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T.B.C. : STS-K-TPT
Serial No.:

Test Booklet Series

B

TEST BOOKLET

Subject : Test 8 – ENVIRONMENT & ECOLOGY
Question Paper

Time Allowed : Two Hours **Maximum Marks : 200**

INSTRUCTIONS

1.IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GOT IT REPLACED BY A COMPLETE TEST BOOKLET.

2. Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer Sheet. Any omission/discrepancy will render the Answer Sheet liable for rejection.

3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. DO NOT write anything else on the Test Booklet.

4. This Test Booklet contains 100/80 items (questions). Each item is printed in English. Each item comprises of four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each item.

5. You have to mark all your responses ONLY on the separate Answer Sheet provided. See directions in the Answer Sheet.

6. All items carry equal marks

7. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.

8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator only the Answer Sheet. You are permitted to take away with you the Test Booklet.

9. Sheets for rough work are appended in the Test Booklet at the end.

10. **Penalty for wrong answers:**

THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS

(i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one third** if the marks assigned to that question will be deducted as penalty.

(ii) If a candidate gives more than one answer, it will be treated as a wrong answer even if one of the given answers happens to be correct and there will be same penalty as above to that question.

(iii) If a question is left blank, i.e., no answer is given by the candidate, there will be no penalty for that question.

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1. Bioaccumulation refers to the gradual build-up of toxic substances in the tissues of living organisms over time. Which of the following is the best example illustrating the concept of bioaccumulation?
(a) A vulture feeding on multiple carcasses in its habitat.
(b) A deer migrating from one forest to another in search of food.
(c) Mercury storing in the tissues of a tuna fish over its lifespan due to contaminated water.
(d) A honeybee collecting nectar from flowers and pollinating plants in the process.

2. In an ecosystem, energy flows from producers to consumers through different trophic levels. Which of the following is the best example illustrating this energy transfer?
(a) A sunflower turning towards the sunlight for photosynthesis.
(b) A snake using its camouflage to avoid predators.
(c) A grasshopper feeding on grass, and a frog preying on the grasshopper
(d) A bear hibernating during winter to conserve energy.

3. Dead zones, also known as hypoxic zones, are increasingly observed in coastal and marine ecosystems due to human-induced nutrient pollution. In this context, which of the following best describes a "Dead Zone" in the ocean?
(a) Regions of the ocean that are inaccessible to humans
(b) Areas where ocean currents and biological activity are absent
(c) Marine zones where dissolved oxygen levels are extremely low, making it difficult for most aquatic organisms to survive
(d) Regions dominated by large marine predators that feed on other organisms

4. In an ecosystem, abiotic components refer to the non-living physical and chemical factors that influence the structure and functioning of biological communities. In this context, consider the following:
1. Water
2. Insolation (solar radiation)
3. Winds
4. Decomposers
5. Soil

Which of the above are abiotic components of an ecosystem?
(a) 1 and 5 only
(b) 1, 2, 3 and 5 only
(c) 2, 3 and 4 only
(d) 1, 3, 4 and 5 only

5. Plants are often classified based on their adaptations to environmental moisture conditions and ecological niches. In this context, consider the following statements:
1. Epiphytes are non-parasitic plants that grow on other plants mainly for physical support.
2. Xerophytic plants require large quantities of water to survive in their habitat.
3. Mesophytes are terrestrial plants adapted to environments that are neither excessively dry nor excessively wet.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

6. With reference to the hierarchy of ecological organization, consider the following sequence Which of the above correctly represents the ascending order of ecological organization from the smallest unit to the largest?
(a) Organism → Community → Population → Ecosystem → Biome → Biosphere
(b) Organism → Population → Community → Ecosystem → Biome → Biosphere
(c) Population → Organism → Ecosystem → Community → Biome → Biosphere
(d) Organism → Ecosystem → Population → Biome → Community → Biosphere

7. Adaptation enables organisms to survive and reproduce in specific environmental conditions. In this context, consider the following pairs:

Type of Adaptation	Example
1. Structural adaptation	Development of sharp claws in predatory birds such as eagles for capturing prey
2. Physiological adaptation	Production of antifreeze proteins in Arctic fish to prevent freezing
3. Behavioural adaptation	Ability of the kangaroo rat to remain in burrows and store food to survive extreme desert temperatures
4. Mimicry (protective adaptation)	Ability of octopuses to change colour and texture to blend with surroundings

Which of the pairs given above are correctly matched?
(a) 1 and 3 only
(b) 2, 3 and 4 only
(c) 1, 2 and 4 only
(d) 1, 2, 3 and 4

8. With reference to the hierarchy of ecological organization, consider the following statements:
1. A biome consists of several ecosystems that share broadly similar climatic conditions and dominant vegetation.
2. A population refers to different species interacting with each other within a defined geographical area.
3. An ecosystem includes interactions only among the biotic components within a given area.
4. The biosphere represents the highest level of ecological organization, encompassing all ecosystems and the interactions of living organisms with the atmosphere, hydrosphere, and lithosphere.

Which of the statements given above is/are correct?
(a) 1 and 4 only
(b) 1, 2 and 3 only
(c) 1, 3 and 4 only
(d) 2 and 3 only

9. With reference to the concept of "Flagship Species" in biodiversity conservation, consider the following statements:
1. A flagship species is a species chosen to represent and promote conservation efforts for a particular habitat or environmental cause.
2. The selection of a flagship species is often based on its charisma, public appeal, or cultural significance to attract public support.
3. A flagship species is necessarily the top predator of the ecosystem and must occupy the highest trophic level.

Which of the statements given above is/are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

10. With reference to cloud seeding as a weather modification technique, consider the following statements:
1. Cloud seeding involves dispersing substances such as silver iodide, potassium iodide, or dry ice into clouds to enhance precipitation.
2. The technique is used to induce rainfall, reduce hail damage, or disperse fog in airports under suitable atmospheric conditions.
3. Cloud seeding can create rain in completely cloudless skies by artificially forming clouds.

Which of the statements given above is/are correct?
(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1, 2 and 3

11. Parasitoidism is a biological interaction in which the parasite ultimately kills its host as part of its life cycle. Parasitoids are typically insects whose larvae develop on or inside a host organism, consuming it until death. In this context, consider the following host–parasite pairs:

1. Ichneumon wasp – Caterpillars
2. Emerald cockroach wasp – Cockroach
3. Screw-worm fly – Livestock
4. Tick – Mammals

Which of the above represent examples of parasitoidism?
Options:
(a) 1 and 2 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

12. Brood parasitism is a reproductive strategy in which one species lays its eggs in the nest of another species, relying on the host to incubate the eggs and raise the offspring, often to the detriment of the host's own young. In this context, consider the following host–parasite pairs:

1. Common cuckoo (*Cuculus canorus*) – Warblers
2. Honeyguide (*Indicator indicator*) – Other bird species
3. Cowbird (*Molothrus* spp.) – Other songbirds
4. Frigate bird – Seabirds

Which of the above represent examples of brood parasitism?
Options:
(a) 1 and 2 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

13. Invasive alien species (IAS) are non-native organisms introduced into an ecosystem where they establish themselves, spread rapidly, and often disrupt native biodiversity and ecosystem functions. In this context, consider the following species:

1. Prosopis juliflora – A drought-resistant tree introduced in India that often outcompetes native vegetation and alters soil and groundwater conditions.
2. African catfish (*Clarias gariepinus*) – A highly predatory fish species known to threaten native freshwater biodiversity.
3. Snow trout (*Schizothorax* spp.) – A fish species naturally occurring in Himalayan river systems.
4. Papaya mealybug (*Paracoccus marginatus*) – An invasive pest that damages papaya and several other crops.

Which of the above are considered invasive species in India?
Options:
(a) 1 and 2 only
(b) 1, 2 and 4 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

14. Consider the following pairs:

Phenomenon	Explanation
1. Ice–albedo feedback in polar regions	Loss of reflective ice surfaces increases solar absorption and accelerates warming
2. Arctic amplification	Polar regions warming faster than the global average due to climate feedback mechanisms
3. Urban heat island effect	Dark urban surfaces such as asphalt absorb more solar radiation compared to natural landscapes
4. Glacier retreat and cryosphere changes	Reduction of ice and snow cover exposes darker land or water surfaces

Which of the pairs given above are correctly matched?
(a) 1 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

15. Obligate mutualism is an ecological interaction in which two species are interdependent for survival and reproduction, such that neither species can complete its life cycle without the other. In this context, consider the following species pairs:

1. Fig tree – Fig wasp
2. Lichen (fungus – algae/cyanobacteria)
3. Coral – Zooxanthellae algae
4. Honeybee – Sunflower

Which of the above represent examples of obligate mutualism?
(a) 1 and 2 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

16. With reference to sector-wise contributions to global greenhouse gas (GHG) emissions, arrange the following sectors in the decreasing order of their share in total emissions:

1. Transportation
2. Industry
3. Agriculture, Forestry and Other Land Use (AFOLU)
4. Electricity and Heat Production

Select the correct answer using the codes given below:
(a) 1 – 2 – 3 – 4
(b) 3 – 2 – 1 – 4
(c) 2 – 4 – 1 – 3
(d) 4 – 3 – 2 – 1

17. Ectoparasitism is a type of parasitism in which the parasite lives on the external surface of the host, feeding on its blood or bodily fluids. These parasites often cause irritation, disease transmission, and weakening of the host.
Which of the following species represent examples of Ectoparasitism?

1. Head Louse (Pediculus humanus capitis) and Humans
2. Ticks and Mammals
3. Hookworm (Ancylostoma) and Humans
4. Bedbugs and Humans

Select the correct answer using the codes below:
A) 1 and 2 only
B) 2, 3, and 4 only
C) 1, 2, and 4 only
D) 1, 2, 3, and 4

18. Predation is a biological interaction where one species (the predator) hunts, kills, and consumes another species (the prey). It plays a crucial role in maintaining ecosystem balance by controlling prey populations.
Which of the following species represent examples of Predation?

1. Tiger and Deer
2. Venus Flytrap and Insects
3. Caterpillar and Leaves
4. Mosquito and Humans

Select the correct answer using the codes below:
A) 1 and 2 only
B) 1, 2, and 3 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

19. Antibiosis is a type of amensalism where one organism produces chemicals that inhibit or kill another organism, while the producer remains unaffected or even benefits. This interaction is commonly seen in microbes, plants, and fungi.
Which of the following species represent examples of Antibiosis?

1. Penicillium Fungus and Bacteria
2. Streptomyces Bacteria and Other Microorganisms
3. Black Walnut Tree and Nearby Plants
4. Cattle Grazing and Grass

Select the correct answer using the codes below:
A) 1 and 2 only
B) 1, 2, and 3 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

20. Agriculture is both vulnerable to climate change and a significant contributor to greenhouse gas emissions. In this context, consider the following factors:

1. Land-use changes such as deforestation and conversion of forests into agricultural land
2. Intensive farming practices involving heavy fertilizer use and mechanization
3. Promotion of vegetarian dietary patterns
4. Livestock rearing and dairy production

Which of the above factors can contribute to climate change?

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

21. With reference to Bisphenol A (BPA), a chemical widely used in plastic manufacturing, consider the following statements:

1. It is used in the production of polycarbonate plastics and epoxy resins.
2. It is a colorless solid that is completely soluble in water.
3. Human exposure to BPA can occur through air, water, and food (dietary intake).

Which of the statements given above is/are correct?
Options:
(a) 1 and 2 only
(b) 1 and 3 only
(c) 2 and 3 only
(d) 1, 2 and 3

22. Amensalism is a type of ecological interaction in which one species is inhibited or harmed, while the other species remains largely unaffected. Such interactions often arise due to chemical inhibition (allelopathy or antibiotics) or unintentional suppression of other organisms. In this context, consider the following species pairs:

1. Black walnut tree (*Juglans nigra*) – Nearby plants
2. Penicillium fungus – Bacteria
3. Cattle grazing – Insects in grasslands
4. Lion – Hyena

Which of the above pairs represent examples of amensalism?
Options:
(a) 1 and 2 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

23. Epiphytes are plants that grow on other plants for physical support but do not extract nutrients or harm the host plant. They rely on air, rain, and organic debris for sustenance, often found in tropical and temperate forests. Which of the following species represent examples of Epiphytes?

1. Orchids growing on tree branches
2. Mistletoe on Mango Trees
3. Spanish Moss (Tillandsia usneoides) on Oak Trees
4. Banyan Tree (Ficus benghalensis) Growing on Other Trees

Select the correct answer using the codes below:
A) 1 and 3 only
B) 1, 3, and 4 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

24. The Tundra Ecosystem is characterized by extreme cold temperatures, permafrost, and low biodiversity. The flora and fauna in this biome have adapted to survive harsh conditions, short growing seasons, and limited precipitation.
Which of the following statements about the Tundra Ecosystem are correct?

1. Mosses, lichens, and dwarf shrubs dominate the tundra flora due to shallow soil and permafrost.
2. Caribou, Arctic foxes, and Snowy owls are common fauna found in the tundra.
3. The tundra experiences high annual rainfall, leading to dense forests and rich vegetation.
4. Permafrost prevents deep-rooted plants from growing, restricting vegetation to low-lying species.

Select the correct answer using the codes below:
A) 1 and 2 only
B) 1, 2, and 4 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

25. Metabiosis is an ecological interaction in which one organism modifies the environment in a way that benefits another organism later, without direct interaction between them. The second organism typically utilizes structures, resources, or habitats created by the first. In this context, consider the following species pairs:

1. Beavers – Aquatic ecosystems
2. Hermit crabs – Empty snail shells
3. Dead trees – Woodpeckers
4. Barnacles – Whales

Which of the above represent examples of metabiosis?
Options:
(a) 1 and 2 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

26. The Taiga Ecosystem (also known as the Boreal Forest) is a cold, coniferous forest biome found in the Northern Hemisphere, characterized by long, harsh winters, short summers, and moderate precipitation.
Which of the following statements about the Taiga Ecosystem are correct?

1. Taiga forests primarily consist of coniferous trees like spruce, fir, and pine, adapted to cold temperatures.
2. Winters in the Taiga are mild with high rainfall, creating favorable conditions for diverse plant life.
3. Common fauna in the Taiga include large mammals such as moose, bears, and wolves, as well as migratory birds.
4. Taiga forests experience frequent wildfires, which play a role in maintaining ecological balance.

Select the correct answer using the codes below:
A) 1 and 3 only
B) 1, 3, and 4 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

27. Point sources of water pollution are pollutants that originate from a single, identifiable discharge point such as a pipe, outlet, or channel. Non-point sources arise from diffuse or scattered activities over a wide area. In this context, consider the following:

1. Factories
2. Sewage treatment plants
3. Oil tankers
4. Acid deposition from atmospheric pollution
5. Livestock feedlots

Which of the above are not considered point sources of water pollution?
(a) 1, 2 and 4 only
(b) 1, 2, 3 and 5 only
(c) 4 and 5 only
(d) 1, 2, 3, 4 and 5

28. Allelopathy refers to a biological interaction in which certain plants release chemical compounds (allelochemicals) into the surrounding environment that suppress the germination, growth, or survival of neighboring plants. In this context, consider the following species pairs:

1. Black walnut tree (*Juglans nigra*) – Nearby plants
2. Eucalyptus tree – Understory vegetation
3. Rice (*Oryza sativa*) – Competing weeds
4. Cuscuta (Dodder) – Host plants

Which of the above represent examples of allelopathy?
Options:
(a) 1 and 2 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

29. The Grassland Ecosystem is characterized by vast open landscapes with dominant grass vegetation, moderate rainfall, and periodic droughts. It supports a unique range of herbivores and carnivores adapted to its conditions.
Which of the following statements about the Grassland Ecosystem are correct?

1. Grasslands experience moderate rainfall (25-75 cm per year), preventing the growth of large trees.
2. Temperate grasslands (like the Prairies and Steppes) have hot summers and cold winters, whereas tropical grasslands (like the Savanna) remain warm throughout the year.
3. Grassland fauna includes large herbivores such as bison, zebras, and antelopes, along with predators like lions and wolves.
4. Grasslands are found only in temperate regions and do not exist in tropical climates.

Select the correct answer using the codes below:
A) 1 and 2 only
B) 1, 2, and 3 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

30. Dissolved Oxygen (DO) is a crucial parameter for assessing water quality. A decline in DO levels in a freshwater lake is most likely to result in:

A) Increased fish population and aquatic biodiversity
B) Higher decomposition rates leading to algal blooms
C) Mass fish mortality and the collapse of aquatic life
D) Increased oxygen availability for bottomdwelling organisms

31. In ecological classification, organisms are often categorized based on their feeding habits. Which of the following pairs are correctly matched?

1. Necrophages – Feed on dead and decaying animal flesh
2. Xylophages – Feed primarily on wood or woody plant material
3. Coprophages – Feed on animal feces
4. Mycophagous organisms – Feed on fungi

Select the correct answer using the codes given below:
(a) 1 and 2 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

32. Tropical and Temperate Rainforests are two distinct types of forest ecosystems that differ in climate, vegetation, and biodiversity. Which of the following statements correctly differentiate between Tropical Rainforests and Temperate Rainforests?

1. Tropical Rainforests are found near the equator, while Temperate Rainforests occur in mid-latitude coastal regions.
2. Tropical Rainforests have greater biodiversity, including species like jaguars and orangutans, whereas Temperate Rainforests have fewer species but include animals like black bears and elk.
3. Tropical Rainforests experience a dry season, while Temperate Rainforests receive rainfall throughout the year.
4. Both types of rainforests are dominated by broadleaf trees, with coniferous trees being rare in both ecosystems.

Select the correct answer using the codes below:
A) 1 and 2 only
B) 1, 2, and 3 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

33. Ecological niche refers to the functional role and position of a species within its ecosystem. Which of the following is the best example illustrating the concept of an ecological niche?
(a) A Bengal tiger preying on spotted deer in an Indian forest and marking its territory with scent.
(b) A peacock displaying its vibrant feathers to attract a mate.
(c) A polar bear living in the Arctic and having thick fur to insulate against cold temperatures.
(d) A banyan tree growing in tropical climates and producing aerial roots to support its branches.

34. A food chain represents the transfer of energy through different trophic levels in an ecosystem. Which of the following best illustrates a terrestrial food chain?
(a) Detritus → Earthworm → Frog → Snake → Hawk
(b) Mushroom → Termite → Lizard → Owl
(c) Neem Tree → Aphid → Butterfly → Crow
(d) Algae → Snail → Crab → Shark

35. An inverted pyramid of biomass occurs when the total biomass at higher trophic levels is greater than at lower levels. Which of the following is the best example of an inverted pyramid of biomass?
(a) Phytoplankton → Zooplankton → Small Fish → Large Fish
(b) Grass → Grasshoppers → Frogs → Snakes
(c) Tree → Caterpillars → Birds → Hawk
(d) Detritus → Earthworms → Frogs → Snakes

36. A pyramid of energy represents the flow of energy at different trophic levels in an ecosystem. Which of the following statements is correct regarding the pyramid of energy?
(a) It is always upright because energy decreases at each successive trophic level.
(b) It can be inverted in some ecosystems, where consumers store more energy than producers.
(c) It is based on the total biomass of organisms rather than the actual energy transfer.
(d) Energy transfer between trophic levels is 100% efficient, with no loss as heat.

37. Different greenhouse gases remain in the atmosphere for varying durations, influencing their long-term impact on climate change. Arrange the following greenhouse gases in the ascending order of their average atmospheric lifetime:
1. Methane (CH_4)
2. Carbon dioxide (CO_2)
3. Nitrous oxide (N_2O)
4. Fluorinated gases (e.g., HFCs, PFCs)

Select the correct answer using the codes below:
(a) Fluorocarbons – Nitrous oxide – Carbon dioxide – Methane
(b) Carbon dioxide – Methane – Fluorocarbons – Nitrous oxide
(c) Nitrous oxide – Fluorocarbons – Methane – Carbon dioxide
(d) Methane – Carbon dioxide – Nitrous oxide – Fluorocarbons

38. What do Coprophages primarily consume?
(A) Dead and decaying organisms
(B) Feces and animal dung
(C) Fungi and mushrooms
(D) Rotten wood and bark

39. Which of the following factors directly influence aquatic productivity in lakes and oceans?
1. Sunlight availability
2. Nutrient concentration
3. Dissolved oxygen levels
4. Salinity variations

Select the correct answer using the codes below:
A) 1 and 2 only
B) 1, 2, and 3 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

40. Which of the following best describes the concept of an ecological niche in an ecosystem?
(a) A honeybee collecting nectar from flowers and pollinating plants in the process. (b) A cactus storing water in its stem to survive in arid conditions. (c) A penguin having a thick layer of fat to survive in cold environments. (d) A vulture having strong eyesight to locate carcasses from a long distance.

41. Biomagnification refers to the increase in the concentration of toxic substances as they move up the food chain. Which of the following is the best example illustrating the concept of biomagnification?
(a) A honeybee collecting nectar from flowers and pollinating plants in the process.
(b) DDT pesticide concentration increasing in the tissues of predatory birds like eagles due to feeding on contaminated fish.
(c) A deer migrating from one forest to another in search of food.
(d) A vulture feeding on multiple carcasses in its habitat.

42. Ecological succession refers to the gradual and natural replacement of one biological community by another over time. Which of the following is the best example of ecological succession?
(a) A predator species adapting to hunt different prey due to food scarcity.
(b) A forest fire temporarily reducing the number of trees in a given area, after which the same tree species grow back.
(c) A population of deer migrating from one forest to another due to seasonal changes.
(d) A volcanic island developing plant life over centuries, starting with lichens and mosses, followed by grasses and trees.

43. Which of the following best describes ecological succession?
(a) The gradual replacement of one biological community by another over time.
(b) The seasonal migration of birds from one region to another.
(c) The adaptation of a species to survive in a new environment.
(d) The sudden disappearance of a species due to natural disasters.

44. Which of the following correctly describes an important process in the nitrogen cycle?
(a) Nitrogen-fixing bacteria convert atmospheric nitrogen (N_2) into ammonia (NH_3), making it available to plants.
(b) Plants absorb atmospheric nitrogen (N_2) directly for their growth and development.
(c) Decomposers convert ammonia into atmospheric nitrogen (N_2) in the final stage of the nitrogen cycle.
(d) Oxygen plays a major role in converting nitrogen compounds into usable forms for plants.

45. Which of the following correctly represents the different phases of the nitrogen cycle in the correct sequence?
(a) Nitrogen Fixation → Nitrification → Assimilation→Ammonification→ Denitrification
(b) Nitrification → Nitrogen Fixation → Denitrification → Assimilation → Ammonification
(c) Denitrification → Ammonification → Assimilation → Nitrogen Fixation → Nitrification
(d) Ammonification→NitrogenFixation→ Denitrification→Nitrification → Assimilation

46. The phosphorus cycle is an important biogeochemical cycle that regulates the availability of phosphorus in ecosystems. In this context, which of the following statements correctly describes a key characteristic of the phosphorus cycle?
(a) The phosphorus cycle is faster than the nitrogen cycle because phosphorus readily circulates through the atmosphere.
(b) Atmospheric phosphorus serves as the principal source of phosphorus for plants.
(c) Phosphorus mainly cycles through fossil fuel combustion and industrial emissions.
(d) Unlike carbon and nitrogen, phosphorus lacks a significant gaseous phase and primarily circulates through rocks, soil, water, and living organisms.

47. Eutrophication is a major environmental problem affecting freshwater and coastal ecosystems due to excessive nutrient enrichment. In this context, which of the following statements best describes the process of eutrophication?
(a) The gradual accumulation of sediments in lakes that eventually transforms them into wetlands over long geological periods.
(b) Excessive input of nutrients such as nitrogen and phosphorus into water bodies, resulting in algal blooms and depletion of dissolved oxygen.
(c) The buildup of toxic heavy metals in aquatic organisms due to industrial pollution.
(d) Rapid decomposition of organic matter in water bodies that increases dissolved oxygen levels for aquatic organisms.

48. Consider the following statements:
Statement 1:
Natural selection is the process by which organisms possessing advantageous heritable traits are more likely to survive and reproduce under environmental pressures, resulting in evolutionary change over generations.
Statement 2:
Artificial selection occurs without human intervention and leads to the survival of the fittest individuals through random environmental processes.
Which one of the following is correct in respect of the above statements?
(a) Both Statement 1 and Statement 2 are correct, and Statement 2 explains Statement 1.
(b) Both Statement 1 and Statement 2 are correct, but Statement 2 does not explain Statement 1.
(c) Statement 1 is correct, but Statement 2 is incorrect.
(d) Statement 1 is incorrect, but Statement 2 is correct.

49. Consider the following description of a greenhouse gas:

- It is emitted from natural sources such as wetlands and from anthropogenic activities including livestock rearing and leakage from natural gas systems.
- It is a potent greenhouse gas with a high capacity to trap heat by absorbing both incoming solar radiation and outgoing terrestrial radiation.

Which of the following greenhouse gases is being described above?
(a) Chlorofluorocarbons (CFCs)
(b) Nitrogen oxides (NOx)
(c) Methane
(d) Carbon dioxide

50. Methane (CH_4) is a potent greenhouse gas emitted from both natural processes and human activities. In this context, consider the following groups of emission sources:
(a) Rice cultivation, enteric fermentation in livestock, leakage from natural gas systems
(b) Cement production, coal combustion in thermal power plants, iron and steel manufacturing
(c) Nitrogen fertilizer application, soil microbial activity, biomass burning
(d) Refrigerant leakage from air conditioners, aerosol propellants, foam insulation industries

51. Evolutionarily Distinct and Globally Endangered (EDGE) species are organisms that represent a unique evolutionary lineage with few close relatives and are also at a high risk of extinction. Protecting such species helps conserve large amounts of evolutionary history. In this context, consider the following species found in India:

1. Ganges River Dolphin (*Platanista gangetica*) – A freshwater cetacean endemic to the Indian subcontinent.
2. Indian Pangolin (*Manis crassicaudata*) – A scaly mammal threatened by illegal wildlife trade.
3. Indian Star Tortoise (*Geochelone elegans*) – A reptile heavily trafficked in the international pet trade.
4. Snow Leopard (*Panthera uncia*) – A high-altitude predator adapted to cold Himalayan ecosystems.

Which of the above species are recognised as EDGE species?
(a) 1 and 2 only
(b) 1, 2 and 3 only
(c) 1, 3 and 4 only
(d) 1, 2, 3 and 4

52. Which of the following best describes "Evolutionarily Distinct and Globally Endangered (EDGE) species"?
(a) Species that have a disproportionately large ecological impact relative to their population size
(b) Species that are evolutionarily unique with few close relatives and are also facing a high risk of extinction
(c) Species selected to represent a conservation campaign or habitat for public awareness
(d) Species whose protection automatically ensures the conservation of many other species in the ecosystem

53. With reference to different forms of parasitism in ecology, consider the following host–parasite pairs associated with *mesoparasitism*:

1. Anchor worm (*Lernaea*) – Freshwater fish
2. Candiru fish (*Vandellia cirrhosa*) – Gills of larger fish
3. Leeches – Mammals
4. Tongue-eating louse (*Cymothoa exigua*) – Marine fish

Which of the pairs given above correctly represent examples of mesoparasitism?
Options:
A. 1 and 2 only
B. 1, 2 and 4 only
C. 2, 3 and 4 only
D. 1, 2, 3 and 4

54. Kleptoparasitism refers to a biological interaction in which one organism steals food or resources captured or collected by another organism, thereby benefiting without investing energy in obtaining the resource itself. In this context, consider the following species interactions:

1. Frigate birds – Seabirds (stealing fish caught by other seabirds)
2. Cuckoo birds – Host birds (laying eggs in the nests of other birds)
3. Hyenas – Lions (taking over prey hunted by lions)
4. Spotted hyenas – Vultures (competing for carcasses and sometimes stealing food)

Which of the above represent examples of kleptoparasitism?
Options:
(a) 1 and 3 only
(b) 1, 3 and 4 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

55. Social parasitism is a biological interaction in which one species exploits the social organisation or cooperative behaviour of another species—such as nest-building, brood care, or food collection—for its own benefit. In this context, consider the following species interactions:

1. Cuckoo birds – Host birds
2. Slave-making ants (*Polyergus* spp.) – Other ant colonies
3. Fig wasp – Fig tree
4. Termite-killing beetle (*Austrospirachtha mimetes*) – Termites

Which of the above represent examples of social parasitism?
Options
(a) 1 and 2 only
(b) 1, 2 and 4 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

56. Commensalism is an ecological interaction in which one species benefits while the other species is neither significantly harmed nor benefited. In this context, consider the following species interactions:

1. Remora fish – Sharks
2. Cattle egret – Grazing cattle
3. Barnacles – Whales
4. Oxpecker bird – Buffalo

Which of the above represent examples of commensalism?
Options:
(a) 1 and 2 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

57. Match the following international environmental conventions with their primary objectives:

List I (Convention)	List II (Primary Focus)
A. Rotterdam Convention	1. Control of transboundary movement of hazardous wastes
B. Basel Convention	2. Regulation of trade in certain hazardous chemicals and pesticides
C. Minamata Convention	3. Protection of human health and the environment from mercury emissions
D. Stockholm Convention	4. Elimination or restriction of persistent organic pollutants (POPs)

Select the correct answer using the codes below:
(a) A-2, B-1, C-3, D-4
(b) A-1, B-2, C-4, D-3
(c) A-2, B-3, C-1, D-4
(d) A-3, B-1, C-2, D-4

58. Which one of the following international environmental agreements aims to eliminate or restrict the production and use of Persistent Organic Pollutants (POPs) to protect human health and the environment?
(a) Rotterdam Convention
(b) Basel Convention
(c) Minamata Convention
(d) Stockholm Convention

59. A keystone species is one whose ecological influence on community structure and ecosystem functioning is disproportionately large relative to its population size. The removal of such species can trigger cascading effects across the ecosystem. In this context, consider the following species:

1. Sea otters – Control sea urchin populations and help maintain kelp forest ecosystems.
2. Tigers – Apex predators that regulate herbivore populations and maintain forest ecological balance.
3. Honey bees – Important pollinators supporting plant reproduction and biodiversity.
4. Elephants – Ecosystem engineers that modify vegetation structure and create habitats for other species.

Which of the above can be considered keystone species?
Options:
(a) 1 and 2 only
(b) 2, 3 and 4 only
(c) 1, 2 and 4 only
(d) 1, 2, 3 and 4

60. Foundation species are organisms that play a dominant role in structuring an ecosystem by creating or modifying habitats and providing resources that support numerous other species. In this context, consider the following organisms:

1. Mangrove trees – Stabilize coastal ecosystems and provide breeding and nursery grounds for many marine species.
2. Coral reefs (reef-building corals) – Construct reef structures that support highly diverse marine ecosystems.
3. Elephants – Modify vegetation and landscapes by creating clearings, dispersing seeds, and forming water holes.
4. Kelp (giant seaweed) – Forms dense underwater forests that provide shelter and food for marine organisms.

Which of the above can be considered foundation species?
Options:
(a) 1 and 2 only
(b) 2, 3 and 4 only
(c) 1, 2 and 4 only
(d) 1, 2, 3 and 4

61. The albedo of a surface refers to the proportion of incoming solar radiation that is reflected back into the atmosphere. Different land surfaces have varying albedo values, which influence local and global climate. Consider the following surface types:

1. Fresh snow
2. Desert sand
3. Forest
4. Ocean water

Which of the following correctly represents the decreasing order of albedo (from highest to lowest reflectivity)?
(a) 1 → 2 → 3 → 4
(b) 1 → 3 → 2 → 4
(c) 2 → 1 → 3 → 4
(d) 3 → 2 → 1 → 4

62. Facultative mutualism refers to a type of ecological interaction in which two species benefit from each other but are not strictly dependent on the relationship for survival. In this context, consider the following species pairs:

1. Honeybee – Sunflower
2. Clownfish – Sea Anemone
3. Oxpecker bird – African buffalo
4. Fig tree – Fig wasp

Which of the above pairs represent facultative mutualism?
Options:
(a) 1 and 2 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

63. Parabiosis is a type of biological association where two organisms live in close physical contact but do not directly depend on each other for survival. Unlike mutualism or commensalism, the interaction is often passive and neither species derives a significant benefit or harm.
Which of the following species represent examples of Parabiosis?

1. Army Ants and Silverfish
2. Sharks and Pilot Fish
3. Barnacles on Whales
4. Hermit Crabs and Sea Anemones

Select the correct answer using the codes below:
A) 1 and 2 only
B) 1, 2, and 3 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

64. With reference to marine vegetation in coastal ecosystems, consider the following statements:

1. Seagrasses are flowering plants capable of producing flowers, seeds, and fruits.
2. Seaweeds (marine macroalgae) form an important component of marine food webs and serve as food for several marine organisms.
3. The Gulf of Mannar region hosts one of the largest and richest seagrass meadows in India.

Which of the statements given above is/are correct?
Options:
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

65. Epizoics are organisms that live on the surface of an animal host without causing harm. Unlike parasites, they do not extract nutrients from the host but use it only as a substrate for attachment or movement.
Which of the following species represent examples of Epizoics?

1. Barnacles on Whales
2. Algae on Turtle Shells
3. Fleas on Dogs
4. Remora Fish on Sharks

Select the correct answer using the codes below:
A) 1 and 2 only
B) 1, 2, and 4 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

66. A food web is a more complex representation of energy flow in an ecosystem compared to a food chain. Which of the following best represents a terrestrial food web?
(a) Grass → Grasshopper → Frog → Snake → Hawk;
(b)Phytoplankton → Zooplankton → Small Fish → Large Fish → Shark
(c) Mushroom → Termite → Lizard → Owl
(d) Neem Tree → Aphid → Butterfly → Crow

67. An inverted pyramid of numbers occurs when the number of individuals increases at higher trophic levels. Which of the following is the best example of an inverted pyramid of numbers?
(a) Tree → Caterpillars → Birds → Hawk
(b) Grass → Grasshoppers → Frogs → Snakes → Hawks
(c) Phytoplankton → Zooplankton → Small Fish → Large Fish
(d) Detritus → Earthworms → Frogs → Snakes

68. An upright pyramid of biomass occurs when the total biomass decreases at higher trophic levels. Which of the following is the best example of an upright pyramid of biomass?
(a) Grass → Deer → Tiger
(b) Phytoplankton → Zooplankton → Small Fish → Large Fish
(c) Tree → Caterpillars → Birds → Hawk
(d) Detritus → Earthworms → Frogs → Snakes

69. Which of the following are correctly matched ?
1. Cartagena Protocol : Bio Safety
2. Montreal Protocol : Ozone Depletion
3. Nagoya Protocol : Differential Responsibility
4. Kyoto Protocol : Benefit Sharing
Select the answer from the below codes
Select the answer from the below codes

a) 1 and 2 only
b) None of the above
c) 2, 3 and 4 only
d) 1, 2, 3 and 4

70. Aquatic ecosystems are divided into distinct zones based on light penetration, depth, and biological activity.
Which of the following statements correctly describe the different zones in an aquatic ecosystem?

1. The Photic Zone is the uppermost layer of water where sunlight penetrates, allowing photosynthesis to occur.
2. The Benthic Zone refers to the bottom of a water body, inhabited by decomposers and benthic organisms.
3. The Littoral Zone extends from the shoreline to deep open water and is dominated by floating and rooted plants.
4. The Limnetic Zone is the deep, dark region of a lake with no light penetration and no photosynthetic activity.
5. The Profundal Zone lies below the limnetic zone and receives little to no sunlight, supporting detritus feeders and organisms adapted to low oxygen levels.

Select the correct answer using the codes below:
A) 1, 2, and 3 only
B) 1, 2, 3, and 5 only
C) 2, 3, 4, and 5 only
D) 1, 2, 3, 4, and 5

71. Which of the following statements regarding pyramid of numbers is correct ?

1. It is mostly upright in pond ecosystem
2. It is always inverted in parasitism
3. It may be neither be inverted nor upright in forest ecosystems

Select the answer from the below codes

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

72. Certain environmental contaminants are known to cause specific diseases in humans. In this context, consider the following pairs of elements/compounds and the diseases associated with them:

1. Cadmium — Itai-Itai ("Ouch-Ouch") disease
2. Nitrates — Methemoglobinemia ("Blue baby syndrome")
3. Arsenic — Minamata disease
4. Methylmercury — Blackfoot disease

How many of the above pairs are correctly matched?
Options:
(a) Only one pair
(b) Only two pairs
(c) Only three pairs
(d) All four pairs

73. Necrophages primarily feed on:
a) Dead and decaying animal flesh
b) Tree bark and plant sap
c) Mushrooms and fungal matter
d) Insects and small arthropods

74. With reference to the hierarchical levels of ecological organization, consider the following statements:

1. A biome is a large ecological region consisting of several ecosystems that share broadly similar climatic conditions and dominant vegetation.
2. A population refers to the interaction of multiple species within a defined geographical area.
3. An ecosystem includes only the living (biotic) components interacting within a particular environment.
4. The biosphere represents the highest level of ecological organization, encompassing all ecosystems and the interactions of living organisms with the atmosphere, hydrosphere, and lithosphere.

Which of the statements given above is/are correct?
(a) 1 and 4 only
(b) 1, 2 and 3 only
(c) 1, 3 and 4 only
(d) 2 and 3 only

75. Invasive alien species (IAS) are non-native organisms introduced into ecosystems where they spread rapidly and disrupt native biodiversity and ecological balance. In this context, consider the following species:

1. *Lantana camara* – A fast-spreading shrub that invades forest ecosystems and suppresses native vegetation.
2. Water hyacinth (*Eichhornia crassipes*) – An aquatic plant that proliferates rapidly and blocks sunlight and oxygen in water bodies.
3. Eucalyptus (*Eucalyptus spp.*) – An introduced tree species widely planted for commercial purposes, often associated with ecological concerns such as soil moisture depletion.
4. Indian cobra (*Naja naja*) – A snake species naturally occurring in Indian ecosystems.

Which of the above can be considered exotic (non-native) species introduced into India?
(a) 1 and 2 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

76. Variation refers to differences in traits among individuals of the same species arising due to genetic, environmental, or evolutionary factors. In this context, consider the following pairs:

Type of Variation	Example
1. Continuous variation	Differences in height among individuals in a human population
2. Discontinuous variation	Ability to roll the tongue in humans
3. Environmental variation	Darkening of moth populations in polluted industrial areas
4. Genetic variation	Differences in eye colour and blood groups among individuals

Which of the pairs given above are correctly matched?
(a) 1 and 2 only
(b) 3 and 4 only
(c) 2, 3 and 4 only
(d) 1, 3 and 4 only

77. Obligate Parasitism is a type of parasitism where the parasite cannot complete its life cycle without a host. These parasites are entirely dependent on their hosts for survival, reproduction, and nutrient supply.
Which of the following species represent examples of Obligate Parasitism?
1. Plasmodium (Malaria Parasite) and Humans
2. Rafflesia (Corpse Flower) and Host Plants
3. Cuscuta (Dodder Plant) and Host Plants
4. Fleas and Mammals
Select the correct answer using the codes below:
A) 1 and 2 only
B) 1, 2, and 3 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

78. With reference to different forms of parasitism in ecology, consider the following host–organism pairs associated with *facultative parasitism*:
1. Candida fungi – Humans
2. Fleas – Mammals
3. Bladderwort (*Utricularia*) – Aquatic insects and small invertebrates
4. Head louse (*Pediculus humanus capitis*) – Humans

Which of the pairs given above correctly represent examples of facultative parasitism?
Options:
A. 1 and 2 only
B. 1 and 3 only
C. 2, 3 and 4 only
D. 1, 2, 3 and 4

79. With reference to the concept of the "Albedo Effect" in climate science, consider the following statements:
1. Albedo refers to the fraction of incoming solar radiation that is reflected back into space by a surface.
2. Surfaces such as snow and ice have higher albedo compared to forests and oceans.
3. A decrease in Arctic sea ice tends to reduce the Earth's overall albedo, thereby enhancing global warming.

Which of the statements given above is/are correct?
(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1, 2 and 3

80. With reference to the ice–albedo feedback mechanism in the Earth's climate system, consider the following statements:
1. The ice–albedo feedback is a positive climate feedback mechanism in which melting snow and ice reduce surface reflectivity, causing greater absorption of solar radiation.
2. This mechanism contributes to Arctic amplification, where the Arctic warms faster than the global average.
3. The ice–albedo feedback helps stabilize global temperatures by increasing reflection of solar radiation during warming phases.

4. Processes such as glacier retreat and reduction in sea ice extent can intensify the ice–albedo feedback.

Which of the statements given above are correct?
(a) 1 and 2 only
(b) 1, 2 and 4 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

81. With reference to the Kigali Amendment to the Montreal Protocol, consider the following statements:

1. It is a legally binding international agreement aimed at phasing down hydrofluorocarbons (HFCs).
2. India has ratified the Kigali Amendment and committed to a phased reduction of HFC consumption and production.
3. Successful implementation of the amendment is expected to avoid up to about 0.4–0.5°C of global temperature rise by the end of the 21st century.

Which of the statements given above is/are correct?
(a) 1 and 3 only
(b) 1, 2 and 3 only
(c) 2 and 3 only
(d) 3 only

82. Endoparasitism refers to a type of parasitic relationship in which the parasite lives inside the body of the host—within tissues, organs, or cells—deriving nutrients at the host's expense. In this context, consider the following species pairs:

1. Plasmodium – Humans
2. Tapeworm (*Taenia*) – Cattle/Humans
3. Mistletoe – Mango tree
4. Leech – Mammals

Which of the above represent examples of endoparasitism?
Options:
(a) 1 and 2 only
(b) 2, 3 and 4 only
(c) 1, 2 and 3 only
(d) 1, 2, 3 and 4

83. The Edge Effect is a phenomenon observed in Ecotones, where biodiversity is often higher than in adjacent ecosystems. This occurs because species from both ecosystems interact, leading to unique ecological dynamics.
Which of the following is an example of the Edge Effect?

1. Mangrove forests
2. Savanna ecosystems
3. Riparian zones (riverbanks)
4. Deep-sea hydrothermal vents

Select the correct answer using the codes below:
A) 1 and 2 only
B) 1, 2, and 3 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

84. Grasslands are major terrestrial ecosystems classified into Temperate Grasslands and Tropical (Hot) Grasslands, based on climate, location, and vegetation types.
Which of the following statements correctly differentiate between Temperate Grasslands and Tropical (Hot) Grasslands?

1. Temperate Grasslands experience cold winters and moderate rainfall, whereas Tropical Grasslands remain warm throughout the year with distinct wet and dry seasons.
2. Temperate Grasslands are found in mid-latitude regions (e.g., Prairies, Pampas, Steppes), while Tropical Grasslands are found near the equator (e.g., Savannas of Africa and Campos of Brazil).
3. Temperate Grasslands support large grazing animals such as bison and pronghorns, while Tropical Grasslands support herbivores like zebras, giraffes, and elephants.
4. Both Temperate and Tropical Grasslands receive high annual rainfall (above 200 cm), making them ideal for dense tree growth.

Select the correct answer using the codes below:
A) 1 and 2 only
B) 1, 2, and 3 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

85. Mountain Ecotones serve as transition zones where altitudinal gradients create distinct ecological boundaries, impacting species distribution and vegetation structure. Which of the following statements correctly describe Mountain Ecotones?

1. The treeline marks the upper boundary of dense forests, beyond which only shrubs and alpine meadows exist.
2. Faunal species in mountain ecotones exhibit high endemism due to geographic isolation and specialized adaptations.
3. Mountain ecotones experience temperature inversion, leading to warmer conditions at higher altitudes than in valleys.
4. The biodiversity in mountain ecotones decreases gradually with increasing elevation due to declining temperatures and oxygen levels.

Select the correct answer using the codes below:

A) 1 and 2 only
B) 1, 2, and 4 only
C) 2, 3, and 4 only
D) 1, 2, 3, and 4

86. Which of the following is an example of a Xylophage?

a) Termites feeding on wood
b) Vultures scavenging carcasses
c) Dung beetles consuming faeces
d) Fungi growing on dead trees

87. In aquatic ecosystems, dissolved oxygen levels determine the survival of aquatic organisms and the overall health of water bodies. In this context, which of the following statements correctly distinguishes between hypoxic and anoxic conditions?
(a) Hypoxia refers to conditions with very low dissolved oxygen, whereas anoxia denotes the complete absence of oxygen in water bodies.
(b) Anoxic conditions occur in well-oxygenated water bodies, while hypoxia results from excessive oxygen levels.
(c) Hypoxia arises due to nutrient deficiency, whereas anoxia occurs due to excess oxygen in the water.
(d) Anoxic conditions enhance marine biodiversity, while hypoxia leads to an increase in fish populations.

88. Harmful Algal Blooms (HABs) occur when certain species of algae proliferate rapidly in aquatic ecosystems, often due to nutrient enrichment and favorable environmental conditions. In this context, which of the following statements correctly describes HABs and their ecological impacts?
(a) Some algal blooms produce toxins that can harm marine organisms, disrupt aquatic ecosystems, and pose risks to human health.
(b) Harmful algal blooms enhance fisheries productivity by increasing dissolved oxygen levels and fish growth.
(c) Algal blooms occur only in freshwater lakes and do not affect marine environments.
(d) Harmful algal blooms arise mainly due to declining nutrient levels, which reduces algal populations.

89. The sulfur cycle is an important biogeochemical cycle involving the movement of sulfur through the atmosphere, lithosphere, hydrosphere, and biosphere. In this context, which of the following statements correctly describes a key process in the sulfur cycle?
(a) Sulfur circulates in nature mainly through volcanic emissions, fossil fuel combustion, and microbial transformations in soil and water.
(b) Plants directly absorb sulfur dioxide (SO_2) from the atmosphere and convert it into organic sulfur compounds.
(c) Sulfur does not contribute to the formation of acid rain because it remains largely bound in solid compounds.
(d) The sulfur cycle is driven only by geological processes and does not involve microbial activity.

90. With reference to atmospheric aerosols, consider the following statements regarding Brown Carbon (BrC):

1. Brown carbon has been explored as a potential technological solution for capturing or storing atmospheric carbon dioxide.
2. Brown carbon particles strongly absorb ultraviolet and visible light, contributing to atmospheric warming.

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

91. Which of the following correctly describes an important process in the carbon cycle?

(a) Plants absorb atmospheric carbon dioxide (CO_2) during photosynthesis and convert it into organic compounds.
(b) Decomposers release oxygen (O_2) into the atmosphere while breaking down dead organic matter.
(c) Animals directly fix atmospheric carbon dioxide (CO_2) and convert it into glucose.
(d) The combustion of fossil fuels reduces the concentration of CO_2 in the atmosphere.

92. Climate change can result from both natural processes and human activities that alter the Earth's energy balance and atmospheric composition. In this context, consider the following factors:

1. Ocean currents
2. Volcanic activity
3. Industrial Revolution and large-scale fossil fuel combustion
4. Sunspot cycles
5. Variations in solar irradiance

Which of the above can influence climate change?

Options:
(a) 1, 2 and 4 only
(b) 1, 2, 3 and 4 only
(c) 2 and 4 only
(d) 1, 2, 3, 4 and 5

93. Which of the following best describes the concept of Ecological Footprint?

(a) The measure of human demand on natural resources and ecosystems in terms of biologically productive land and water required to sustain consumption and absorb waste.
(b) The total carbon emissions produced by a country, calculated annually based on industrial output and transportation use.
(c) The number of species that go extinct due to human activities in a given ecosystem over a specific period.
(d) The amount of oxygen consumed by organisms in a given area, used to assess ecosystem productivity.

94. Marine upwelling is an oceanographic process in which deep, cold, and nutrient-rich waters rise to the ocean surface, significantly influencing marine productivity. In this context, consider the following statements:

1. Some of the most biologically productive marine regions of the world occur in areas where upwelling takes place.
2. Upwelling brings nutrient-rich deep waters to the surface, supporting phytoplankton growth.
3. Upwelling currents generally transport fish larvae away from coastal regions, reducing coastal fish populations.

Which of the statements given above is/are correct?

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

95. Which of the following expressions best expresses an organism's functional place in the community of organisms as well as the physical space it occupies?

a) Ecotone
b) Trophic level
c) Ecocline
d) Ecological niche

96. What percentage of the global land surface is covered by peatlands, and how much carbon do they store?
(a) 1% of the land surface; 50 billion tonnes of carbon
(b) 5% of the land surface; 300 billion tonnes of carbon
(c) 10% of the land surface; 150 billion tonnes of carbon
(d) 3% of the land surface; nearly 550 billion tonnes of carbon

97. With reference to the distribution of ozone in the Earth's stratosphere, consider the following statements:

1. The rate of ozone formation is highest in the tropical stratosphere due to intense solar ultraviolet radiation.
2. Despite higher ozone production in the tropics, the total ozone concentration over tropical regions is relatively lower than in higher latitudes.
3. The mid-latitude regions experience the lowest ozone concentrations throughout the year.
4. Significant thinning of the ozone layer is commonly observed in the polar regions.

Which of the statements given above are correct?
(a) 1 and 2 only
(b) 1, 2 and 4 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

98. Match the Nitrogen-Fixing Bacteria (Column I) with their Scientific Name (Column II) and Function (Column III).

Column I (Type of Bacteria)	Column II (Bacteria Name)	Column III (Function)
A. Free-living nitrogenfixing bacteria	1. Rhizobium	P. Converts atmospheric nitrogen (N_2) into ammonia (NH_3) in root nodules of legumes
B. Symbiotic nitrogenfixing bacteria	2. Nitrobacte r	Q. Converts atmospheric nitrogen (N_2) into ammonia (NH_3) in the
		soil independently
C. Cyanobacteri a (Blue-green algae)	3. Nostoc	R. Fixes nitrogen in aquatic environments through photosynthesi s
D. Nitrifying bacteria	4. Azotobacte r	S. Converts nitrites (NO_2^-) into nitrates (NO_3^-)

Which of the following correctly matches Column I, Column II, and Column III?
(a) A - 1 - Q, B - 2 - P, C - 3 - R, D - 4 - S
(b) A - 2 - Q, B - 4 - P, C - 3 - S, D - 1 - R
(c) A - 4 - Q, B - 1 - P, C - 3 - R, D - 2 - S
(d) A - 3 - R, B - 2 - Q, C - 1 - P, D - 4 - S

99.What is the role of Azotobacter,Clostridium and Rhizobium in Nitrogen Cycle ?
a) Ammonifying Bacteria
b) Nitrifying Bacteria
c) Nitrogen Fixing Bacteria
d) Denitrifying Bacteria

100. Match the following types of speciation with their corresponding definitions and examples:

List I (Type of Speciation)	List II (Definition)	List III (Example)
A. Allopatric Speciation	1. Speciation due to strong environmental gradients across a continuous population range	a. Darwin's finches diverging after isolation on different Galápagos islands
B. Sympatric Speciation	2. Formation of new species within the same geographical area due to ecological or genetic differences	b. Apple maggot flies evolving host preference within the same region
C. Peripatric Speciation	3. Evolution of a small isolated population at the periphery of a larger population	c. Small founder populations evolving on isolated islands
D. Parapatric Speciation	4. Formation of species due to geographic isolation by physical barriers	d. Grass species adapting to metal-contaminated soils near mines

Select the correct code:
(a) A-4-a, B-2-b, C-3-c, D-1-d
(b) A-2-a, B-4-b, C-3-c, D-1-d
(c) A-4-b, B-2-a, C-1-c, D-3-d
(d) A-3-a, B-2-d, C-4-b, D-1-c