 only
c) 2, 3, 5 and 6 only
d) 1, 2, 3, 4, 5 and 6

Q.37) Solution: (a)

Statement Analysis:

- Biomes are large geographical areas. Biomes are defined as "the world's major communities, classified according to the predominant vegetation and characterized by adaptations of organisms to that particular environment". Biomes are also defined by factors such as plant structures (such as trees, shrubs, and grasses), leaf types (such as broadleaf and needleleaf), plant spacing (forest, woodland, savanna), and climate
- Freshwater biome consists of the lakes, ponds, rivers, streams, and wetlands. The marine regions include oceans, coral reefs and estuaries.
- Marine regions cover about three-fourths of the Earth's surface. It includes oceans, coral reefs, and estuaries. The largest of all the ecosystems, oceans are very large bodies of water that dominate the Earth's surface
- Estuaries and coral reefs are examples of desert habitats (**Hence 3,4,6 are not correct**)
- Grasslands, Deserts and Tropical rainforest are the examples of Biome. (**Hence 1,2 and 5 are correct)**

Q.38) Which of the following statements is/are not correct with reference to the different types of ecology?

1. Autecology is the study of the community of living organisms as a unit.
2. Synecology is the study of individual species or individuals in relation to the environment.
3. An example of Autecology is side effects of acid rain to a pond ecosystem.

Select the correct option using the codes given below

a) Only one
b) Only two
c) All three
d) None

Q.38) Solution :(c)

Statement Analysis:

- Autecology is the study of individual species or individuals in relation to the environment. (**Hence Statement 1 is incorrect)**
- Synecology is the study of the community of living organisms as a unit. (**Hence Statement 2 is incorrect).**
- An example of Autecology is side effects of acid rain to a pond ecosystem. (**Hence Statement 3 is incorrect**).

Q.39) Which of the following is related to the terms like "Rhizophora mangle", "Avicennia germinans", "Laguncularia racemosa" and "Conocarpus erectus"?

a) Coral reefs
b) Mangroves
c) Wetlands
d) Brackish Lakes

Q.39) Solution :(b)

Statement Analysis:

- Rhizophora mangle is the scientific name of **Red mangrove.** Rhizophora racemosa is the dominant species. It is the pioneer at the edge of the alluvial salt swamp. It typically grows along the water's edge and is easily identifiable by its tangled, reddish 'prop-roots'.
- Avicennia germinans is the scientific name of **Black mangrove.** Avicennia germinans tend to be found in the more coastal areas. Avicennia germinans is characterized by

numerous finger-like projections, called pneumatophores, which protrude from the soil around the tree's trunk

- Laguncularia racemosa is the scientific name of **White mangrove.** Laguncularia racemosa has no visible aerial roots and is most easily identified by its leaves. They are elliptical, light yellow green, and have two distinguishing glands at the base of the leaf where it meets the stem. This species tends to occupy higher elevations farther upland than either the red or black mangroves.
- Conocarpus erectus is the scientific name of **Buttonwood mangrove.** Conocarpus erectus is in the same family as the white mangrove. The name is derived from the button-like appearance of the dense, rounded flower heads that grow in a branched cluster, and the purplish-green, round, cone-like fruit
- Mangroves support livelihoods in providing habitat for food species, timber for dwellings, cooking and heat, and many other subsistence and commercial activities. Mangroves also provide protection of the coastline from erosion and storm surges.
- The first global attempt to document the status of the mangrove resource, the World Mangrove Atlas, was published in 1997 by the International Society for Mangrove Ecosystems (ISME), financed by ITTO and in partnership with UNEP-WCMC. The information for Africa was updated by UNEP-WCMC in the publication Mangroves of East Africa (2003). This report provides a profile for the 19 countries of the region from Mauritania south to Angola

Q.40) Consider the following statements with respect to the Mission Mausam:

1. The Mission Mausam is a 10,000 Crore initiative to Enhance India's Weather and Climate Forecasting by 2047
2. Mission Mausam has the goal of making Bharat a "Weather-ready and Climate-smart" nation, so as to mitigate the impact of climate change and extreme weather events and strengthen the resilience of the communities and it will be implemented during 2024-26.
3. Indian Institute of Tropical Meteorology under the Ministry of the Earth Science will be the sole implementing agency for the Mission Mausam
4. Mission Mausam will improve forecasts on both spatial and temporal scales and air quality data and help strategize weather management.

How many of the above statements is/are correct with reference to the features of the Mission Mausam?

a) Only one
b) Only two
c) Only three
d) All the four

Q.40) Solution: (b)

Statement Analysis:

- **Statement one is not correct:** The Union Cabinet approved Mission Mausam on September 11, 2024, with a **budget outlay of 2,000 crores over two years**, is an ambitious initiative of the Government of India
- **Statement two is correct:** Mission Mausam has the goal of making Bharat a "Weather-ready and Climate-smart" nation, so as to mitigate the impact of climate change and extreme weather events and strengthen the resilience of the communities. Currently the Mission Mausam will be implemented during 2024-26 and it seeks to exponentially enhance the country's weather and climate observations, understanding, modelling and forecasting, leading to better, more useful, accurate and timely services.
- **Statement three is not correct:** Three institutes of the Ministry Earth Science: **IMD, NCMRWF and the Indian Institute of Tropical Meteorology, will primarily implement Mission Mausam.** These institutions will be supported by other Ministry Earth Science institutions (Indian National Centre for Ocean Information Services and National Institute of Ocean Technology) along with collaborating national and international institutes, academia and industries, furthering India's leadership in weather and climate sciences and services.
- **Statement four is correct:** According to the secretary of the Ministry of Earth Science, Mission Mausam will improve forecasts on both spatial and temporal scales and air quality data and help strategize weather management/intervention in the long run. "By March 2026, we are looking at installing a wider network of radars, wind profilers, and radiometers for better observations.

Q.41) With reference to climate change, consider the following statements:

1. Climate change refers to long-term shifts in temperatures and weather patterns.
2. This term 'global warming' is interchangeable with the term 'climate change.'
3. The only reason attributed to climate change is anthropogenic activities such as burning of fossil fuels like coal, oil and gas.

Which of the above statements is/are correct?

a) 1 only
b) 1 and 2 only
c) 1 and 3 only
d) 1, 2 and 3

Q.41) Solution (a)

Explanation:

- Climate change refers to long-term shifts in temperatures and weather patterns. It is directly contributing to humanitarian emergencies from heatwaves, wildfires, floods, tropical storms and hurricanes and they are increasing in scale, frequency and intensity. It is therefore a threat multiplier, undermining and potentially reversing decades of health progress. **Hence, statement 1 is correct.**
- Global warming is the long-term heating of Earth's surface observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere. This term is not interchangeable with the term "climate change." **Hence, statement 2 is not correct.**
- Climate change can take place due to natural as well as anthropogenic reasons. The natural reasons include changes in the sun's activity or large volcanic eruptions. But since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil and gas. **Hence, statement 3 is not correct.**

Q.42) Consider the following:

1. Greenland icesheet loss
2. Amazon rainforest dieback
3. Boreal permafrost collapse
4. Atlantic Meridional Oceanic Circulation (AMOC) cessation

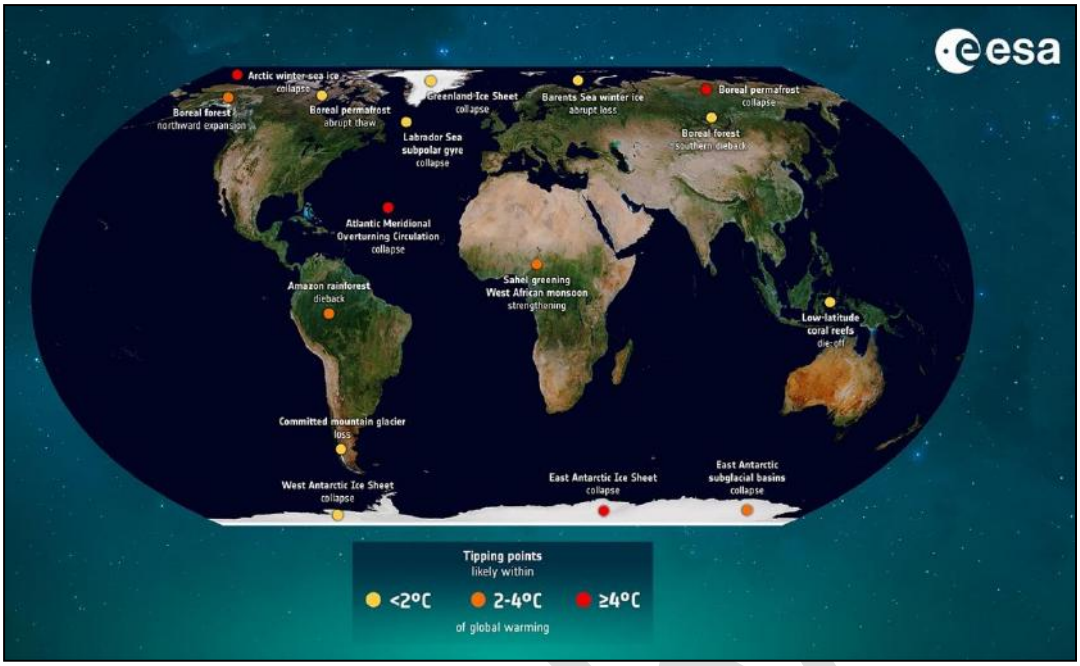
Which of the above are considered as climate tipping points?

a) 1 and 2 only
b) 1, 2 and 3 only
c) 2, 3 and 4 only
d) 1, 2, 3 and 4

Q.42) Solution (d)

Explanation:

- The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report defines tipping points as "critical thresholds in a system that, when exceeded, can lead to a significant change in the state of the system, often with an understanding that the change is irreversible." Moreover, breaching one tipping point can increase the likelihood of crossing others — triggering a catastrophic domino effect. For instance, unabated global warming can cause irreversible ice melt from the Greenland ice sheet. This could slow down the ocean's circulation of heat, the Atlantic Meridional Overturning Circulation (AMOC), which, in turn, could impact South America's monsoon system. Changes in the monsoon system may lead to a rise in the frequency of droughts in the Amazon rainforest. **Hence, option d is the correct answer.**



Q.43) Consider the following gases:

1. Carbon Dioxide (CO_2)
2. Methane (CH_4)
3. Nitrous Oxide (N_2O)
4. Water Vapour

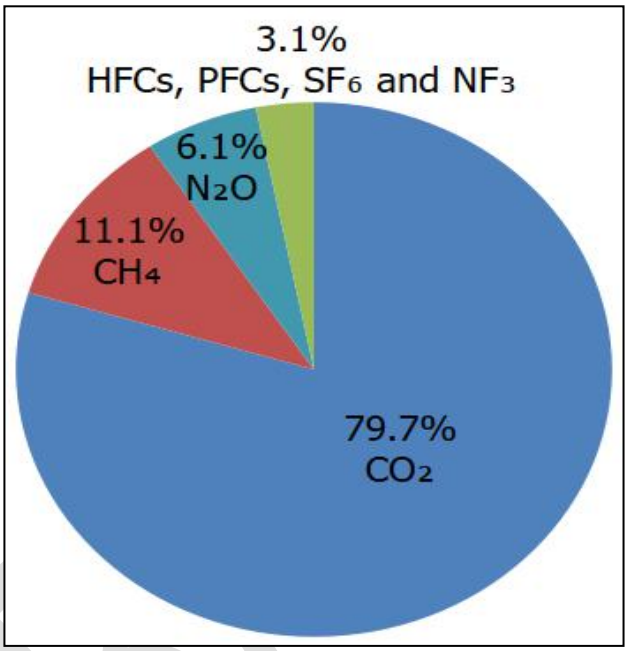
How many of the above can be considered as greenhouse gases (GHGs)?

a) Only one
b) Only two
c) Only three
d) All four

Q.43) Solution (d)

Explanation:

- Greenhouse gases (GHGs) warm the Earth by absorbing energy and slowing the rate at which the energy escapes to space; they act like a blanket insulating the Earth. Atmospheric gases like Carbon Dioxide (CO2), Methane (CH4), Nitrous Oxide (N2O), Water Vapour, and Chlorofluorocarbons (CFCs) can trap the out-going infrared radiation from the earth's surface. Therefore, these gases are known as greenhouse gases (GHGs), and the heating effect is known as the greenhouse effect. **Hence, option d is the correct answer.**



Q.44) With respect to black carbon (soot), consider the following statements:

1. Black carbon increases global warming by increasing albedo of the earth after getting deposited on snow.
2. It can stay in the atmosphere for decades and it has a longer lifetime than carbon dioxide.
3. It heats the atmosphere directly by absorbing more sunlight when compared to carbon dioxide.

How many of the statements given above is/are correct?

a) Only one
b) Only two
c) All three
d) None

Q.44) Solution (a)

Explanation:

- Black carbon, commonly known as soot, is a component of fine particulate air pollution (PM 2.5). It is formed by the incomplete combustion of wood and fossil fuels, a process which also creates carbon dioxide (CO2), carbon monoxide, and volatile organic compounds. It warms the earth by reducing (not increasing) albedo when deposited on snow. **Hence, statement 1 is not correct.**

- Black carbon is said to be one of the largest contributors to climate change after CO2. But unlike CO2, which can stay in the atmosphere for years together, black carbon is short-lived and remains only for days to weeks before it descends as rain or snow. **Hence, statement 2 is not correct.**
- The black carbon (soot) is the strongest absorber of sunlight (a lot more than carbon dioxide) and heats the air directly. Among aerosols (such as brown carbon, sulphates), Black Carbon has been recognized as the second most important anthropogenic agent for climate change and the primary marker to understand the adverse effects caused by air pollution. **Hence, statement 3 is correct.**

Q.45) With respect to Global Warming Potential (GWP), consider the following statements:

1. The reference gas used for measuring global warming potential is Carbon Dioxide.
2. Methane and Chlorofluorocarbons have higher global warming potential when compared to Carbon Dioxide.

Which of the above statements is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.45) Solution (c)

Explanation:

- CO2, by definition, has a GWP of 1 regardless of the time period used, because it is the gas being used as the reference. CO2 remains in the climate system for a very long time: CO2 emissions cause increases in atmospheric concentrations of CO2 that will last thousands of years. **Hence, statement 1 is correct.**
- Methane (CH_4) is estimated to have a GWP of 27-30 over 100 years. Nitrous Oxide (N2O) has a GWP 273 times that of CO2 for a 100-year timescale. Chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), hydrochlorofluorocarbons (HCFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF6) are sometimes called high-GWP gases because, for a given amount of mass, they trap substantially more heat than CO2. **Hence, statement 2 is correct.**

Q.46) Consider the following statements:

1. GRIHA is a rating tool that evaluates the environmental performance of a building holistically over its entire life cycle.
2. The GRIHA rating system is developed by NITI Aayog.

Which of the above statements is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.46) Solution (a)

Explanation:

- GRIHA is an acronym for Green Rating for Integrated Habitat Assessment. GRIHA is a Sanskrit word meaning 'Abode.' It is a rating tool that helps people assesses the performance of their building against certain nationally acceptable benchmarks. It evaluates the environmental performance of a building holistically over its entire life cycle, thereby providing a definitive standard for what constitutes a 'green building.' **Hence, statement 1 is correct.**
- The GRIHA rating system, based on accepted energy and environmental principles is developed by TERI (The Energy and Resources Institute) and it has been adopted by the Ministry of New and Renewable Energy. It assesses a building out of 34 criteria and awards points on a scale of 100. In order to qualify for GRIHA certification, a project must achieve at least 50 points. **Hence, statement 2 is not correct.**

Q.47) Which of the following best describes the term 'Arctic Amplification?'

a) Arctic is warming slower than the rest of the planet
b) Arctic is warming faster than the rest of the planet
c) Arctic is warming as fast as the rest of the planet
d) Arctic is not warming at all and maintaining its status quo in terms of temperature

Q.47) Solution (b)

Explanation:

- The Arctic is warming twice to three times as fast as the rest of the planet due to sea ice loss—a phenomenon known as Arctic amplification. As sea ice declines, it becomes younger and thinner, and therefore becomes more vulnerable to further melting. This warming is more concentrated in the Eurasian part of the Arctic, where the Barents Sea north of Russia and Norway is warming at an alarming rate- almost seven times faster than the global average. **Hence, option b is the correct answer.**

Q.48) With respect to coral reefs, consider the following statements:

1. Coral reefs are made up of calcareous skeletons of thousands of tiny marine organisms called coral polyps.
2. Polyps are deep, cold-water sea organisms with hard bodies covered by phosphorous layers.
3. The world's largest coral reef is situated on the eastern coast of North America.

Which of the above statements is/are correct?

a) 1 only
b) 1 and 2 only
c) 1 and 3 only
d) 1, 2 and 3

Q.48) Solution (a)

Explanation:

- Coral reefs are made up of calcareous skeletons of thousands of tiny marine organisms called coral polyps. They belong to the phylum cnidaria and occur in different forms and colours, depending upon the nature of the salts they are made of. **Hence, statement 1 is correct.**
- Polyps are shallow, warm-water organisms with soft bodies covered by calcareous skeletons. The polyps extract calcium salts from seawater to form these hard, tubular skeletons. Small marine plants (algae) also deposit calcium carbonate, contributing to coral growth. **Hence, statement 2 is not correct.**
- The 2300-km-long Great Barrier Reef (GBR) off the NE coast of Australia is the world's largest reef. It is not a single reef but a large complex consisting of many reefs. India's major coral reef areas are located in the Andaman and Nicobar Islands, Lakshadweep, the Gulf of Mannar and the Gulf of Kachchh. Also, some coral reefs, over a period of time, transform or evolve into coral islands (e.g., Lakshadweep). **Hence, statement 3 is not correct.**

Q.49) The global agreement/protocol which has successfully protected the stratospheric ozone layer by phasing out the production and consumption of ozone-depleting substances is?

a) Paris Agreement
b) Marrakesh Agreement
c) Kyoto Protocol
d) Montreal Protocol

Q.49) Solution (d)

Explanation:

- The Montreal Protocol on Substances that Deplete the Ozone Layer is the landmark multilateral environmental agreement that regulates the production and consumption of nearly 100 man-made chemicals referred to as ozone depleting substances (ODS). When released into the atmosphere, those chemicals damage the stratospheric ozone layer, Earth's protective shield that protects humans and the environment from harmful levels of ultraviolet radiation from the sun. Adopted on 16 September 1987, the Protocol is to date one of the rare treaties to achieve universal ratification. Hence, option d is the correct answer.

Q.50) Consider the following issues:

1. Pollution
2. Climate change
3. Biodiversity loss
4. Antimicrobial Resistance

Which of the above together constitute the triple planetary crisis?

a) 1, 2 and 3
b) 1, 3 and 4
c) 1, 2 and 4
d) 2, 3 and 4

Q.50) Solution (a)

Explanation:

- The triple planetary crisis refers to the three main interlinked issues that humanity currently faces: climate change, pollution and biodiversity loss. This term underscores the interdependence of these issues and their collective impact on the planet's ecosystems, societies, and economies. Each of these issues has its own causes and effects and each issue needs to be resolved if we are to have a viable future on this planet. **Hence, option a is the correct answer.**

Q.51) Consider the following statements about Eco Mark Scheme:

1. Eco Mark is a voluntary labelling scheme for consumer products meeting Indian environmental criteria and quality standards.
2. The Eco Mark Scheme is being administered by the Bureau of Indian Standards.

Which of the above statements is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.51) Solution (c)

Explanation:

- Eco Mark is a voluntary labelling scheme for consumer products meeting Indian environmental criteria and quality standards. The Scheme covers various product categories like Soaps and Detergents, Paints, Food Items, Lubricating Oils, Packing/Packaging Materials, Architectural Paints and Powder Coatings, Batteries, Electrical and Electronic Goods, Food Additives, Wood Substitutes, Cosmetics, Aerosols and Propellants, Plastic Products, Textiles, Fire-extinguisher, Leather and Coir & Coir Products. **Hence, statement 1 is correct.**
- ECO Mark Scheme was instituted by the Government of India for labeling of environment friendly products. It is being administered by the Bureau of Indian Standards. The presence of ECO Logo along with ISI Mark on a product indicates that the product meets certain Environmental criteria along with the Quality requirements as specified in the relevant Indian Standard. **Hence, statement 2 is correct.**

Q.52) The world's first-ever market for trading in particulate matter emissions was launched by?

a) Government of Andhra Pradesh
b) Government of Uttar Pradesh
c) Government of Maharashtra
d) Government of Gujarat

Q.52) Solution (d)

Explanation:

- The Government of Gujarat in 2019 launched the world's first-ever market for trading in particulate matter emissions in the city of Surat. The project called the Emission Trading Scheme, aims to reduce air pollution by allowing industries to 'buy and sell' permits for emitting particulate matter. **Hence, option d is the correct answer.**

Q.53) With reference to Central Pollution Control Board (CPCB), consider the following statements:

1. CPCB is a statutory organisation constituted under the Water (Prevention and Control of Pollution) Act, 1974.
2. It comes under Ministry of Science and Technology.
3. The headquarter of CBCB is located in Bengaluru.

Which of the above statements is/are correct?

a) 1 only
b) 1 and 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.53) Solution (a)

Explanation:

- The Central Pollution Control Board (CPCB) is a statutory organisation constituted in September 1974 under the Water (Prevention and Control of Pollution) Act, 1974. Further, CPCB was entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981. It also provides technical services to the Ministry of Environment, Forests, and Climate Change (MOEFCC) under the provisions of the Environment (Protection) Act, 1986. **Hence, statement 1 is correct.**
- The Central Pollution Control Board (CPCB) of India comes under the Ministry of Environment, Forest and Climate Change (MoEFCC). It is the apex organization in country in the field of pollution control, as a technical wing of MoEFCC. The board is led by its chairperson appointed by the Appointments Committee of the Cabinet of the Government of India. **Hence, statement 2 is not correct.**
- The headquarter of Central Pollution Control Board (CPCB) is located in New Delhi, with seven zonal offices and 5 laboratories. The board conducts environmental assessments and research. It is responsible for maintaining national standards under a variety of environmental laws, in consultation with zonal offices, tribal, and local governments. **Hence, statement 3 is not correct.**

Q.54) With reference to Ecological diversity, consider the following statements:

4. It includes the variation in both terrestrial and aquatic ecosystems.
5. It is the largest scale of biodiversity.
6. It excludes human-altered ecosystems such as agricultural landscapes.

How many of the statements above is/are correct?

e) 1 only
f) 1 and 2 only

g) 2 and 3 only
h) 1, 2 and 3

Q.54) Solution (b)

Explanation:

- Ecological diversity refers to the variety of ecosystems in a given region, including both terrestrial (land) and aquatic (water) ecosystems. It encompasses the different habitats, ecological processes, and species interactions within these environments. **(Statement 1 is correct)**
- Ecological diversity operates on a broader scale compared to genetic and species diversity. It encompasses different ecosystems and their complex interactions across landscapes and regions, making it the largest scale of biodiversity. **(Statement 2 is correct)**
- Ecological diversity does not exclude human-altered ecosystems. In fact, it includes the variation in all ecosystems, including those modified by human activities, such as agricultural and urban landscapes. These systems are considered part of ecological diversity as they host distinct ecological processes and species interactions. **(Statement 3 is incorrect)**

Q.55) Which one of the following best defines the term 'Gamma diversity'?

a) The diversity of species within a specific habitat or ecosystem.
b) The total diversity of species across different ecosystems within a region.
c) The difference in species diversity between ecosystems or habitats within a region.
d) The genetic variation within a population of a species.

Q.55) Solution (b)

Explanation:

- Alpha diversity refers to the species richness or diversity within a particular habitat or ecosystem. It measures the number of species in a local ecosystem or a single community. **(Option a is incorrect)**
- Gamma diversity refers to the total diversity of species across multiple ecosystems within a larger geographical area or region. It is a measure of the overall biodiversity

at the landscape level, encompassing different ecosystems and their species. **(Option b is correct)**

- Beta diversity measures the change or difference in species composition between different ecosystems or habitats within a region. It highlights how species diversity varies from one habitat to another. **(Option c is incorrect)**
- Genetic diversity refers to the variation in genes within a population of a species. It ensures the adaptability of a species to changing environments and contributes to the overall health of populations. **(Option d is incorrect)**

Q.56) The Western Ghats are known for their rich biodiversity. Which one among the following is the most appropriate reason for this phenomenon?

a) It experiences uniform rainfall throughout the year.
b) It serves as a barrier between different biogeographical zones.
c) It is a global biodiversity hotspot with a wide range of endemic species.
d) It has a low-altitude terrain, promoting species migration.

Q.56) Solution (c)

Explanation:

- The Western Ghats experience varying rainfall patterns depending on the region. While the western slopes receive heavy rainfall during the monsoon, the eastern slopes are drier. This variation in rainfall contributes to its diverse ecosystems, but it is not uniform throughout the year. **(Option a is incorrect)**
- While the Western Ghats do act as a physical barrier influencing climate and rainfall, this is not the main reason for its rich biodiversity. The biodiversity of the Western Ghats is largely due to its range of habitats, from tropical rainforests to montane grasslands, and the presence of numerous endemic species. **(Option b is incorrect)**
- The Western Ghats are recognized as one of the world's biodiversity hotspots, containing a high level of endemism. Many species of plants, amphibians, reptiles, and mammals are found only in this region, making it ecologically significant. Its designation as a global biodiversity hotspot by Conservation International highlights its importance in species diversity. **(Option c is correct)**
- The Western Ghats have a varying altitude, with many regions reaching high elevations. These altitudinal gradients contribute to the formation of distinct ecosystems, but it is not a low-altitude terrain. The high altitude, rather than promoting migration, supports unique ecosystems adapted to specific conditions. **(Option d is incorrect)**

Q.57) Ecosystem services provided by wetlands include the following:

1. Water purification
2. Flood control

3. Carbon sequestration
4. Generation of tidal energy

Select the correct answer using the code given below:

a) 1 and 2 only
b) 2 and 3 only
c) 1, 2 and 3 only
d) 2, 3 and 4 only

Q.57) Solution (c)

Explanation:

- Wetlands play a critical role in water purification by filtering pollutants, sediments, and nutrients from the water before it reaches rivers, lakes, or oceans. Wetland plants and microorganisms break down contaminants, improving water quality. The Ramsar Convention on Wetlands recognizes wetlands' role in water purification and maintaining water quality. **(Statement 1 is correct)**
- Wetlands act as natural buffers against flooding by absorbing excess water during heavy rainfall or storm surges. Their ability to store and slowly release water helps reduce the severity of floods and protects surrounding areas. **(Statement 2 is correct)**
- Wetlands are significant carbon sinks, particularly peatlands, which store large amounts of carbon in the form of organic matter. By sequestering carbon, wetlands help mitigate climate change by reducing the amount of carbon dioxide in the atmosphere. **(Statement 3 is correct)**

Q.58) Consider the following statements:

1. They have high population density.
2. They can be any organism, from animals and plants to bacteria and fungi.
3. Role is same across different ecosystems.

Which of the statement/s above correctly describe a 'Keystone species?

a) 1 and 2 only
b) 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.58) Solution (b)

Explanation:

- Keystone species do not necessarily have a high population density. In fact, many keystone species have relatively low population numbers but exert a disproportionate influence on their ecosystem. The impact of keystone species comes from the critical role they play in maintaining the structure and function of an ecosystem, not from their abundance. E.g.: Gray wolf in Yellowstone National Park **(Statement 1 is incorrect)**
- Keystone species can be found across all types of organisms, from animals and plants to microorganisms like bacteria and fungi. Their critical ecological roles can range from top predators that regulate prey populations to plants that provide essential resources for other species. E.g.: Sea otters, Beavers and certain Mangrove plants. **(Statement 2 is correct)**
- The role of a keystone species is not the same across different ecosystems. A species' role is specific to the ecosystem it inhabits. In one ecosystem, a species may function as a predator, while in another, it may be an ecosystem engineer or primary producer. Keystone species' roles vary based on the structure and needs of the ecosystem they support. **(Statement 3 is incorrect)**

Q.59) Consider the following pairs:

	Region		**Endemic Species**
1.	Hangul	-	Arunachal Pradesh
2.	Sanga deer	-	Wular lake
3.	Lemur	-	Seychelles

Which of the pairs above is/are correct?

a) Only one pair
b) Only two pairs
c) All three pairs
d) None

Q.59) Solution (d)

Explanation:

- The Hangul (Kashmir Stag) is not found in Arunachal Pradesh but is endemic to the Kashmir region of Jammu & Kashmir in India, specifically in Pachigam National Park. The Hangul is critically endangered, and efforts have been made to protect its dwindling population. **(Pair 1 is incorrect)**

- The Sanga deer is not found in Wular Lake. It is an endemic and endangered species of Manipur, specifically in the Kabul Lamai National Park, which is located on the Loka Lake, the largest freshwater lake in northeastern India. The Sanga is also known as the dancing deer due to its unique gait. **(Pair 2 is incorrect)**
- Lemurs are not found in the Seychelles. They are endemic to Madagascar, an island country off the southeastern coast of Africa. Madagascar is home to over 100 species of lemurs, all of which are found nowhere else in the world. The Seychelles, located in the Indian Ocean, has its own unique fauna, but lemurs are native only to Madagascar. **(Pair 3 is incorrect)**

Q.60) Consider the following statements with respect to Indian Biodiversity:

1. India is a mega diverse country in terms of biodiversity.
2. Roughly 32% of Indian plants are endemic to the country.
3. Approximately 62% of the amphibians found in India are unique to this country

Which of the statements above is/are correct?

a) 1 only
b) 1 and 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.60) Solution (d)

Explanation:

- India is recognized as one of the 17 mega-diverse countries in the world. These countries are considered to have exceptionally high levels of biodiversity and endemism. India has rich biodiversity across various ecosystems, including forests, wetlands, marine areas, and deserts. The country is home to about 8% of the world's known species and is part of four global biodiversity hotspots. **(Statement 1 is correct)**
- India has a significant number of endemic plant species, meaning species that are found only in India. About 32% of Indian plant species are considered endemic. The Western Ghats, the Eastern Himalayas, and the Andaman and Nicobar Islands are known for high levels of plant endemism. Endemic plants play a critical role in India's biodiversity and require focused conservation efforts. **(Statement 2 is correct)**
- India is home to a variety of amphibian species, with a significant proportion being endemic. Approximately 62% of the amphibians found in India are unique to the country. This includes species that are found in specific regions, such as the Western Ghats, which is known for its rich diversity of amphibians, including frogs and toads. **(Statement 3 is correct)**

Q.61) Consider the following statements:

3. GRIHA is a rating tool that evaluates the environmental performance of a building holistically over its entire life cycle.
4. The GRIHA rating system is developed by NITI Aayog.

Which of the above statements is/are correct?

e) 1 only
f) 2 only
g) Both 1 and 2
h) Neither 1 nor 2

Q.61) Solution (a)

Explanation:

- GRIHA is an acronym for Green Rating for Integrated Habitat Assessment. GRIHA is a Sanskrit word meaning 'Abode.' It is a rating tool that helps people assesses the performance of their building against certain nationally acceptable benchmarks. It evaluates the environmental performance of a building holistically over its entire life cycle, thereby providing a definitive standard for what constitutes a 'green building.' **Hence, statement 1 is correct.**
- The GRIHA rating system, based on accepted energy and environmental principles is developed by TERI (The Energy and Resources Institute) and it has been adopted by the Ministry of New and Renewable Energy. It assesses a building out of 34 criteria and awards points on a scale of 100. In order to qualify for GRIHA certification, a project must achieve at least 50 points. **Hence, statement 2 is not correct.**

Q.62) Consider the following statements:

Statement-I: World Wetlands Day is celebrated on 2nd February every year.
Statement-II: The Ramsar Convention on wetlands was adopted on 2nd February, 1971.

Which one of the following is correct in respect of the above statements?

a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
b) Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I
c) Statement-I is correct but Statement-II is incorrect
d) Statement-I is incorrect but Statement-II is correct

Q.62) Solution (a)

Explanation:

- The Ramsar Convention is an intergovernmental treaty, adopted on 2nd February 1971, in the Iranian city of Ramsar, on the southern shore of the Caspian Sea. To commemorate the adoption of this international agreement on wetlands, World Wetlands Day is celebrated on 2nd February every year. The theme of World Wetland Day, 2024 is 'Wetlands and Human Wellbeing' which underscores the critical role wetlands play in enhancing our lives. **Hence, option a is the correct answer.**

Q.63) With reference to Intergovernmental Panel on Climate Change (IPCC), consider the following statements:

1. The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change.
2. Till now, IPCC has produced 16 assessment reports that provide guidelines for estimating greenhouse gas emissions and removal.
3. IPCC undertakes extensive scientific researches to produce these assessment reports.

Which of the above statements are INCORRECT?

a) 1 and 2 only
b) 1 and 3 only
c) 2 and 3 only
d) 1, 2 and 3

Q.63) Solution (c)

Explanation:

- The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change. It is an intergovernmental body of the UN constituted to advance scientific knowledge about climate change caused by human activities. **Hence, statement 1 is correct.**
- The IPCC prepares comprehensive Assessment Reports about the state of scientific, technical and socio-economic knowledge on climate change, its impacts and future risks, and options for reducing the rate at which climate change is taking place. The latest report is the Sixth (not sixteenth) Assessment Report which consists of three Working Group contributions and a Synthesis Report. **Hence, statement 2 is INCORRECT.**
- The IPCC does not itself undertake scientific assessments but only evaluates the state of scientific evidence on various aspects of climate change. It has 195 member states who elect a bureau of scientists to serve through an assessment cycle and the bureau selects experts to prepare IPCC reports. **Hence, statement 3 is INCORRECT.**

Q.64) With reference to United Nations Conference on the Human Environment, 1972 consider the following statements:

1. It was held in Stockholm, Sweden.
2. It is famously known as 'Earth Summit.'
3. It marked the emergence of international environmental law.

Which of the above statements are correct?

a) 1 and 2 only
b) 1 and 3 only
c) 2 and 3 only
d) 1, 2 and 3

Q.64) Solution (b)

Explanation:

- The 1972 United Nations Conference on the Human Environment, also known as the Stockholm Declaration, contained 26 principles, and placed environmental issues at the forefront of international concerns and marked the start of a dialogue between industrialized and developing countries on the link between economic growth, the pollution of the air, water, and oceans and the well-being of people around the world. **Hence, statement 1 is correct.**
- The United Nations Conference on Environment and Development (UNCED), which was held in Rio de Janeiro, Brazil, in 1992 was also known as the 'Earth Summit.' It concluded that the concept of sustainable development was an attainable goal for all the people of the world, regardless of whether they were at the local, national, regional or international level. **Hence, statement 2 is not correct.**
- The 1972 United Nations Conference on the Human 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 including the Stockholm Declaration and Action Plan for the Human Environment and several resolutions. **Hence, statement 3 is correct.**

Q.65) Which of the following statements is/are correct about UN Convention to Combat Desertification (UNCCD)?

1. It aims to protect and restore land, and combat desertification and drought.
2. It is a legally binding agreement.
3. Its permanent Secretariat is located in Bonn, Germany.

Select the answer using given code:

a) 1 only
b) 1 and 2 only
c) 1 and 3 only
d) 1, 2 and 3

Q.65) Solution (d)

Explanation:

- The UN Convention to Combat Desertification (UNCCD) aims to protect and restore land, and combat desertification and drought. It is the only convention stemming from a direct recommendation of the Rio Conference's Agenda 21. It was adopted in Paris, France, in June 1994 and entered into force in December 1996. **Hence, statement 1 is correct.**
- It is the only internationally legally binding framework set up to address the problem of desertification. The Convention is based on the principles of participation, partnership and decentralization- the backbone of good governance and sustainable development. It has 197 parties, making it near universal in reach. **Hence, statement 2 is correct.**
- Its permanent Secretariat is located in Bonn, Germany. The functions of the secretariat are to make arrangements for sessions of the Conference of the Parties (COP) and its subsidiary bodies established under the Convention, and to provide them with services as required. **Hence, statement 3 is correct.**

Q.66) With reference to United Nations Environment Programme (UNEP), consider the following statements:

1. The United Nations Environment Programme (UNEP) is the leading global authority on the environment.
2. The UNEP is headquartered in Nairobi, Kenya, making it the first UN headquarters in the Global South.
3. The Emission Gap Report is released annually by UNEP.

How many of the statements given above is/are correct?

a) Only one
b) Only two
c) All three
d) None

Q.66) Solution (c)

Explanation:

- The United Nations Environment Programme (UNEP) is the leading global authority on the environment. Through scientific studies, policy support, intergovernmental coordination and public advocacy, UNEP helps humanity to foster climate stability, live in harmony with nature and forge a pollution-free future, in line with the 2030 Agenda for Sustainable Development. **Hence, statement 1 is correct.**
- On 15 December, 1972, the 27th session of the UN General Assembly officially adopted Nairobi as UNEP's home base, making it the first UN headquarters in the Global South. This decision responded to a strong call from countries in the Global South to locate the fledgling agency in the developing world, which would have a crucial role to play in the environmental movement to follow. **Hence, statement 2 is correct.**
- Emission Gap Report, Adaptation Gap Report, Global Environment Outlook are the major reports released by United Nations Environment Programme (UNEP). Some of the major campaigns launched by UNEP include Beat Pollution, UN75, World Environment Day, Wild for Life. **Hence, statement 3 is correct.**

Q.67) Consider the following statements:

1. National Forest Policy of India, 1988 envisages a goal of achieving 25% of the geographical area of the country under forest and tree cover.
2. Forest cover includes all lands having trees of more than one hectare in an area with a tree canopy density of more than 33%, irrespective of ownership and species composition of trees.
3. India State of Forest Report (ISFR) is an annual publication of Forest Survey of India.

How many of the above statements is/are correct?

a) Only one
b) Only two
c) All three
d) None

Q.67) Solution (d)

Explanation:

- National Forest Policy of India, 1988 envisages a goal of achieving 33% of the geographical area of the country under forest and tree cover. The National Forest Policy, 1988 was brought as an Act of the Parliament of India to revise the previously enacted National Forest Policy of 1952. It strongly suggested the idea of empowering and involving local communities in the protection and development of forests. **Hence, statement 1 is not correct.**

- India State of Forest Report (ISFR) is a biennial publication of Forest Survey of India (FSI), an organization under the Ministry of Environment Forest & Climate Change. **Hence, statement 2 is not correct.**
- Forest cover includes all lands having trees of more than one hectare in an area with a tree canopy density of more than 10%, irrespective of ownership, the legal status of the land, and species composition of trees. **Hence, statement 3 is not correct.**

Q.68) Which of the following protocol/convention regulates the transboundary movement of living modified organisms (LMOs)?

a) Montreal Protocol
b) Cartagena Protocol
c) Vienna Convention
d) Ramsar Convention

Q.68) Solution (b)

Explanation:

- The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is an international agreement which aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biological diversity, taking also into account risks to human health. It was adopted on 29 January 2000 and entered into force on 11 September 2003. **Hence, option b is the correct option.**

Q.69) Consider the following statements about Kigali Amendment:

1. The Kigali Amendment to the Montreal Protocol aims to phase out the use of potent greenhouse gases called hydrofluorocarbons (HFCs).
2. The Kigali Amendment to the Montreal Protocol is legally binding treaty with mandatory targets for countries.

Which of the above statements is/are correct.

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.69) Solution (c)

Explanation:

- The Montreal Protocol on Substances that Deplete the Ozone Layer is the landmark multilateral environmental agreement that regulates the production and consumption of nearly 100 man-made chemicals referred to as ozone depleting substances (ODS). Under the Kigali Amendment; Parties to the Montreal Protocol will phase down production and consumption of Hydrofluorocarbons, commonly known as HFCs. **Hence, statement 1 is correct.**
- At the Kigali meeting, the world agreed to reduce the use of HFCs and move to refrigerants that neither cause global warming nor create an ozone hole. Notably, unlike Paris Agreement (where there are no repercussions for non-compliance), the Kigali Amendment to the Montreal Protocol is legally binding with mandatory targets for countries. **Hence, statement 2 is correct.**

Q.70) Consider the following issues:

5. Pollution
6. Climate change
7. Biodiversity loss
8. Antimicrobial Resistance

Which of the above together constitute the triple planetary crisis?

e) 1, 2 and 3
f) 1, 3 and 4
g) 1, 2 and 4
h) 2, 3 and 4

Q.70) Solution (a)

Explanation:

- The triple planetary crisis refers to the three main interlinked issues that humanity currently faces: climate change, pollution and biodiversity loss. This term underscores the interdependence of these issues and their collective impact on the planet's ecosystems, societies, and economies. Each of these issues has its own causes and effects and each issue needs to be resolved if we are to have a viable future on this planet. **Hence, option a is the correct answer.**

Q.71) Consider the following states:

1. Arunachal Pradesh
2. Madhya Pradesh
3. Chhattisgarh
4. Odisha

Arrange the above states in terms of descending cover of forest area as per ISFR 2021?

a) 1-2-3-4
b) 2-1-3-4
c) 3-1-4-2
d) 4-3-1-2

Q.71) Solution (b)

Explanation:

- According to ISFR 2021, The total forest and tree cover of the country is 80.9 million hectare which is 24.62 percent of the geographical area of the country. Area-wise Madhya Pradesh has the largest forest cover in the country followed by Arunachal Pradesh, Chhattisgarh, Odisha and Maharashtra. In terms of forest cover as percentage of total geographical area, the top five States are Mizoram (84.53%), Arunachal Pradesh (79.33%), Meghalaya (76.00%), Manipur (74.34%) and Nagaland (73.90%). **Hence, option b is the correct answer.**

Q.72) The 30 by 30 (30X30) target, which aims to designate 30% of Earth's land and ocean area as protected areas by 2030 is launched by?

a) United Nations Environment Programme (UNEP)
b) World Meteorological Organization (WMO)
c) High Ambition Coalition (HAC) for Nature and People
d) International Union for Conservation of Nature (IUCN)

Q.72) Solution (c)

Explanation:

- 30 by 30 (or 30x30) is a worldwide initiative was launched by the High Ambition Coalition for Nature and People (HAC) in 2020 for governments to designate 30% of Earth's land and ocean area as protected areas by 2030. The High Ambition Coalition (HAC) for Nature and People was launched in 2019 by Costa Rica, France and Britain as an intergovernmental group to champion a global deal for nature and people that

can halt the accelerating loss of species, and protect vital ecosystems. **Hence, option c is the correct answer.**

Q.73) With reference to carbon markets, consider the following statements:

1. Carbon markets allow the trade of carbon credits with the overall objective of bringing down carbon emissions.
2. The Paris Agreement provides for the use of international carbon markets by countries to fulfil their NDCs (Nationally Determined Contributions).
3. In Carbon trading, one credit gives the country or a company the right to emit one quintal of CO2.

Which of the above statements is/are correct?

a) 1 only
b) 1 and 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.73) Solution (b)

Explanation:

- Carbon markets are a tool for putting a price on carbon emissions. It allows the trade of carbon credits with the overall objective of bringing down emissions. These markets create incentives to reduce emissions or improve energy efficiency. For example, an industrial unit which outperforms the emission standards stands to gain credits. Another unit which is struggling to attain the prescribed standards can buy these credits and show compliance to these standards. **Hence, statement 1 is correct.**
- Article 6 of the Paris Agreement provides for the use of international carbon markets by countries to fulfil their NDCs (Nationally Determined Contributions). NDCs are climate commitments by countries setting targets to achieve net-zero emissions. For example, India aims to reach the target of net zero by 2070. **Hence, statement 2 is correct.**
- A carbon credit is a kind of tradable permit that, per United Nations standards, equals one tonne of carbon dioxide removed, reduced, or sequestered from the atmosphere. In Carbon trading, one credit gives the country or a company the right to emit one tonne of CO2. Carbon credits are traded at various exchanges across the world. **Hence, statement 3 is not correct.**

Q.74) With reference to Paris Agreement, consider the following statements:

1. The Paris Agreement is a legally binding international treaty on climate change.
2. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in December 2015.
3. Its overarching goal is to hold the increase in the global average temperature to well below 2°C above pre-industrial levels.

Which of the above statements is/are correct?

a) 1 only
b) 1 and 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.74) Solution (d)

Explanation:

- The Paris Agreement is a legally binding international treaty on climate change. It provides a durable framework guiding the global effort for decades to come. It marks the beginning of a shift towards a net-zero emissions world. Implementation of the Agreement is also essential for the achievement of the Sustainable Development Goals. **Hence, statement 1 is correct.**
- The Paris Agreement was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015. It entered into force on 4 November 2016. Today, 195 Parties (194 States plus the European Union) have joined the Paris Agreement. **Hence, statement 2 is correct.**
- The Paris Agreement sets long-term goals to guide all nations to substantially reduce global greenhouse gas emissions to hold global temperature increase to well below 2°C above pre-industrial levels and pursue efforts to limit it to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change. **Hence, statement 3 is correct.**

Q.75) In 2021, PM Modi addressed the COP26 climate summit in Glasgow and announced the 'Panchamrit' or the five-point agenda to fight climate change. Which of the following are part of this 'Panchamrit'?

1. Reach 5,000 GW non-fossil energy capacity by 2030.
2. 50 per cent of its energy requirements from renewable energy by 2030.
3. Reduction of the carbon intensity of the economy by 45 per cent by 2030, over 2005 levels.

Select the answer using code given below:

a) 1 and 2 only
b) 1 and 3 only
c) 2 and 3 only
d) 1, 2 and 3

Q.75) Solution (c)

Explanation:

- The Government of India articulated and put across the concerns of developing countries at the 26th session of the Conference of the Parties (COP26) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Glasgow, United Kingdom. Further, India presented the following five nectar elements (Panchamrit) of India's climate action:
    - Reach 500 GW non-fossil energy capacity by 2030.
    - 50 per cent of its energy requirements from renewable energy by 2030.
    - Reduction of total projected carbon emissions by one billion tonnes from now to 2030.
    - Reduction of the carbon intensity of the economy by 45 per cent by 2030, over 2005 levels.
    - Achieving the target of net zero emissions by 2070. **Hence, option c is the correct answer.**

Q.76) With respect to Mission LiFE, consider the following statements:

1. Mission LiFE (Lifestyle for Environment) was launched by Prime Minister Narendra Modi at COP27 in Sharm El-Sheikh, Egypt.
2. The Mission LiFE emboldens the spirit of the P3 model, i.e., Pro Planet People.

Which of the above statements is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.76) Solution (b)

Explanation:

- Mission LiFE was introduced by Prime Minister Narendra Modi—at COP26 in Glasgow on 1 November 2021—as a mass movement for "mindful and deliberate utilization,

instead of mindless and destructive consumption" to protect and preserve the environment. According to the United Nations Environment Programme (UNEP), if 1 out of 8 billion people worldwide adopt environment-friendly behaviours in their daily lives, global carbon emissions could drop up to 20%. **Hence, statement 1 is not correct.**

- Mission LiFE aims to nudge individuals and communities to practice a lifestyle that is synchronous with nature and does not harm it. Those who practice such a lifestyle are recognised as Pro Planet People. India is the first country to include LiFE in its Nationally Determined Contributions (NDCs). **Hence, statement 2 is correct.**

Q.77) Consider the following statements about Eco Mark Scheme:

3. Eco Mark is a voluntary labelling scheme for consumer products meeting Indian environmental criteria and quality standards.
4. The Eco Mark Scheme is being administered by the Bureau of Indian Standards.

Which of the above statements is/are correct?

e) 1 only
f) 2 only
g) Both 1 and 2
h) Neither 1 nor 2

Q.77) Solution (c)

Explanation:

- Eco Mark is a voluntary labelling scheme for consumer products meeting Indian environmental criteria and quality standards. The Scheme covers various product categories like Soaps and Detergents, Paints, Food Items, Lubricating Oils, Packing/Packaging Materials, Architectural Paints and Powder Coatings, Batteries, Electrical and Electronic Goods, Food Additives, Wood Substitutes, Cosmetics, Aerosols and Propellants, Plastic Products, Textiles, Fire-extinguisher, Leather and Coir & Coir Products. **Hence, statement 1 is correct.**
- ECO Mark Scheme was instituted by the Government of India for labeling of environment friendly products. It is being administered by the Bureau of Indian Standards. The presence of ECO Logo along with ISI Mark on a product indicates that the product meets certain Environmental criteria along with the Quality requirements as specified in the relevant Indian Standard. **Hence, statement 2 is correct.**

Q.78) The world's first-ever market for trading in particulate matter emissions was launched by?

e) Government of Andhra Pradesh
f) Government of Uttar Pradesh

g) Government of Maharashtra
h) Government of Gujarat

Q.78) Solution (d)

Explanation:

- The Government of Gujarat in 2019 launched the world's first-ever market for trading in particulate matter emissions in the city of Surat. The project called the Emission Trading Scheme, aims to reduce air pollution by allowing industries to 'buy and sell' permits for emitting particulate matter. **Hence, option d is the correct answer.**

Q.79) With reference to Central Pollution Control Board (CPCB), consider the following statements:

4. CPCB is a statutory organisation constituted under the Water (Prevention and Control of Pollution) Act, 1974.
5. It comes under Ministry of Science and Technology.
6. The headquarter of CBCB is located in Bengaluru.

Which of the above statements is/are correct?

e) 1 only
f) 1 and 2 only
g) 2 and 3 only
h) 1, 2 and 3

Q.79) Solution (a)

Explanation:

- The Central Pollution Control Board (CPCB) is a statutory organisation constituted in September 1974 under the Water (Prevention and Control of Pollution) Act, 1974. Further, CPCB was entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981. It also provides technical services to the Ministry of Environment, Forests, and Climate Change (MOEFCC) under the provisions of the Environment (Protection) Act, 1986. **Hence, statement 1 is correct.**
- The Central Pollution Control Board (CPCB) of India comes under the Ministry of Environment, Forest and Climate Change (MoEFCC). It is the apex organization in country in the field of pollution control, as a technical wing of MoEFCC. The board is led by its chairperson appointed by the Appointments Committee of the Cabinet of the Government of India. **Hence, statement 2 is not correct.**
- The headquarter of Central Pollution Control Board (CPCB) is located in New Delhi, with seven zonal offices and 5 laboratories. The board conducts environmental

assessments and research. It is responsible for maintaining national standards under a variety of environmental laws, in consultation with zonal offices, tribal, and local governments. **Hence, statement 3 is not correct.**

Q.80) With respect to National Action Plan for Climate Change (NAPCC), consider the following statements:

1. The National Action Plan on Climate Change (NAPCC) was released by Prime Minister's Council on Climate Change (PMCCC) in 2014.
2. It outlines a national strategy that aims to enable the country to adapt to climate change and enhance the ecological sustainability of India's development path.
3. National Solar Mission is a part of the National Action Plan on Climate Change (NAPCC).

Which of the above statements is/are correct?

a) 1 only
b) 1 and 2 only
c) 2 and 3 only
d) 1, 2 and 3

Q.80) Solution (c)

Explanation:

- The National Action Plan on Climate Change (NAPCC) was designed and published under the guidance of Prime Minister's Council on Climate Change (PMCCC) in 2008 to mitigate and adapt to the adverse impact of climate change. **Hence, statement 1 is not correct.**
- NAPCC outlines a national strategy that aims to enable the country to adapt to climate change and enhance the ecological sustainability of India's development path. It stresses that maintaining a high growth rate is essential for increasing living standards of the vast majority of people of India and reducing their vulnerability to the impacts of climate change. It also co-ordinates the activities of the State Board and resolve disputes among them. **Hence, statement 2 is correct.**
- There are eight National Missions which form the core of the National Action Plan. They focus on promoting understanding of climate change, adaptation and mitigation, energy efficiency and natural resource conservation. These are:
    - National Solar Mission.
    - National Mission for Enhanced Energy Efficiency.
    - National Mission on Sustainable Habitat.
    - National Water Mission.
    - National Mission for Sustaining the Himalayan Eco-system.
    - National Mission for a Green India.
    - National Mission for Sustainable Agriculture 8. National Mission on Strategic Knowledge for Climate Change. **Hence, statement 3 is correct.**

Q.81) Which of the following statements are correct about crop rotation?

1. Growing of different crops on a piece of land in a pre-planned succession is called crop rotation.
2. The availability of moisture and irrigation facilities decide the choice of crops to be grown.
3. Ideally staple grain crops are rotated with leguminous crops.

Select the correct code using codes given below:

a) 1 and 2 only
b) 2 and 3 only
c) 1 and 3 only
d) All of the above

Q.81) Solution: Option (d)

Explanation:

Usually grain crops like rice, wheat etc, needs a lot of nutrition. Repeated growing of these crops rob the land from its nutrients. Hence it is ideal to rotate them with leguminous crops so that their fertility can be regained through nitrogen fixation.
Hence Option d is the correct answer.

Q.82) Which one of the following terms describes the practice of growing two or more crops simultaneously on the same piece of land?

a) Crop rotation
b) Mixed cropping
c) Intercropping
d) Mixed farming

Q.82) Solution: Option (d)

Explanation:

Mixed cropping is growing two or more crops simultaneously on a piece of land, this reduces risk and if the insects and some microorganisms attack anyone's crop the two crops also get spoiled, and is difficult to spray pesticides to crops. Intercropping is the growing of two or more crops simultaneously on a piece of land in definite patterns. This method of cropping can give a better yield.
• Crop rotation is the practice of planting different crops sequential' on the same plot of land to impro soil health, optimize nutrients in the soil, and combat pest and weed pressure. Mixed farming is the one in which there is rearing of livestock. The livestock enterprises are

complementary to crop production so as to provide a balanced and productive system of farming.
Hence Option d is the correct answer.

Q.83) Among the following, which one is related to Blue Revolution in India?

a) Floriculture
b) Sericulture
c) Pisciculture
d) Horticulture

Q.83) Solution: Option (c)

Explanation:

Blue revolution refers to the intense growth of the aquaculture industry by the rapid increase in fish and marine products. It was first begun in China. China accounts for around two-thirds of total aquaculture production worldwide.
Hence Option c is the correct answer.

Q.84) The National Disaster Management Division in India is the nodal division in the Ministry of Home Affairs for disaster management. Who is the Ex-officio Chairman of the National Disaster Management Authority?

a) The Prime Minister
b) The Home Minister
c) The Defence Minister
d) The Health and Family Welfare Minister

Q.84) Solution: Option (a)

Explanation:

The setting up of NDMA is mandated by the Disaster Management Act,2005.
• It is a Statutory Body for disaster management in the country.
• It is mandated to lay down the policies, plans and guidelines for Disaster Management. India envisions the development of an ethos of Prevention, Mitigation, Preparedness and Response.
• It is the apex body for Disaster Management in India.
• It is the nodal division in the Ministry of Home Affairs for disaster management.
• The National Disaster Management Authority (NDMA) is headed by the Prime Minister of India.
• The Prime Minister is the Ex-official Chairman of the National Disaster Management Authority.

• The Cabinet Minister is the Vice-Chairman.
The NDMA Secretariat, headed by a Secretary, is responsible for providing secretarial support and continuity.
• NDMA has 8 Ministers of State as its Members.
• It develops practices, delivers hands-on training and organizes drills for disaster management.
Some of the key responsibilities-
• Lay down policies on disaster management.
• Approve the National Plan.
• Provide such support to other countries affected by major disasters as may be determined by the Central Government.
• Take such other measures for the prevention of disaster, or the mitigation, or preparedness and capacity building for dealing with threatening disaster situations or disasters as it may consider necessary.
Hence Option a is the correct answer.

Q.85) The region where farmers specialise in vegetables only, this type of farming is known as:

a) Cooperative farming
b) Mixed farming
c) Truck farming
d) Collective farming

Q.85) Solution: Option (c)

Explanation:

The farmers specialize in vegetables only, this type of farming is known as Truck farming.
• In the regions where farmers specialize in vegetables only, the farming is known as Truck farming, and the distance of truck farms from the market is governed by the distance that a truck can cover overnight, hence the name truck farming.
• Vegetable farms are in some regions known as truck farms: "truck" is a noun for which its more common meaning overshadows its historically separate use as a term for"vegetables are grown for the market". The production of crops of some vegetables on an extensive scale in regions especially suited to their culture primarily for shipment to distant markets known as Truck farming.
• The major truck-farming areas are in California, Texas, Florida, along the Atlantic Coastal Plain, and in the Great Lakes area.Centres for specific crops vary with the season. Among the most important truck crops are tomatoes, lettuce, melons, beets, broccoli, celery, radishes, onions, cabbage, and strawberries.
Hence Option C is the correct answer.

Q.86) Consider the following statements:

1. The Disaster Management Act was passed by the Parliament in 2005.
2. The Union Home Minister Acts as a Chairperson of the National Disaster Management Authority (NDMA).
3. The NDMA may have not more than nine members including Vice-Chairman.
4. The tenure of the members of NDMA shall be five years.

Which of the statements given above are correct?

a) 1,2 and 3
b) 1 ,3 and 4
c) 2,3 and 4
d) All above

Q.86) Solution: Option (b)

Explanation:

The National Disaster Management
Authority (NDMA) is the apex statutory body for disaster management in India.
• The Disaster Management Act was passed by Parliament in 2005.
• The NDMA may have not more than Nine members including Vice-Chairman.
• Hence, **Options (1), (3) and (4) are correct.**
• The Prime Minister acts as a Chairperson of the NDMA instead of the Union Home Minister.
Hence statement 2 is not correct.

Q.87) The mixing of fertilizer or chemicals in irrigation water is called

a) Fertilization
b) Fertugation
c) Fertigation
d) Ferguration

Q.87) Solution: Option (c)

Explanation:

The mixing of fertilizer or chemicals in irrigation water is called Fertigation.
• Fertigation is a method in which fertilizer is mixed within the irrigation water by the drip system.
• In this system, fertilizer solution is distributed evenly in irrigated land. The availability of nutrients is very high therefore the efficiency is more and reducing the losses.

• In this method, both liquid fertilizers, as well as water-soluble fertilizers, are used. By this method, fertilizer use efficiency is increased from 80 to 90 per cent.
Hence Option C is the correct answer.

Q.88) Consider the following statements about drip irrigation system:

1. This is a type of micro irrigation system.
2. This method is more suitable in crops with space between two rows.
3. This method is very useful for fruit trees.
4. This method saves water.

Which of the above statements about drip irrigation system is correct:

a) 1,2,4 only
b) 1,3, 4 only
c) 1,2,3 and 4
d) 1,2,3 only

Q.88) Solution: Option (c)

Explanation:

• Drip Irrigation is indeed a type of micro-irrigation system that allows water to drip slowly to the roots of plants. This method is more suitable for crops with space between two rows as it can be precisely controlled and delivers water directly to the plant roots. It is very useful for fruit trees as it provides the right amount of water and nutrients directly to the roots.This method saves water by reducing evaporation and runoff, making it a highly efficient irrigation method.
Hence Option C is the correct answer.

Q.89) Which of the following States of India have the higher Opportunities for the development of wind power?

a) Uttar Pradesh and Punjab
b) Bihar and Jharkhand
c) Tamil Nadu and Gujarat
d) Rajasthan and Odisha

Q.89) Solution: Option (c)

Explanation:

Wind Energy:

• It is a type of renewable energy which is restricted to geographical areas where the wind is relatively constant. It involves rotation of the wind turbines (mechanical energy) due to rotor to spin (kinetic energy) and generation of electricity using a generator. Direct energy conversion usually implies the elimination of mechanical rotary machinery (turbines). Wind turbines are used to convert wind energy to electricity. India is ranked fifth in the world with a total wind power capacity of 10° MW. In India, states such as Gujarat, Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh have great potential for wind energy.
Hence Option C is the correct answer.

Q.90) With reference to solar power production in India, consider the following statements:

1. India is the third largest in the world in the manufacture of silicon wafers used in photovoltaic units.
2. The solar power tariffs are determined by the Solar Energy Corporation of India.

Which of the statements given above is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.90) Solution: Option (d)

Explanation:

Not a single silicon chip for solar energy is manufactured in India. Every solar panel which is made in India is assembled while all the material comes other countries. India is yet to develop semiconductor clusters. India plans to invest $480 million to set up its first unit for manufacturing solar silicon cells that will feed a project to build the world's largest solar power plant. Central Electricity Regulatory Commission regulate the tariff of generating companies owned or controlled by the Central Government. Solar Energy Corporation of India Limited (SECI) has a power trading license.
Hence Option D is the correct answer.

Q.91) With reference to technologies for solar power production, consider the following statements?

1. 'Photovoltaics is a technology that generates electricity by direct conversion of light into electricity, while 'Solar Thermal' is a technology that utilizes the Sun's rays to generate heat which is further used in the electricity generation process.
2. Photovoltaics generates Alternating Current (AC), while Solar Thermal generates Direct Current (DC).

3. India has a manufacturing base for Solar Thermal technology, but not for Photovoltaics.

Which of the statements given above is/are correct?

a) 1 only
b) 2 and 3 only
c) 1,2 and 3
d) None

Q.91) Solution: Option (a)

Explanation:

Photovoltaic (PV) devices generate electricity directly from sunlight using PV cells made up of semiconductors.
• Photovoltaic devices convert optional radiation into electricity.
• Several solar thermal systems can collect and transform radiant energy
received from the sun into high-temperature thermal (heat) energy, which can be used directly or converted into electricity. **Hence Statement 1 is Correct.**
• Solar energy can be converted directly into electrical energy (direct current, DC) by photovoltaic (PV) cells commonly called solar cells. **Hence Statement 2 is not Correct.**
• India has a manufacturing base for Solar Thermal technology as well c for Photovoltaics. **Hence Statement 3 is not Correct.**

Q.92) With reference to "Geothermal Energy" consider the following statements:

1. Geothermal energy uses the heat generated by the Earthquakes.
2. It is the only renewable energy source that is unaffected by day-night.
3. The main advantage of geothermal energy is its low cost.

Which of the statements given above are correct?

a) 1 and 2 only
b) 2 and 3 only
c) 1 and 3 only
d) 1, 2 and 3

Q.92) Solution: Option (b)

Explanation:

Geothermal energy uses the heat generated by the Earth's core to produce clean energy. **Hence Statement 1 is incorrect.**

Geothermal Energy is the only renewable energy source that is unaffected by day-night. The main advantage of geothermal energy is its low cost. **Hence Statement 2 and 3 are correct.**

Q.93) Consider the following statements:

1. The Puga valley in the Ladakh region has the most promising geothermal field.
2. The Global Geothermal Alliance (GGA) - a platform for enhanced dialogue and knowledge sharing for coordinated action to increase the share of installed geothermal electricity and heat generation worldwide.
3. The main concern with reference to geothermal energy is the release of hydrogen sulfide.

Which of the above-given statements is/are correct?

a) 1 and 2 only
b) 1 and 3 only
c) 2 and 3 only
d) 1,2 and 3

Q.93) Solution: Option (d)

Explanation:

In India, Northwestern Himalayas and the western coast are considered geothermal areas.
• The USA has the world's largest geothermal power plants followed by New Zealand, Iceland, the Philippines and Central America.
• The Puga valley in the Ladakh region has the most promising geothermal field. **Hence, statement 1 is correct**
• The Geological Survey of India has already identified more than 350 hot spring sites, which can be explored as areas to tap geothermal energy.
• Geothermal energy can pose several environmental problems which include on-site noise, emissions of gas and disturbance at drilling sites.
• The steam contains hydrogen sulphide gas, which has the odour rotten eggs and causes air pollution. **Hence, statement 3 is correct**. The minerals in the steam are also toxic to fish and they are corrosive to pipes, and equipment, requiring constant maintenance.
• To promote wider geothermal energy development, IRENA coordinates and facilitates the work of the Global Geothermal Alliance (GGA) - a platform for enhanced dialogue and knowledge sharing for coordinated action to increase the share of installed geothermal electricity and heat generation worldwide. **Hence, statement 2 is correct.**

Q.94) t is possible to produce algae-based biofuels, but what is/are the likely limitation(s) of developing countries in promoting this industry?

1. Production of algae-based biofuels is possible in seas only and not on continents.

2. Setting up and engineering the algae-based biofuels production requires high level of expertise/technology until the construction is completed.
3. Economically viable production necessitates the setting up of large scale facilities which may raise ecological and social concerns.

Select the correct answer using the codes given below:

a) 1 and 2 only
b) 2 and 3 only
c) 3 only
d) 1,2 and 3

Q.94) Solution: Option (b)

Explanation:

Biofuel Production
• Land and Water Flexibility: Algae-based biofuels can be produced on land, saline water, or wastewater, not just in seas. They can also grow on non-cropland and brackish or polluted water. Land-Based Systems: These systems are more advanced and widely used compared to sea-based systems. **Hence, statement 1 is incorrect.**
• Technological and Expertise Requirements
• Pre-Commercial Stage: The production of algae-based biofuels requires high levels expertise and advanced technology, especially during the setup and construction stages.
Capital Investment: Developing countries often face challenges in capital investments due to the pre-commercial nature of this technology. **Hence, statement 2 is correct.**
• Ecological and Social Concerns :Impact on Food and Resources: Large-scale production facilities may compete with food production, raising concerns about food shortages and increased costs.
• Environmental Impact: Such facilities may also have ecological implications, affecting local ecosystems. **Hence, statement 3 is correct.**

Q.95) With reference to the Green Hydrogen, consider the following statements:

1. Green hydrogen is produced with the help of electrolysis through electricity generated from renewable sources of energy such as solar and wind.
2. An electric current then splits the water into hydrogen and oxygen.
3. This ensures no greenhouse gas emissions as the only by-product of this process is oxygen, making it a great replacement for carbon-emitting fuels.

Which of the above statement is/are correct?

a) 1 only
b) 2 and 3 only
c) 1 and 3 only

d) 1,2, and 3

Q.95) Solution: Option (d)

Explanation:

Green hydrogen

• It is produced with the help of electrolysis through electricity generated from renewable sources of energy such as solar and wind. **Hence, statement 1 is correct.**

An electric current then splits the water into hydrogen and oxygen. **Hence, statement 2 is correct.**

• This ensures no greenhouse gas emissions as the only byproduct of this process is oxygen, making it a great replacement for carbon-emitting fuels. **Hence, statement 3 is correct**.

• Green Chemicals like ammo and methanol can directly be utilized in existing applications like fertilizers, mobility, power, chemicals, shipping etc

Green Hydrogen blending up to 10% may be adopted in CGD networks to gain widespread acceptance.

• It is a clean-burning molecule, which can decarbonize a range of sectors including iron and steel, chemicals, and transportation.

• Renewable energy that cannot be stored or used by the grid can be channelled to produce hydrogen.

Q.96) Consider the following statements:

1. Biochemical Oxygen Demand (BOD) is the amount of dissolved oxygen needed by bacteria in decomposing the organic wastes present in water.
2. Greater the BOD, greater is the amount of organic matter.

Which of the statements given above is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.96) Solution (c)

Explanation:

- Biochemical Oxygen Demand (BOD) measures the amount of oxygen that microorganisms, such as bacteria, need to break down the organic matter in a given water sample. The more organic waste present in the water, the more oxygen the bacteria will need for decomposition. BOD is a critical indicator of water quality,

especially in aquatic ecosystems, and is used to assess the pollution levels in water bodies.

- The higher the BOD value, the greater the amount of organic pollutants in the water. This is because a higher concentration of organic matter means that more oxygen will be required for the bacteria to decompose it. High BOD levels indicate significant organic pollution in a water body, which can lead to oxygen depletion and negatively impact aquatic life. **(Hence Option (c) is correct)**

Q.97) Which of the following is an integrated approach that combines sustainable land management practices with efforts to reduce poverty and biodiversity loss in desertification-prone areas?

a) Land Degradation Neutrality
b) National Watershed Development
c) National Mission on Sustainable Agriculture
d) Soil Health Card Scheme

Q.97) Solution (a)

Explanation:

- Land Degradation Neutrality (LDN) is a globally recognized framework initiated by the United Nations Convention to Combat Desertification (UNCCD). LDN aims to balance land degradation with efforts to improve land productivity, ecosystem services, and human well-being. It integrates sustainable land management, biodiversity conservation, and poverty reduction, especially in desertification-prone areas.
- The National Watershed Development Programme focuses on improving the management of watersheds for agricultural productivity and water resource conservation, primarily in rainfed areas.
- The National Mission on Sustainable Agriculture (NMSA) focuses on climate-resilient agriculture practices, including water-efficient cropping systems, improving soil health, and agroforestry.
- The Soil Health Card Scheme is an initiative by the Government of India to provide farmers with information on soil fertility and recommendations on nutrient management.

Hence Option A is the correct answer.

Q.98) Which of the following best describes the aim of the Shoonya campaign initiated by NITI Aayog?

a) Reducing air pollution by promoting the use of Electric Vehicles (EVs).
b) Promoting circular economy in the management of the Municipal Solid Wastes.
c) Promoting biofuels and phased reduction of fossil fuels in public transport.

d) Incentivizing the construction of public utilities to eliminate open defecation.

Q.98) Solution: Option (a)

Explanation:

- The "Shoonya – Zero Pollution Mobility" initiative, led by NITI Aayog, aims to enhance air quality in India by expediting the adoption of electric vehicles (EVs) for ride-hailing and delivery services. Derived from the Sanskrit word for zero, "Shoonya" signifies the inception of possibilities. Inspired by this meaning, the campaign intends to transform the transportation sector through a swift transition to zero-emission vehicles. The campaign focuses on creating awareness among consumers and acknowledging industry efforts towards sustainable mobility. The Shoonya campaign aims to pave the way for 100% electrification in India's urban final-mile connectivity and delivery sector.

Hence Option A is the correct answer.

Q.99) Consider the following statements with respect to the Mission Mausam:

5. The Mission Mausam is a 10,000 Crore initiative to Enhance India's Weather and Climate Forecasting by 2047
6. Mission Mausam has the goal of making Bharat a "Weather-ready and Climate-smart" nation, so as to mitigate the impact of climate change and extreme weather events and strengthen the resilience of the communities and it will be implemented during 2024-26.
7. Indian Institute of Tropical Meteorology under the Ministry of the Earth Science will be the sole implementing agency for the Mission Mausam
8. Mission Mausam will improve forecasts on both spatial and temporal scales and air quality data and help strategize weather management.

How many of the above statements is/are correct with reference to the features of the Mission Mausam?

e) Only one
f) Only two
g) Only three
h) All the four

Q.99) Solution: Option (b)

Explanation:

- The Union Cabinet approved Mission Mausam on September 11, 2024, with a **budget outlay of 2,000 crores over two years**, is an ambitious initiative of the Government of India **Statement one is not correct**.

- Mission Mausam has the goal of making Bharat a "Weather-ready and Climate-smart" nation, so as to mitigate the impact of climate change and extreme weather events and strengthen the resilience of the communities. Currently the Mission Mausam will be implemented during 2024-26 and it seeks to exponentially enhance the country's weather and climate observations, understanding, modelling and forecasting, leading to better, more useful, accurate and timely services. **Statement two is correct**
- Three institutes of the Ministry Earth Science: IMD, NCMRWF and the Indian Institute of Tropical Meteorology, will primarily implement Mission Mausam**.** These institutions will be supported by other Ministry Earth Science institutions (Indian National Centre for Ocean Information Services and National Institute of Ocean Technology) along with collaborating national and international institutes, academia and industries, furthering India's leadership in weather and climate sciences and services. **Statement three is not correct**
- According to the secretary of the Ministry of Earth Science, Mission Mausam will improve forecasts on both spatial and temporal scales and air quality data and help strategize weather management/intervention in the long run. "By March 2026, we are looking at installing a wider network of radars, wind profilers, and radiometers for better observations. **Statement four is correct**

Q.100) Which one of the following best describes the term "red tides"?

a) The phenomenon of seasonal algae blooms that are harmful to marine life
b) The rise in sea levels due to global warming, causing floods in coastal regions
c) The occurrence of high tides caused by the gravitational pull of the moon during a red moon period.
d) The appearance of red-colored corals due to increased temperatures in coral reefs.

Q.100) Solution (a)

Explanation:

- Red tides are caused by the rapid growth of certain types of algae, mainly dinoflagellates, which produce toxins. These algal blooms can give the water a reddish or brownish color and are harmful to marine life due to the toxins produced, leading to mass fish deaths, shellfish poisoning, and even harm to humans in some cases. These events are often related to changes in water temperature, nutrient availability, or other environmental factors. **(Option (a) is correct)**
- Rising sea levels are a consequence of global warming but are unrelated to the phenomenon of red tides. Rising sea levels are caused by the melting of polar ice caps and the thermal expansion of water due to global temperature increases, but they do not cause discoloration of water or toxic algal blooms. **(Option (b) is incorrect)**
- High tides caused by the gravitational pull of the moon are known as spring tides, and while these tides can be stronger during specific lunar events, they are unrelated to the concept of red tides, which are algal blooms, not tidal phenomena. **(Option (c) is incorrect)**

- Increased temperatures in coral reefs lead to coral bleaching, where corals expel the symbiotic algae living in their tissues, causing the corals to turn white. This is unrelated to red tides, which involve the discoloration of water due to algal blooms, not changes in coral color. **(Option (d) is incorrect)**