CBSE NCERT Based Chapter wise Questions (2025-2026)

Class-XII

Subject: Biology

Chapter Name : Ecosystem (Chap : 12)

Total : 6 Marks (expected) [MCQ(2)-2 Marks, CBQ(1)-4 Marks]

Level - 2

MCQ Type :

1. Which of the following correctly explains why the pyramid of energy can never be inverted?
   Ⓐ Producers are always maximum
   Ⓑ Energy is recycled efficiently
   Ⓒ Energy flow follows second law of thermodynamics
   Ⓓ Consumers cannot photosynthesise

Hint : Heat loss at each transfer

2. In an aquatic ecosystem, the pyramid of biomass is inverted because
   Ⓐ Producers have higher productivity
   Ⓑ Phytoplankton have low standing crop
   Ⓒ Consumers are short-lived
   Ⓓ Decomposers dominate

Hint : Compare standing crop, not productivity

3. The maximum loss of energy between trophic levels occurs due to
   Ⓐ Photosynthesis Ⓑ Respiration Ⓒ Consumption Ⓓ Decomposition

Hint : Energy used for metabolic activities

4. If Gross Primary Productivity is 1800 g m^{-2} yr^{-1} and respiration is 700 g m^{-2} yr^{-1}, Net Primary Productivity is
   Ⓐ 2500 Ⓑ 1100 Ⓒ 900 Ⓓ 700

Hint : NPP = GPP – R

5. Which factor does not directly affect primary productivity?
   Ⓐ Plant species
   Ⓑ Photosynthetic efficiency
   Ⓒ Herbivore population
   Ⓓ Nutrient availability

Hint : Think of producers only

6. Which statement about detritus food chain is correct?
   Ⓐ Starts with green plants
   Ⓑ Dominant in grasslands
   Ⓒ Major pathway in forests
   Ⓓ Energy transfer is higher than grazing food chain

Hint : Leaf litter rich ecosystems

7. Standing state differs from standing crop because it refers to
   Ⓐ Nutrient quantity Ⓑ Energy Ⓒ Biomass Ⓓ Organism number

Hint : Non-living components

8. Ecological efficiency is generally about
   Ⓐ 10% Ⓑ 5% Ⓒ 100% Ⓓ 90%

Hint : Lindeman's law

9. Which of the following is a correct sequence in decomposition?
   Ⓐ Fragmentation → Leaching → Catabolism → Humification

Ⓑ Fragmentation → Catabolism → Leaching → Humification

Ⓒ Leaching → Fragmentation → Catabolism → Mineralisation

Ⓓ Fragmentation → Leaching → Catabolism → Humification → Mineralisation

10. The major reason why food chains rarely exceed 4–5 trophic levels is

Ⓐ Limited biomass Ⓑ Low photosynthesis Ⓒ Excess decomposers Ⓓ Progressive energy loss

Hint : Energy availability

Assertion and Reason :

Directions: Read the following questions and choose any one of the following four responses.

A: Assertion and Reason both are correct and Reason is the correct explanation of Assertion.

B: Assertion and Reason both are correct and Reason is not the correct explanation of Assertion.

C: Assertion is correct but Reason is wrong.

D: Assertion is wrong but Reason is correct.

1. **Assertion (A) :** Net primary productivity is less than gross primary productivity.
Reason (R) : Plants use part of the fixed energy in respiration.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

Hint : GPP – R

2. **Assertion (A) :** Pyramid of biomass in sea ecosystems is often inverted.
Reason (R) : Phytoplankton have very high reproductive rates but low biomass.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

Hint : Standing crop vs productivity

3. **Assertion (A) :** Decomposition is faster in tropical regions.
Reason (R) : Warm and moist conditions discourage microbial activity.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

Hint : Climate factor

4. **Assertion (A) :** Energy flow in an ecosystem is cyclic.
Reason (R) : Nutrients are recycled in biogeochemical cycles.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

Hint : Energy vs matter

5. **Assertion (A) :** Detritus food chain is more important than grazing food chain in forests.
Reason (R) : Decomposers are not represented as a trophic level.

Ⓐ A Ⓑ B Ⓒ C Ⓓ D

Short Answer Questions : **[2 Marks]**

1. Why is respiration considered a major cause of energy loss in ecosystems?

Hint : Metabolic activities

2. Distinguish between standing crop and standing state.

Hint : Biomass vs nutrients

3. Why is NPP considered more relevant than GPP for ecosystem studies?

Hint : Available energy

4. Give one reason why aquatic ecosystems show inverted biomass pyramids.

Hint : Phytoplankton size

5. Why are decomposers called the "link" between biotic and abiotic components?

Hint : Nutrient recycling

Short Answer Questions : **[3 Marks]**

1. Explain Lindeman's 10 percent law of energy transfer with the help of an example.

Hint : Energy transfer efficiency

2. Describe the role of detritivores in decomposition.

Hint : Fragmentation

3. Differentiate between grazing and detritus food chains.

Hint : Starting point, habitat

4. Explain how temperature and moisture affect decomposition.

Hint : Microbial activity

5. (a) How many primary producers do you think would be needed to support six tertiary consumers in a grassland ecosystem?

   (b) Draw a grassland pyramid to substantiate your answer.

Long Answer Questions :

1. Explain energy flow in an ecosystem with the help of a suitable diagram.

Hint : Unidirectional, 10% law

2. Describe the process of decomposition and its ecological significance.

Hint : Steps + nutrient cycling

3. Discuss primary productivity and factors affecting it.

Hint : GPP, NPP, environment

4. Describe different types of ecological pyramids and their limitations.

Hint : Number, biomass, energy

5. Explain the structure and functions of an ecosystem.

Hint : Biotic, abiotic, processes

Case Based Questions.

1. A study was conducted in a **grassland ecosystem** to analyse the flow of energy across different trophic levels. The average annual energy captured by producers was measured as **20,000 kJ m^{-2} yr^{-1}**. Of this, only **10%** was transferred to primary consumers, while further transfers to secondary and tertiary consumers followed the same efficiency.

   Answer the following:

   (a) Why does energy decrease at each successive trophic level?

Hint : Recall energy loss as heat during metabolic activities

   (b) Identify the ecological law illustrated by this graph.

Hint : Think about Lindeman's concept

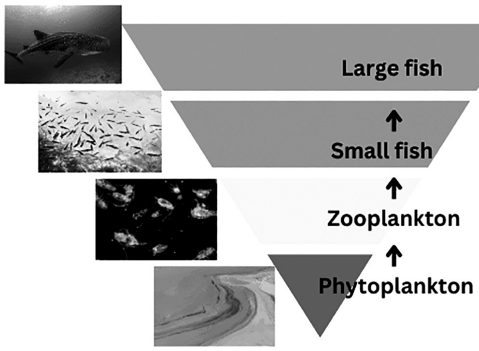
   (c) Predict the impact on the ecosystem if the number of tertiary consumers suddenly increases.

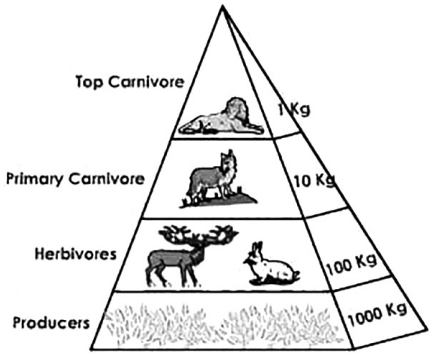
Hint : Link population increase to energy availability

   (d) Why are food chains in nature generally limited to 3–4 trophic levels?

Hint : Consider progressive loss of usable energy

2. An ecologist compared two ecosystems—a pond ecosystem and a forest ecosystem—to study the structure of ecological pyramids. Data on biomass distribution (g m^{-2}) were recorded and represented graphically.





The pond ecosystem showed an inverted biomass pyramid, whereas the forest ecosystem showed an upright pyramid.

Answer the following:

(a) Explain why the biomass pyramid is inverted in the pond ecosystem.

Hint : Compare life span and reproduction rate

(b) Name the organisms responsible for high productivity at the producer level in the pond.

Hint : Focus on phytoplankton characteristics

(c) Which ecosystem has a higher standing crop of producers and why?

Hint : Recall meaning of standing crop

(d) How does turnover rate influence the shape of biomass pyramids?

Hint : Think of rapid replacement of biomass

ANSWER

MCQs

1. Ⓒ	3. Ⓑ	5. Ⓒ	7. Ⓐ	9. Ⓓ
2. Ⓑ	4. Ⓑ	6. Ⓒ	8. Ⓐ	10. Ⓓ

Assertion-Reason

1. Ⓐ	2. Ⓐ	3. Ⓒ	4. Ⓓ	5. Ⓑ