Instructions

1. EVOLUTION & ECOSYSTEM REVISION

Q1. The first cellular form of life evolved:

A In air. **B** On land. **C** In water environment. **D** In deep soil.

Q2. For Questions two statements are given - one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion (A): Darwin showed how even a slow growing animal like an elephant could reach enormous numbers.

Reason (R): When resources in the habitat are unlimited, each species has the ability to realise its innate potential fully.

A Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

B Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

C Assertion (A) is true, but Reason (R) is false.

D Assertion (A) is false, but Reason (R) is true.

Q3. The theory of evolution supported by the experiment conducted by Louis Pasteur is: **1 Mark**

A Spontaneous generation theory.

B Life comes only from pre-existing life.

C Abiogenesis of life.

D Big bang theory.

Q4. For Questions two statements are given - one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion (A): A cattle egret and grazing cattle in close association is a classic example of commensalism.

Reason (R): As grazing cattle move through the field, they stir up and flush out insects from the vegetation that otherwise might be difficult for egrets to find and catch.

A Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

B Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

C Assertion (A) is true, but Reason (R) is false.

D Assertion (A) is false, but Reason (R) is true.

Q5. The life originated on earth through a process of: **1 Mark**

A Chemosynthesis **B** Spontaneous origin **C** Special creation **D** None of the above

Q6. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion: Maximum contribution of oxygen is from phytoplankton.

Reason: 90% of the photosynthesis with oxygen evolution is contributed by them.

A Both A and R are true and R is the correct explanation of A.

B Both A and R are true but R is not the correct explanation of A.

C A is true but R is false.

D A is false and R is also false.

Q7. Evolution in which the animals of two different gene ecology show too much similarity with one another, as a result of adaptation is termed as: **1 Mark**

A Parallel evolution **B** Retrogressive evolution **C** Progressive evolution **D** Convergent evolution

Q8. In a food chain, the largest population is that of: **1 Mark**

A Decomposers. **B** Producers. **C** Primary consumers. **D** Tertiary consumers.

Q9. The second trophic level in a lake is: **1 Mark**

A Phytoplankton. **B** Zooplankton. **C** Benthos. **D** Fishes.

Q10. Self – ordered proto-protein contacted with water and by self-assembly gave rise to: **1 Mark**

A Protocell **B** Protobiont **C** Eobiont **D** All of the above

Q11. Age of fossils in the past was generally determined by radio-carbon method and other method involving radioactive elements found in the rocks. More precise methods, which were used recently and led to the revision of the evolutionary periods for different groups of organisms, include. **1 Mark**

A Study of carbohydrates/ proteins in fossils
B Study of the condition of fossilization.
C Electron Spin Resonance (ESR) and fossil DNA.
D Study of carbohydrates/ proteins in rocks

Q12. Decomposers like fungi and bacteria are: **1 Mark**

1. Autotrophs.
2. Heterotrophs.
3. Saprotrophs.
4. Chemo-autotrophs.
5. Choose the correct answer.

A ii and iii. **B** i and ii. **C** i and iv. **D** i and iii.

Q13. Artificial selection to obtain cows yielding higher milk output represents: **1 Mark**

A Artificial selection to obtain cows yielding higher milk output represents.
B Disruptive as it splits the population into two one yielding higher output and the other lower output.
C Stabilizing followed by disruptive as it stabilizes the population to produce higher yielding cows.
D Stabilizing selection as it stabilizes this character in the population.

Q14. The most accepted line of descent in human evolution is: **1 Mark**

A Ramapithecus → Homo habilis → Homo erectus → Homo sapiens.
B Australopithecus → Ramapithecus → Homo erectus →Homo habilis → Homo sapiens.
C Homo erectus → Homo habilis → Homo sapiens.
D Australopithecus → Ramapithecus → Homo sapiens → homo habilis.

Q15. 'Golden age of dinosaurs'/ Age of reptiles was: **1 Mark**

A Mesozoic **B** Coenozoicc **C** Palaeozoic **D** Psychozoic

Q16. Species are considered as. **1 Mark**

A Artificial concept of human mind which cannot be defined in absolute terms.
B Real units of classification devised by taxonomists.
C Real basic units of classification.
D The lowest units of classification.

Q17. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**
Assertion: Microspheres are believed to be the precursors of life.
Reason: Microspheres are self-duplicating aggregates of proteins surrounded by lipid bilayer.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false and R is also false.

Q18. Evolutionary convergence is characterized by: **1 Mark**

A Development of characteristics by random mating.
B Replacement of common characteristics in different group.
C Development of dissimilar characteristics in closely related groups.
D Development of a common set of characteristics in group of different ancestry.

Q19. Pick up the correct food chain: **1 Mark**

A Grass → Chaemeleon → Insect → Bird.
B Grass → Fox → Rabbit → Bird.
C Phytoplankton → Zooplankton → Fish.
D Fallen leaves → Bacteria → Insect larvae.

Q20. Which one of the following sets includes only the vestigial structures in man? **1 Mark**

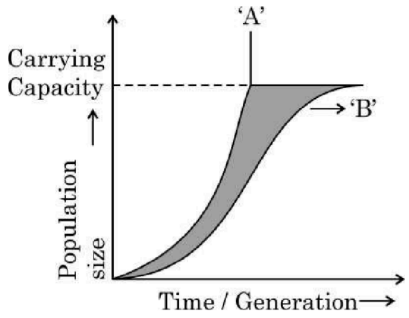
A Body hair, olecranon process, coccyx, patella.

B Wisdom teeth, mammary glands, coccyx, patella.

C Coccyx, nictitating membrane, vermiform appendix, ear muscles.

D Coccyx, body hair, ear ossicles, vermiform appendix.

Q21. Study the graph given below, showing the population growth curves 'A' and 'B' respectively. **2 Marks**



1. What is 'Carrying Capacity' in respect of Curve 'B' indicative of?
2. Mention the action of possible natural forces that could have lead to curve 'B'.

Q22. **2 Marks**

1. Select the homologous structures from the combinations given below:
   1. Forelimbs of whales and bats.
   2. Tuber of potato and sweet potato.
   3. Eyes of octopus and mammals.
   4. Thorns of Bougainvillea and tendrils of Cucurbita.
2. State the kind of evolution they represent.

Q23. Many members of genus Glomus form a mycorrhizial association with plants. Elaborate how is this association beneficial to the plants. **2 Marks**

Q24. How do Darwin's finches illustrate adaptive radiation? **2 Marks**

Q25. Mammals are capable of maintaining homeostasis. But, very few smaller animals can survive in polar regions. Give reasons. **2 Marks**

Q26. Wings of birds and wings of butterflies contribute to locomotion. Explain the type of evolution such organs are a result of. **2 Marks**

Q27. Ecological pyramids give important information about the ecological system, but do have some limitations. List any two limitations of ecological pyramids. **2 Marks**

Q28. Global carbon is fixed in the biosphere through photosynthesis. **3 Marks**

1. Explain any two ways by which carbon is returned to the atmosphere through natural processes.
2. List any two human activities that have influenced the carbon cycle in nature.

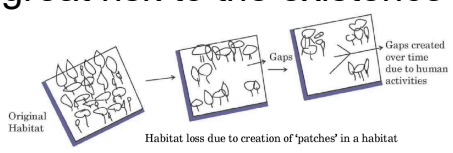
Q29. Read the account of a natural large forest area that underwent many changes from the year 2002 to 2014 and answer the question that follow: **3 Marks**

In 2002 there was a large area of natural forest habitat in a country. In 2007 a canal was built midway through this natural area. This was required to meet the irrigation demand of the nearby areas. In 2014, Ecologists suggested to create green corridors connecting two fragmented parts of the initial large natural forest habitat. Explain the reason behind such suggestion by ecologists.

Q30. **3 Marks**

1. Name the process that makes the detritus become part of the soil in the nutrient cycle.
2. Write the factors responsible for controlling the rate of this process.
3. Mention the condition when the rate would be faster.

Q31. Given below is a picture of a natural large habitat that is being continuously broken into smaller patches. This process is continuing, increasing and expanding over time due to human impact, thereby posing a great risk to the existence of species in the habitat. **3 Marks**



Habitat loss due to creation of 'patches' in a habitat

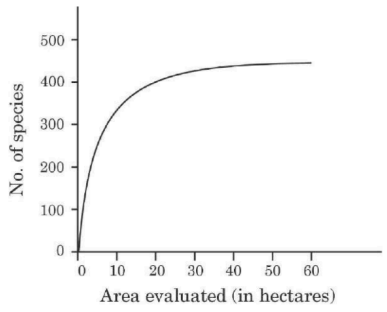
1. Do you agree with the above statement? Give two suitable reasons in support of your answer.

2. Write the ecological term used for such patches formed in an original habitat.

Q32. 1. Name the two primate ancestors of the present day humans, who existed approximately about 15 million years ago. **3 Marks**
2. According to geological records, when and where did Australopithecines live?
3. Give two differences between Homo habilis and Homo erectus.

Q33. "Forests provide intangible benefits to us." Explain by taking three different areas, how. **3 Marks**

Q34. The graph given below shows species-area relationship of a certain region. **3 Marks**



1. Study the graph and explain what it represents.
2. After a while, a small area was taken for constructing a road which divided the region into two. Write the impact this construction would have on species richness of the region.

Q35. **Read the case study given below and answer the questions that follow:** **4 Marks**

Interaction of biotic and abiotic components result in a physical structure that is characteristic for each type of ecosystem. Identification and enumeration of plant and animal species of an ecosystem gives its species composition. Vertical distribution of different species occupying different levels is called stratification. For example, trees occupy top vertical strata or layer of a forest, shrubs the second and herbs and grasses occupy the bottom layers. The components of the ecosystem are seen to function as a unit when you consider the following aspects: (i) Productivity; (ii) Decomposition; (iii) Energy flow; and (iv) Nutrient cycling. To understand the ethos of an aquatic ecosystem let us take a small pond as an example. This is fairly a self-sustainable unit and rather simple example that explain even the complex interactions that exist in an aquatic ecosystem. A pond is a shallow water body in which all the above mentioned four basic components of an ecosystem are well exhibited. The abiotic component is the water with all the dissolved inorganic and organic substances and the rich soil deposit at the bottom of the pond. The solar input, the cycle of temperature, day-length and other climatic conditions regulate the rate of function of the entire pond. The autotrophic components include the phytoplankton, some algae and the floating, submerged and marginal plants found at the edges.

The consumers are represented by the zooplankton, the free swimming and bottom dwelling forms. The decomposers are the fungi, bacteria and flagellates especially abundant in the bottom of the pond. This system performs all the functions of any ecosystem and of the biosphere as a whole, i.e., conversion of inorganic into organic material with the help of the radiant energy of the sun by the autotrophs; consumption of the autotrophs by heterotrophs; decomposition and mineralisation of the dead matter to release them back for reuse by the autotrophs, these event are repeated over and over again. There is unidirectional movement of energy towards the higher trophic levels and its dissipation and loss as heat to the environment.

1. What is stratification in an ecosystem?
2. Name two autotrophic components found in a pond ecosystem.
3. Explain the role of decomposers in a pond ecosystem.

OR

3. Describe how energy flow occurs in a pond ecosystem.

Q36. **Read the case study given below and answer the questions that follow:** **4 Marks**

The consumers that feed on these herbivores are carnivores, or more correctly primary carnivores (though secondary consumers). Those animals that depend on the primary carnivores for food are labelled secondary carnivores. A simple grazing food chain (GFC) is depicted below:

Grass → Goat → Man

Producer → Primary consumer → Secondary consumer

The detritus food chain (DFC) begins with dead organic matter. It is made up of decomposers which are heterotrophic organisms, mainly fungi and bacteria. They meet their energy and nutrient requirements by degrading dead organic matter or detritus. These are also known as saprotrophs (sapro: to decompose). Decomposers secrete digestive enzymes that break down dead and waste materials into

simple, inorganic materials, which are subsequently absorbed by them. In an aquatic ecosystem, GFC is the major conduit for energy flow. As against this, in a terrestrial ecosystem, a much larger fraction of energy flows through the detritus food chain than through the GFC. Detritus food chain may be connected with the grazing food chain at some levels: some of the organisms of DFC are prey to the GFC animals, and in a natural ecosystem, some animals like cockroaches, crows, etc., are omnivores. These natural interconnections of food chains make it a food web. How would you classify human beings?

1. What are primary carnivores?
2. What role do decomposers play in the detritus food chain?
3. Explain the difference in energy flow between grazing food chains (GFC) and detritus food chains (DFC) in aquatic and terrestrial ecosystems.

OR

3. How can the detritus food chain (DFC) be connected with the grazing food chain (GFC) to form a food web? Give examples.

Q37. Read the case study given below and answer the questions that follow: 4 Marks

You may have heard of the earthworm being referred to as the farmer's 'friend'. This is so because they help in the breakdown of complex organic matter as well as in loosening of the soil. Similarly, decomposers break down complex organic matter into inorganic substances like carbon dioxide, water, and nutrients, and the process is called decomposition. Dead plant remains such as leaves, bark, flowers, and dead remains of animals, including fecal matter, constitute detritus, which is the raw material for decomposition.

The important steps in the process of decomposition are fragmentation, leaching, catabolism, humification, and mineralisation. Detritivores (e.g., earthworm) break down detritus into smaller particles. This process is called fragmentation. By the process of leaching, water-soluble inorganic nutrients go down into the soil horizon and get precipitated as unavailable salts. Bacterial and fungal enzymes degrade detritus into simpler inorganic substances. This process is called catabolism. It is important to note that all the above steps in decomposition operate simultaneously on the detritus. Humification and mineralisation occur during decomposition in the soil. Humification leads to the accumulation of a dark coloured amorphous substance called humus that is highly resistant to microbial action and undergoes decomposition at an extremely slow rate. Being colloidal in nature it serves as a reservoir of nutrients. The humus is further degraded by some microbes and the release of inorganic nutrients occurs by the process known as mineralisation. Decomposition is largely an oxygen-requiring process.

The rate of decomposition is controlled by the chemical composition of detritus and climatic factors. In a particular climatic condition, the decomposition rate is slower if detritus is rich in lignin and chitin, and quicker if detritus is rich in nitrogen and water-soluble substances like sugars. Temperature and soil moisture are the most important climatic factors that regulate decomposition through their effects on the activities of soil microbes. Warm and moist environments favour decomposition whereas low temperature and anaerobiosis inhibit decomposition resulting in a build-up of organic materials.

1. What is the role of earthworms in the decomposition process?
2. Define the process of leaching in decomposition.
3. Explain the processes of humification and mineralisation in soil decomposition.

OR

3. How do temperature and soil moisture affect the rate of decomposition?

Q38. Read the case study given below and answer the questions that follow: 4 Marks

Ecological succession refers to the steady and reasonably predictable shift in the species makeup of a specific area. During succession, certain species colonise an area and their populations increase, while other species' populations drop and even perish. Sere refers to the full succession of communities that change in a specific location (s). Seral stages or seral communities are the names given to the individual transitional communities. Secondary succession begins in locations where natural biotic communities have been disrupted, such as abandoned farmlands, burned or cut woods, or flooded fields. Because some soil or silt is present, secondary succession occurs faster than primary succession.

1. What is ecological succession?
2. What are seral stages or seral communities?
3. Differentiate between primary succession and secondary succession.

OR

3. Why does secondary succession occur faster than primary succession?

Q39. Read the case study given below and answer the questions that follow: **4 Marks**

Except for the deep sea hydro-thermal ecosystem, the sun is the only source of energy for all ecosystems on Earth. Of the incident solar radiation, less than 50 per cent of it is photosynthetically active radiation (PAR). We know that plants and photosynthetic bacteria (autotrophs) fix the Sun's radiant energy to make food from simple inorganic materials. Plants capture only 2-10 per cent of the PAR, and this small amount of energy sustains the entire living world. Therefore, it is very important to know how the solar energy captured by plants flows through different organisms in an ecosystem. All organisms are dependent on producers for their food, either directly or indirectly. The green plants in the ecosystem are called producers. In a terrestrial ecosystem, the major producers are herbaceous and woody plants. Likewise, producers in an aquatic ecosystem are various species like phytoplankton, algae, and higher plants.

You have read about the food chains and webs that exist in nature. Starting from the plants (or producers), food chains or rather webs are formed such that an animal feeds on a plant or on another animal and, in turn, is food for another. The chain or web is formed because of this interdependency. No energy trapped in an organism remains in it forever. The energy trapped by the producer is either passed on to a consumer or the organism dies. The death of an organism is the beginning of the detritus food chain/web. All animals depend on plants (directly or indirectly) for their food needs.

They are hence called consumers and also heterotrophs. If they feed on the producers, the plants, they are called primary consumers, and if the animals eat other animals which in turn eat the plants (or their produce), they are called secondary consumers. Likewise, you could have tertiary consumers too. Obviously, the primary consumers will be herbivores. Some common herbivores are insects, birds, and mammals in terrestrial ecosystems and molluscs in aquatic ecosystems.

1. What is the primary source of energy for all ecosystems on Earth, except for the deep sea hydro-thermal ecosystem?
2. Who are the producers in a terrestrial ecosystem?
3. Explain the role of photosynthetically active radiation (PAR) in an ecosystem.

OR

3. Describe the flow of energy through different trophic levels in an ecosystem.