10.ADAPTATIONS IN DIFFERENT ECOSYSTEMS

TEACHING TASK (Page 61 – 63)

Multiple Choice Questions (MCQs)

1) What are pneumatophores?

Answer: C) Unique projections from roots

Explanation: Pneumatophores are specialized root structures in mangrove plants that project above the soil to facilitate oxygen intake for respiration in waterlogged, saline environments.

2) What is the term used for the strategies and mechanisms organisms develop over time to survive in different conditions?

Answer: C) Adaptation

Explanation: Adaptation refers to the traits or behaviors that evolve over time to enhance an organism's survival and reproduction in specific environments.

3) What is an adaptation?

Answer: B) A structure or behavior that helps an organism survive in its environment

Explanation: Adaptations are characteristics (structural, behavioral, or physiological) that improve an organism’s ability to survive and reproduce in its habitat.

4) What is the main adaptation of Opuntia (cactus)?

Answer: B) Leaves reduced to spines to minimize water loss

Explanation: In Opuntia, leaves are modified into spines to reduce transpiration and conserve water, a critical adaptation for arid environments.

5) Which of the following is an example of a symbiotic relationship in marine ecosystems?

Answer: B) Clownfish forming relationships with anemones

Explanation: Clownfish and sea anemones share a mutualistic relationship where clownfish gain protection from predators, and anemones benefit from food scraps and protection from parasites.

6) What adaptation helps marine mammals insulate against the cold?

Answer: B) Blubber

Explanation: Blubber is a thick layer of fat that insulates marine mammals like whales and seals, helping them maintain body temperature in cold waters.

7) What adaptation helps some fish remain stationary above the seafloor despite changing pressures?

Answer: C) Swim bladders

Explanation: Swim bladders are gas-filled sacs in fish that regulate buoyancy, allowing them to maintain their position in the water column despite pressure changes.

8) What factor makes the ocean difficult to explore?

Answer: B) Lack of physical boundaries and immense size

Explanation: The ocean's vast size and lack of clear boundaries pose significant challenges for exploration, requiring advanced technology to navigate and study.

9) Which zone receives sufficient sunlight for photosynthesis?

Answer: C) Euphotic Zone

Explanation: The euphotic zone is the uppermost layer of the ocean where sunlight penetrates sufficiently to support photosynthesis by phytoplankton and other plants.

10) What is a characteristic adaptation of animals in the bathyal zone?

Answer: A) Bioluminescent structures

Explanation: The bathyal zone, located at intermediate depths, is dimly lit, and many organisms develop bioluminescence to attract prey, communicate, or deter predators.

11) What distinguishes freshwater ecosystems from marine ecosystems?

Answer: B) Low salinity

Explanation: Freshwater ecosystems have low salinity (less than 1%), while marine ecosystems have high salinity (around 3.5%).

12) Which zone in a lake is the shallow, near-shore area?

Answer: B) Littoral Zone

Explanation: The littoral zone is the shallow, near-shore region of a lake where light penetrates to the bottom, supporting diverse plant and animal life.

13) Which zone is described as dimly lit and cold, located in the deep waters of a lake?

Answer: C) Profundal Zone

Explanation: The profundal zone is the deep, cold, and lightless region of a lake, typically inhabited by organisms adapted to low oxygen and light.

14) What type of beak adaptation might a finch have if it primarily eats seeds?

Answer: B) Short and robust beak

Explanation: Seed-eating finches have short, strong beaks adapted for cracking hard seed shells.

15) Which animals are examples of those that develop a thick layer of fat to cope with cold?

Answer: B) Whales, seals, and polar bears

Explanation: These animals develop blubber or thick fat layers to insulate against cold environments, unlike frogs, birds, or reptiles.

Advanced Level Questions

1) What adaptations allow Aloe vera to thrive in arid environments?

Answer: A) Conserving water in succulent leaves, B) Closing stomata during the day

Explanation:

A) Correct: Aloe vera stores water in its thick, succulent leaves to survive arid conditions.

B) Correct: It uses CAM (Crassulacean Acid Metabolism) photosynthesis, closing stomata during the day to reduce water loss.

C) Incorrect: Aloe vera has a deep root system to access groundwater, not a shallow one.

D) Incorrect: Releasing water through transpiration is counterproductive in arid environments.

2) What are some characteristics of the littoral zone?

Answer: A) Shallow, near-shore area, B) Warmest part of the lake or pond, C) Supports a diverse range of organisms including snails, clams, and insects

Explanation:

A) Correct: The littoral zone is the shallow, near-shore area of a lake or pond.

B) Correct: It is warmer due to sunlight penetration and shallow depth.

C) Correct: It supports diverse organisms like snails, clams, insects, and rooted plants.

D) Incorrect: It contains rooted and emergent plants, not only floating plants.

3) Assertion and Reason: Camels have long eyelashes.

Reason: Long eyelashes help camels protect their eyes from sand and dust in the desert environment.

Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

Explanation: Camels have long eyelashes (Assertion is true), and these eyelashes protect their eyes from sand and dust in desert conditions (Reason is true and explains the Assertion).

4) Assertion and Reason: Freshwater fish regulate salt absorption through their gill cells.

Reason: Freshwater fish absorb excess water through their permeable mouth and gill membranes.

Answer: B) Both Assertion and Reason are true, but Reason is NOT the correct explanation for Assertion.

Explanation:

Assertion is true: Freshwater fish actively regulate salt absorption through specialized gill cells to maintain osmotic balance.

Reason is true: They absorb water through permeable gills and mouth due to the hypotonic environment.

However, the Reason does not explain salt absorption; it describes water regulation, so it is not the correct explanation.

5) Matrix Matching Type Answer:

Hump, Long eyelashes, Nostrils, Long legs → p. Camel

Swimming through sand → q. Golden Mole

Furry soles, Oversized ears → r. Fennec Fox

Large surface area for gaseous exchange → s. Aquatic plants in ponds

Ability to store water in swollen stem tissues → t. Xerophytic plants in arid regions

Explanation:

Camels have humps for energy storage, long eyelashes and nostrils for protection, and long legs for mobility.

Golden moles “swim” through sand with specialized limbs.

Fennec foxes have furry soles to walk on hot sand and oversized ears for heat dissipation.

Aquatic plants have large surfaces for gas exchange.

Xerophytic plants store water in stems to survive arid conditions.

6) Comprehension: Which zone of a lake is characterized by its shallow, near-shore area?

Answer: C) Littoral zone

Explanation: The littoral zone is the shallow, near-shore area of a lake where light penetrates to the bottom, supporting diverse life.

7) Comprehension: Which zone of a lake is characterized by being deep and lightless?

Answer: C) Profundal zone

Explanation: The profundal zone is the deep, lightless region of a lake, characterized by cold temperatures and low oxygen.

LEARNERS TASK (Page 63 – 65)

Multiple Choice Questions (MCQs)

1) What are pneumatophores?

Answer: C) Unique projections from roots

Explanation: Same as Teaching Task Q1. Pneumatophores are root projections in mangroves for oxygen uptake in waterlogged soils.

2) What is the purpose of pneumatophores in mangrove trees?

Answer: B) To help in root respiration in saline marshy conditions

Explanation: Pneumatophores allow mangroves to access oxygen in oxygen-poor, saline, and waterlogged soils.

3) What common feature do xerophytes share?

Answer: C) They are adapted to dry conditions

Explanation: Xerophytes are plants adapted to arid environments through features like reduced leaves, thick cuticles, and water storage.

4) What adaptation allows camels to store energy and water?

Answer: B) Hump

Explanation: Camels store fat in their humps, which can be metabolized for energy and water in desert conditions.

5) What fundamental substance in living cells reflects evolutionary ties to marine environments?

Answer: B) Protoplasm

Explanation: Protoplasm, the living content of cells, has a composition similar to seawater, reflecting the marine origin of life.

6) What structure helps dolphins and fishes regulate their buoyancy?

Answer: B) Swim bladders

Explanation: Swim bladders in fish (and analogous structures in dolphins) regulate buoyancy. Dolphins use lung adjustments, but swim bladders are the standard answer for fish.

7) What are the two main categories of aquatic ecosystems?

Answer: C) Freshwater and Marine

Explanation: Aquatic ecosystems are broadly classified into freshwater (lakes, rivers) and marine (oceans, seas) based on salinity.

8) What is a common adaptation of turtles and fishes that aids in swimming?

Answer: A) Fins and flippers

Explanation: Fins in fish and flippers in turtles are adapted for efficient movement through water.

9) What type of bodies do many deep-sea organisms in the abyssal zone have?

Answer: C) Shiny or transparent bodies

Explanation: Many abyssal organisms have shiny or transparent bodies to avoid detection or blend into the dark environment.

10) Which of the following is NOT a common feature of organisms in the euphotic zone?

Answer: C) Bioluminescent structures

Explanation: The euphotic zone has ample light, so bioluminescence is less common. Green plants, sharp vision, and shiny/transparent bodies are typical.

11) How do animals in the profundal zone find food?

Answer: B) Relying on smell and auditory senses

Explanation: In the dark profundal zone, animals rely on smell and hearing, as vision is limited.

12) Which plant develops air-filled structures in its leaf bases to remain afloat?

Answer: C) Water Hyacinth (Eichhornia crassipes)

Explanation: Water hyacinth has air-filled petioles (leaf bases) that provide buoyancy, allowing it to float.

13) What adaptation allows Hydrilla to grow in low light conditions?

Answer: C) Efficient carbon dioxide absorption through its leaves

Explanation: Hydrilla's thin leaves and lack of stomata allow efficient CO_2 absorption, aiding photosynthesis in low-light conditions.

14) What is aestivation?

Answer: B) A period of reduced activity during summer

Explanation: Aestivation is a dormancy state in hot, dry summer conditions to conserve energy and water.

15) What mutualistic relationship forms lichens?

Answer: A) Algae and fungi

Explanation: Lichens result from a mutualistic relationship where algae provide food via photosynthesis, and fungi provide structure and protection.

Advanced Level Questions

1) Which of the following adaptations are seen in the Kangaroo Rat?

Answer: A) Living without drinking water, B) Synthesizing water from its food, D) Having large ears to dissipate heat

Explanation:

A) Correct: Kangaroo rats survive without drinking water, relying on metabolic water.

B) Correct: They synthesize water from dry seeds through metabolism.

C) Incorrect: Kangaroo rats have thin fur for desert life, not thick fur.

D) Correct: Large ears help dissipate heat in hot desert environments.

2) Which behaviors help desert animals regulate their body temperature?

Answer: B) Walking on hot sand with furry soles, C) Moving sideways with minimal contact with sand, D) Raising feet off the hot sand

Explanation:

A) Incorrect: Swimming through sand (e.g., golden mole) is for locomotion, not temperature regulation.

B) Correct: Furry soles (e.g., fennec fox) protect feet from hot sand.

C) Correct: Sideways movement (e.g., sidewinder snake) minimizes contact with hot surfaces.

D) Correct: Raising feet (e.g., lizards) reduces heat absorption from the ground.

3) Assertion and Reason: Hydrilla is capable of growing in low light conditions.

Reason: Hydrilla lacks stomata and has thin leaves, enabling it to adapt to low light conditions.

Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

Explanation:

Assertion is true: Hydrilla grows in low-light aquatic environments.

Reason is true: Its thin leaves and lack of stomata enhance CO_2 absorption and photosynthesis efficiency in low light, explaining the Assertion.

4) Assertion and Reason: Pneumatophores are adaptations found in many plant species.

Reason: Pneumatophores help plants absorb nutrients from the air.
Answer: C) Assertion is true, but Reason is false.

Explanation:

Assertion is true: Pneumatophores are found in some plant species, like mangroves.

Reason is false: Pneumatophores facilitate oxygen uptake for root respiration, not nutrient absorption from the air.

5) Matrix Matching Type Answer:

Littoral zone → q. Zone characterized by shallow, near-shore area

Limnetic zone → r. Zone with highest levels of photosynthetic activity

Profundal zone → p. Bottom-dwelling animals and microbes

Stores water in its succulent stem tissues → t. Aloe vera

Variation in beak shapes and feather colors → s. Darwin's finches

Explanation:

Littoral zone is shallow and near-shore.

Limnetic zone has high light for photosynthesis.

Profundal zone supports bottom-dwelling organisms.

Aloe vera stores water in succulent stems.

Darwin’s finches show beak and feather variations due to adaptive radiation.

6) Comprehension: Which marine organisms are mentioned as examples of creatures that have evolved without the need for strong limbs?

Answer: C) Giant squids and whales

Explanation: The passage specifies giant squids and whales as examples that rely on buoyancy from saltwater, not strong limbs.

7) Comprehension: What provides buoyancy to marine creatures like giant squids and whales?

Answer: D) Saltwater

Explanation: The high salinity of saltwater provides buoyancy, reducing the need for strong limbs in these organisms.