Give Short Answers of the Following Questions

1. What are the three of life and how do they differ in terms of cellular structure?

Ans.

Thee Domains of Life	Cellular Structure
(i) Bacteria	• Prokaryotic cells, cell walls contain peptidoglycan, lack membrane-bound organelles.
(ii) Arrchaea	• Prokaryotic, but with unique membrane lipids and no peptidoglycan in cell walls.
(iii) Eukarya	• Eukaryotic cells with membrane-bound organelles and nuclei.

2. Describe one key feature that differentiates Archaea and Bacteria.

Ans. Key Difference between Archaea from Bacteria:

(i) Cell wall Composition:

- Bacteria have cell walls made of peptidoglycan.
- Archaea lack peptidoglycan and instead have pseudopeptidoglycan or other unique polymers.

(ii) Membrane lipids

- Bacteria have fatty acid chains linked to glycerol by ester bonds.
- Archaea have branched isoprene chains linked to glycerol by ester bonds, which stabilize membranes in extreme environments.

3. How do sponges reproduce asexually?

Ans. Sponges Reproduce Asexually:

(i) Budding: A small outgrowth forms on the parent sponge, detaches, and develops into a new individual.

(ii) Fragmentation: Broken pieces (due to environmental stress or predation) regenerate into complete sponges.

(iii) Gemmule Formation (in freshwater sponges): Survivable clusters of cells (gemmules) encased in protective coats hatch into new sponges under favorable conditions.

4. Differentiate the following:

i. Sac-like and tube-like digestive system

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Ans.

Sac-like Digestive System	Tube-like Digestive System
• Sac-like digestive system has one opening. • Sac-like digestive system mixes food and waste. • Sac-like digestive system is less efficient system. • Sac-like digestive system is found in simpler animals	• Tube-like digestive system has two (mouth and anus). • Tube-like digestive system separates digestion and excretion. • Tube-like digestive system is more efficient system. • Tube-like digestive system found in complex animals.

5. Differentiate between the:

ii. Polyps vs. Medusa:

Ans.

Polyps	Medusa
• Polyps are sessile. • Polyps have mouth facing upward. • Polyps are cylindrical. • Polyps reproduce asexually.	• Medusae are free-swimming. • Medusae have mouth facing. downward. • Medusae are bell-shaped. • Medusae reproduce sexually.

6. Differentiate between:

iii. Urochordata vs. Cephalochordata

Ans.

Urochordata (Tunicates)	Cephalochordata (Lancelets)
• Urochordates have notochord only in larvae. • Urochordates adults are sessile. • Urochordates have a tunic. • Urochordates lose some chordate features in adulthood.	• Cephalochordates have notochord lifelong. • Cephalochordates are motile. • Cephalochordates do not have a tunic. • Cephalochordates retain all chordate features.

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7. Differentiates between:

iv. Ectotherms vs. Endotherms

Ans.

Ectotherms	Endotherms
• Ectotherms rely on external heat. • Ectotherms have variable body temperature. • Ectotherms require less food energy. • Ectotherms become inactive in cold.	• Endotherms generate internal heat. • Endotherms maintain constant temperature. • Endotherms require more food energy. • Endotherms remain active.

8. Differentiates between Marsupials vs. Placental Mammals

Ans.

Marsupials	Placental Mammals
• Marsupials give birth to immature young. • Marsupials carry young in pouch. • Marsupials have shorter gestation. • Marsupials are mostly found in Australia.	• Placental mammals to mature young. • Placental mammals develop young inside uterus. • Placental mammals longer gestation are worldwide. • Placental mammals are worldwide.

9. Differentiates between Gymnosperms vs. Angiosperms

Ans.

Gymnosperms	Angiosperms
• Gymnosperms have naked seeds. • Gymnosperms do not have flower. • Gymnosperms usually have needle-like leaves. • Gymnosperms reproduce using cones.	• Angiosperms have seeds fruits. • Angiosperms have flowers. • Angiosperms have broad leaves. • Angiosperms use flowers for reproduction.

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10. Which kingdom is characterized by organisms with chitin in their cell walls and that are mostly decomposers?

Ans. Kingdom Fungi:

- Organisms with chitin in their cell walls belong to the fungi kingdom.
- Fungi are mostly decomposers, breaking down dead organic matter.
- They secrete enzymes that digest complex substances externally.
- This process helps recycle nutrients back into the environment.
- Chitin provides strength and rigidity to their cell wall.

11. What type of speciation occurs when population are geographically separated?

Ans. Allopatric Speciation:

- Occurs when populations are isolated by physical barriers or geographical barrier such as mountains or rivers.
- It leads to genetic divergence over time.
- **Example:** The speciation observed in Darwin' finches on the Galapagos Islands, where different populations adapted to diverse environments.

12. What is the role of genetic drift in the process of Speciation?

Ans. Role of Genetic Drift in the process of Speciation:

- Genetic drift causes random changes in allele frequencies, especially in small populations.
- Overtime, these random changes can make populations genetically different.
- If they become so different that they can no longer interbreed, thus new species can form.
- This is how genetic drift can lead to speciation.

13. What is the primary method used to assess species distribution along an environmental gradient?

Ans. Primary Method Used To Assess Species Distribution Along An Environmental Gradient:

Transect Sampling:

- It involves laying out a line or strip (transect) across the study area and recording species at regular intervals along this line.
- **Use:** This method is effective for studying the distribution of species across environments.
- **Example:** In a coastal zone, a transect can be laid from the high tide line to the low tide line, to record the types and abundance of intertidal organisms.

14. Which level of biodiversity assessment involves evaluating the variety of ecosystem in a region?

Ans. Ecosystem Diversity Assessment:

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- Ecosystem diversity assessment involves evaluating the variety of ecosystem in a region.
- This level of biodiversity assessment looks at the different types of ecosystem, such as forests, grasslands, wetlands, and their distribution.
- It helps to understand the complexity and health of ecosystem.
- Ecosystem diversity is crucial for maintaining ecological balance.