ECOSYSTEM

<table>
<tr><th>Q.No</th><th>Question</th><th>Marks</th></tr>
<tr><td colspan="3">Multiple Choice Question</td></tr>
<tr><td>Q.239</td><td>Stratification in ecology refers to the vertical layering of habitat. This layering is dependent on several factors. For example, in an aquatic ecosystem, layers are formed based on the temperature required by organisms.

Which of the following is TRUE about the need of organisms that live in the uppermost layer of an ocean ecosystem?

<table>
<tr><th></th><th>temperature requirement</th><th>oxygen requirement</th></tr>
<tr><td>P</td><td>warmer</td><td>high</td></tr>
<tr><td>Q</td><td>colder</td><td>high</td></tr>
<tr><td>R</td><td>warmer</td><td>low</td></tr>
<tr><td>S</td><td>colder</td><td>low</td></tr>
</table>

A. P
B. Q
C. R
D. S</td><td>1</td></tr>
<tr><td>Q.240</td><td>Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R).

Assertion (A): The energy utilised by an organism for growth is not transferred to the next trophic level.

Reason (R): Growth causes an increase in biomass.

Which of the following is correct?

A. Both A and R are true, and R is the correct explanation for A.
B. Both A and R are true, but R is not the correct explanation for A.
C. A is true, but R is false.
D. A is false, but R is true.</td><td>1</td></tr>
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Q.241	Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). Assertion (A): Humus is organic in nature. Reason (R): Steps occurring before humification ensure the removal of most inorganic substances from the detritus. Which of the following is correct? A. Both A and R are true, and R is the correct explanation for A. B. Both A and R are true, but R is not the correct explanation for A. C. A is true, but R is false. D. A is false, but R is true.	1
Q.242	Nitin was studying a graph where he studied the impact of some factors on the rate of decomposition. For which of the following factors will the rate of decomposition show a somewhat bell-curved graph? *[Note: A bell curve is a graph where the values on the y-axis increase steadily, reach a peak and decrease at the same rate as the increase, creating a curve shaped like a bell]* W) chitin content in detritus X) fructose content in detritus Y) moisture content in the soil Z) temperature of the environment A. only W B. only Z C. only Y and Z D. only X, Y and Z	1
Q.243	If X is the amount of energy produced by the producers, which of the following is the correct amount of energy received by humans from the producers in a food web? A. only 10% B. either 10% or 1% C. either 10%, 1% or 0.1% D. Humans are not part of a food web.	1

Q.244	Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). Assertion (A): Plants do not constitute the first trophic level in all food chains. Reason (R): Dead plants or animals is the first trophic level for detritivores. Which of the following is correct? A. Both A and R are true, and R is the correct explanation for A. B. Both A and R are true, but R is not the correct explanation for A. C. A is true, but R is false. D. A is false, but R is true.	1
Q.245	If the energy produced by the producers of a food web is 20,810 kcal, what is the minimum amount of energy that will be available to snakes in this food web? A. 383 kcal B. 2081 kcal C. 10000 kcal D. Cannot say without knowing the level that is occupied by snakes in this chain.	1
Q.246	Which of the following statements is/are TRUE about lichens? X) They do not always depend on biotic factors for growth. Y) They come from rocks. Z) They are pioneer species in all environments. A. only X B. only Z C. only Y and Z D. all - X, Y and Z	1
Q.247	A carbon sink is any environment that can store carbon and remove it from the atmosphere. Which of the following will lead to a DECLINE in carbon sink? A. Deforestation B. Population growth C. Burning of fossil fuels D. Increase in industrial activity	1
Q.248	Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R).	1

	Assertion (A): The phosphorus cycle starts in the Earth's crust. Reason (R): Rocks are found in abundance in the Earth's crust. Which of the following is correct? A. Both A and R are true, and R is the correct explanation for A. B. Both A and R are true, but R is not the correct explanation for A. C. A is true, but R is false. D. A is false, but R is true.	
Free Response Questions/Subjective Questions		
Q.249	A pioneer species is a species that invades a bare area. Such bare areas are usually xerophytic. The pioneer species is gradually replaced by other species, till a climax species/ community remains stable in the environment. (a) Why is the pioneer species replaced by the climax species/community? (b) What is the environment type usually required by the climax species?	2
Q.250	State THREE points of difference between a natural terrestrial ecosystem and a man-made ecosystem such as zoo.	3
Q.251	The Tundra desert's gross primary productivity (GPP) is 800 kilocalories/m^2 and respiration losses are about 200 kilocalories. (a) What is the net primary productivity of the desert? Show calculations. (b) Why do deserts have the least NPP across most ecosystems?	2
Q.252	Fish farming involves the commercial breeding of fish either in fish tanks or in artificial enclosures such as fish ponds. Is a fish farm an example of an ecosystem? Justify your answer.	2
Q.253	Give a reason why: (a) Mass lost in faeces is considered available biomass for the next trophic level. (b) Secondary productivity of herbivores is lower than primary productivity. (c) The ocean is not a productive ecosystem.	3
Q.254	Given below is the approximate percentage content of cellulose, hemicellulose and lignin composition of the same mass of dried grass and coconut husks.	3

	cellulose	**hemicellulose**	**lignin**
dried grass	40%	40%	20%
coconut husks	25%	20%	50%

	(a) Considering ambient climatic conditions, which of these will take longer to decompose and why? (b) If these materials are found in marshy soils, would overall decomposition be faster? Justify.	
Q.255	The first law of thermodynamics states that energy can neither be created nor destroyed, only altered in form. Does the energy flow in an ecosystem follow this rule? Justify.	2
Q.256	Identify if the statements given below are true or false. Justify your answer. (a) In an inverted food pyramid, the energy is the lowest at the first trophic level. (b) The biomass of zooplankton is greater than phytoplankton as they reproduce fast and have a longer life span. (c) In the long run, an inverted food pyramid is unstable.	3
Q.257	Justify the following statements: (a) A xeric environment turns into a mesic environment over time. (b) A mesic environment is preferred over a hydric or xeric environment.	2

Answer key and Marking Scheme

Q.No	Answers	Marks
Q.239	A. P	1
Q.240	D. A is false, but R is true.	1
Q.241	A. Both A and R are true, and R is the correct explanation for A.	1
Q.242	C. only Y and Z	1
Q.243	C. either 10%, 1% or 0.1%	1
Q.244	A. Both A and R are true, and R is the correct explanation for A.	1
Q.245	A. 383 kcal	1
Q.246	A. only X	1
Q.247	A. Deforestation	1
Q.248	A. Both A and R are true, and R is the correct explanation for A.	1
Q.249	(a) because the climax species makes the environment non-conducive for the pioneer species (b) mesophytic	2
Q.250	1 mark each for any three of the following: - Natural ecosystems are self-sustaining whereas man-made ecosystems require the assistance of humans. - The nutrient cycle starts and ends in the same ecosystem in natural ecosystems whereas in man-made ecosystems the nutrient cycle may begin in one place and end in another. - Individuals of a species may be scattered throughout the geography in natural ecosystems whereas species are present in close proximity in man-made ecosystems. - Interactions are spontaneous in natural ecosystems whereas they are controlled by humans in man-made ecosystems. [Accept any other valid points.]	3
Q.251	(a) 0.5 marks for the correct formula and 0.5 marks for the correct answer: NPP = GPP - R NPP = 800 - 200 = 600 kilocalories/m2	2

	(b) The low water availability and other conditions are not unfavourable for rapid photosynthesis.	
Q.252	1 mark for each of the following: - Yes, it is. - In a fish farm, fish interact with each other as well as the physical environment created for them making it an ecosystem. [No marks to be allotted if correct justification is not provided.]	2
Q.253	1 mark for each of the following: (a) Faeces are available to decomposers and so are not completely removed from the food web. (b) Not all biomass produced by producers is consumed by herbivores, a lot is lost and is available to decomposers. (c) Sunlight is a largely limiting factor, especially in deep ocean layers, making photosynthesis and therefore productivity low. [Accept any other valid answer.]	3
Q.254	(a) 0.5 marks for each of the following: - coconut husks - higher lignin content reduces the rate of decomposition (b) 1 mark for each of the following: - It would be slower. - Marshy soils tend to have less oxygen availability/anaerobic conditions exist which reduces the rate of decomposition.	3
Q.255	- Yes it does. - Energy from the Sun is converted to chemical energy by photosynthesis which is then transferred through various trophic levels as chemical energy or utilised to produce heat energy. [No marks to be awarded if justification is not provided.]	2
Q.256	0.5 marks for identifying if true or false and 0.5 marks for the justification: (a) - False. - Energy is always highest in the first trophic level and reduces as we move up the pyramid. (b) - True.	3

	- Since the biomass of zooplankton is greater it is likely that more individuals are present per unit area than phytoplankton which is possible when organisms do not die fast but reproduce fast. (c) - True. - Since a lower amount of food will be available to the higher trophic levels, it is likely to be unstable over time. [Accept any other valid justification. No marks are to be awarded for writing true/false if the correct justification is not provided.]	
Q.257	1 mark for each of the following: (a) As pioneer species and then seral plant communities grow in a xeric environment, they increase the moisture content in the environment as they perform their physiological processes making the environment mesic. (b) A mesic environment provides an ambient environment with the right moisture content for the growth of most species. [Accept any other valid justification.]	2