Biology

Short Questions, Answers & Definitions

Introduction to Cells

1. What is a cell?
A cell is the basic structural and functional unit of life. It carries out all the functions necessary for living things to survive.

2. Why are cells called the building blocks of life?
Cells are called the building blocks of life because all living things are made up of cells, just like a house is made of bricks.

3. Give an example of large cells visible to the naked eye.
Examples include the egg cell of an ostrich, unicellular green algae *Acetabularia*, and giant amoeba.

4. Who discovered cells and when?
Robert Hooke discovered cells in 1665 while observing cork under a simple microscope.

5. Who discovered the nucleus and when?
Robert Brown discovered the nucleus in plant cells in 1831.

Types of Cells

6. What are the two basic types of cells?

- **Prokaryotic cells** – Simple cells without membrane-bound organelles (e.g., bacteria).
- **Eukaryotic cells** – Complex cells with membrane-bound organelles (e.g., plant and animal cells).

Cell Wall

7. What is the cell wall?
The cell wall is a rigid, non-living outer layer found in plant cells, fungi, algae, and some bacteria. It provides shape, strength, protection, and support.

8. What is the plant cell wall made of?
It is made of cellulose, hemicellulose, and pectin.

9. What are plasmodesmata?
Plasmodesmata are small channels in the plant cell wall that allow the exchange of materials between adjacent cells.

Cell Membrane

10. What is the cell membrane?
The cell membrane is a thin, elastic, selectively permeable layer around the cytoplasm that controls what enters and leaves the cell.

11. What is the fluid mosaic model?
It describes the cell membrane as a flexible lipid bilayer with proteins and carbohydrates that can move around, creating a constantly changing pattern.

Cytoplasm

12. What is cytoplasm?
Cytoplasm is the jelly-like fluid inside a cell that holds organelles and is the site for many metabolic reactions.

13. What is cytosol?
Cytosol is the liquid part of the cytoplasm, containing water, salts, enzymes, and other molecules.

Nucleus

14. What is the nucleus?
The nucleus is the control center of the cell. It contains DNA, which controls cell activities and passes traits to the next generation.

15. What are nucleoli?
Nucleoli are small structures inside the nucleus where ribosomes are made.

Cytoskeleton

16. What is the cytoskeleton?
The cytoskeleton is a network of protein filaments (microtubules, microfilaments, intermediate filaments) that gives the cell shape, supports organelles, and helps movement.

Ribosomes

17. What are ribosomes?
Ribosomes are tiny structures made of proteins and rRNA that make proteins for the cell. They can be free in the cytoplasm or attached to rough ER.

Endoplasmic Reticulum (ER)

18. What are the two types of ER and their functions?

- **Rough ER** – Has ribosomes, makes proteins.
- **Smooth ER** – No ribosomes, makes lipids, detoxifies chemicals, and transports materials.

Golgi Apparatus

19. What is the function of the Golgi apparatus?
It modifies, packages, and transports proteins and other materials in vesicles inside or outside the cell.

Lysosomes

20. What are lysosomes?
Small vesicles with digestive enzymes that break down food, wastes, and damaged cell parts (mainly in animal cells).

Mitochondria

21. What are mitochondria and why are they called the powerhouse of the cell?
Mitochondria produce energy (ATP) through aerobic respiration, using oxygen to break down glucose.

Plastids

22. Name the three types of plastids and their functions.

- **Chloroplasts** – Green, do photosynthesis.
- **Chromoplasts** – Store bright pigments for flower/fruit color.
- **Leucoplasts** – Store starch, lipids, proteins.

Vacuoles

23. What is the function of vacuoles?
Vacuoles store water, nutrients, and waste; in plants, the large central vacuole maintains turgor pressure.

Centrioles

24. What are centrioles and their function?
Centrioles help in cell division by forming spindle fibers. They also form basal bodies for cilia and flagella.

Cilia and Flagella

25. What is the function of cilia and flagella?
They help in movement. Cilia are short and many; flagella are long and few.

Comparison Between Plant and Animal Cells

26. Name three structures found only in plant cells.
Cell wall, chloroplasts, large central vacuole.

27. Name two structures found only in animal cells.
Centrioles, lysosomes.

Cell Specialization

28. What is cell specialization?
The process by which cells develop special structures and functions to perform specific tasks.

29. Give examples of specialized plant cells.

- **Mesophyll cells** – Photosynthesis.
- **Root hair cells** – Absorb water and minerals.
- **Guard cells** – Control stomata opening/closing.

30. Give examples of specialized animal cells.

- **Muscle cells** – Movement.
- **Neurons** – Transmit nerve impulses.
- **Red blood cells** – Carry oxygen.
- **Liver cells** – Detoxification and storage.

Division of Labour

31. What is division of labour in cells?
It means different parts or cells perform specific tasks to increase efficiency.

Stem Cells

32. What are stem cells?
Unspecialized cells that can divide and develop into different types of specialized cells.

33. Give two examples of stem cell functions in the body.

- Skin stem cells repair wounds.
- Bone marrow stem cells make blood cells.

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34. Humbase
Definition: A Humbase is a special type of large, closed-frame beehive used to keep honeybees in a safe and organized environment. Its design allows for better monitoring of the bee colony and higher honey production.

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35. Drone
Definition: A drone is a male honeybee. Its primary role is to mate with the queen bee so she can lay eggs. Drones do not have stingers and do not collect honey.

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36. Hive Frames
Definition: Hive frames are rectangular wooden or plastic structures placed inside the hive.

Bees build honeycombs on these frames and use them to store honey, pollen, and to raise brood (larvae).

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37. Pollen

Definition: Pollen is a fine yellow or colored powder from flowers collected by honeybees. It is an important source of protein for bees and is used in feeding the young bees.

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38. Honey

Definition: Honey is a sweet, thick substance produced by honeybees from the nectar of flowers. It is the main energy source for bees and is also valuable for human nutrition and medicinal use.
