Biology – Cell: The Building Block of Life (Detailed Answers)

Q1Differentiate between the following pairs of terms based on the clues given in parentheses: (i) Cell membrane and cell wall (permeability)(ii) RER and SER (structure)(iii) Chloroplasts and chromoplasts (pigments)

1. (i) Cell Membrane vs Cell Wall:

• Cell membrane: Living, flexible, selectively permeable . allowing only certain substances to pass

• Cell wall: Non-living, rigid, freely permeable (plants only).

(ii) RER vs SER:

· RER: Ribosomes present on its surface giving it a rough appearance → Protein synthesis.

· SER: No ribosomes , appears smooth → Lipid synthesis & detoxification.

(iii) Chloroplast vs Chromoplast:

• Chloroplast: Chlorophyll, photosynthesis.

• Chromoplast: Carotenoids pigments (red, orange, yellow), colour in fruits/flowers.

Q2Two similar animal cells are placed in two different solutions: Cell X is placed in pure water. Cell Y is placed in a concentrated salt solution. Cells are observed after some time. Cell X swells, and Cell Y shrinks.

Which statement provides the correct explanation for the above observations?(i) Salt molecules moved into Cell Y, causing it to shrink.(ii) Water moved into Cell X and more water moved out of Cell Y than the salt solution entered in it.(iii) Water moved into Cell X and moved out of Cell Y through the cell membrane.(iv) Solute movement caused osmosis in both cells.

2. Cell X swells in pure water due to endosmosis, while Cell Y shrinks in salt solution due to exosmosis.

Pure water → Endosmosis → Cell swells

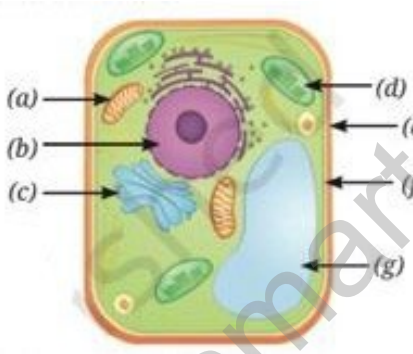
Salt solution → Exosmosis → Cell shrinks

Correct answer:

(iii) Water moved into Cell X and moved out of Cell Y through the cell membrane.

Q3 Look at the diagram of a cell in Fig. 2.20. Identify the parts labelled from(a) to (g) and correctly match them with their functions given below:

(i) Controlling all the activities of a cell.(ii) Site of cellular respiration.(iii) Storage organelle that also provides rigidity to the cell.(iv) Separates the cell contents from surroundings.(v) Provides structural rigidity to the cell.(vi) Packs and stores materials received from ER.(vii) Helps in manufacturing food.



3. (a) Mitochondria – site of respiration (b) Nucleus – controls activities.
(c) Golgi apparatus – packaging and storage. ER – helps in manufacturing food.
(d) Plastid [Chloroplast] - Helps in manufacturing food.
(e) Cell wall – provides rigidity.
(f) Cell membrane – separates cell contents from surroundings.
(g) Vacuole – storage and rigidity.

Q4 Which of the following option(s) of the pairs of cell organelles are correctly placed under the given categories?

Option	Present in the plant cells	Absent in the animal cells
(i)	Leucoplast	Cell wall
(ii)	Mitochondria	Ribosome
(iii)	Cell wall	Golgi apparatus
(iv)	Lysosome	Endoplasmic reticulum

4. Correct option: (i) Leucoplast present in plant cells and Cell Wall absent in animal cells.

Q5 Two students, Renu and Rohit, were having a discussion on the plastids. Renu emphasised that all parts of the plants, even roots, contain plastids. However, Rohit did not agree with the statement and told her that plastids are absent in plant roots since the roots are underground and do not need to perform photosynthesis. Who is correct? Justify youranswer.

5. Renu is correct. Roots have leucoplasts (a type of plastid) for storage though they lack chloroplasts.

Q6 Mitochondria and chloroplasts are two important organelles in a plant cell. Discuss how these two organelles are structurally and functionally similar to each other, and different from each other.

6. Similarities: Both have double membranes and own DNA & posses 70 s Ribosomes .
Differences: Chloroplasts perform photosynthesis, mitochondria perform respiration.

Q7 Which of the following pairs of cell organelles contains DNA ? (i) Chloroplasts, Ribosomes(ii) Mitochondria, Nucleus(iii) Golgi bodies, Ribosomes(iv) Nucleus, Lysosomes

7. Correct answer: (ii) Mitochondria and nucleus contain DNA.

Q8 A researcher carried out an experiment in which she took two carrots of similar size. She placed one carrot in plain water and the other carrot in concentrated salt solution (Fig. 2.21). After 24 hours she recorded her observations.

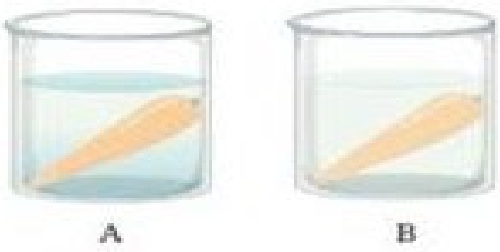


Fig. 2.21: Experimental set-up having carrot (a) in plain water; and (b) in salt solution

(i) What hypothesis does she want to test through this experiment? (ii) What would you suggest for the improvement of this experiment? (iii) Why does the carrot in plain water stay stiff and crunchy, but the carrot in concentrated salt solution become rubbery and limp?

8. (i) Hypothesis: Osmosis causes movement of water across cell membranes.
(ii) Improvement: Use more samples and controlled conditions.
(iii) Plain water makes carrot turgid (endosmosis), salt solution causes water loss (exosmosis).

Q9 Indicate the presence or absence of following structures in bacterial and animal cells:

Structures in a cell	Bacterial cell	Animal cell
Chromosome		
Nucleus		
Mitochondria		
Golgi complex		
Chromoplasts		

9. Chromosome: Present in both.
Nucleus: Absent in bacteria, present in animal cells.
Mitochondria: Absent in bacteria, present in animal cells.
Golgi: Absent in bacteria, present in animal cells.
Chromoplasts: Absent in both.

Q10 Carry out the following experiment:

Take four peeled potato halves and scoop each one out to make potato cups. One of these potato cups should be made from a boiled potato. Place each of the potato cups in a beaker containing water (Fig. 2.22).

Now, set up the experiment as follows:

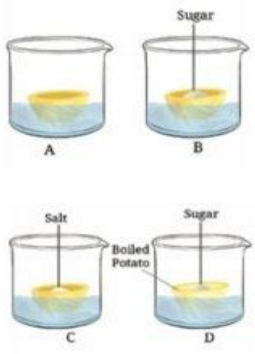


Fig. 2.22: Experimental set-up

(a) Keep Cup A empty. (b) Add one teaspoon sugar in Cup B. (c) Add one teaspoon salt in Cup C. (d) Add one teaspoon sugar in the boiled potato in Cup D.

Observe the four potato cups at least two hours and answer the following questions:(i) Explain why water gathers in the hollowed portion of Cup B and Cup C.(ii) Why is Cup A necessary for this experiment? (iii) Explain why water does not gather in the hollowed portions of Cups A and D.

10. (i) Water enters cups B and C due to osmosis [endo-osmosis].
(ii) Cup A acts as control .
(iii) No water in A and D because no osmotic gradient or membrane destroyed in D due to boiling.

Q11 Identify the pair that incorrectly matches the cell organelle with its function.

(i) Ribosome — Protein synthesis(ii) SER — Lipid and cellulose synthesis(iii) Lysosome — Digestion of foreign agents .

11. Incorrect pair: (ii) SER – cellulose synthesis (incorrect, SER synthesizes lipids).

Q12 What outcome do you expect, if all the mitochondria are removed froma eukaryotic cell?

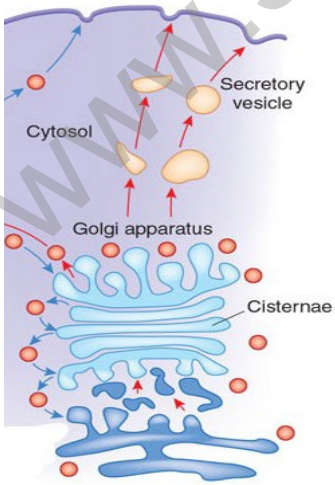
12. Without mitochondria, cell cannot produce ATP → cell dies.

Q13 Which phenomenon inhibits the formation of tumors in the human body? Can plants also develop tumors? Explain.

13. Apoptosis (programmed cell death) inhibits tumors. Plants can develop tumors but they are less harmful due to rigid cell walls.

Q14 The cell membrane of a cell is made up of proteins and lipids. Which cell organelles help in the synthesis of cell membrane? Write the path of these compounds from their site of synthesis to the cell membrane and show this through a labelled diagram.

14. Proteins synthesized in RER, lipids in SER → transported to Golgi → sent via vesicles to cell membrane.



Q15 What would happen if gametes are formed by mitotic divisions?

15. Gametes formed by mitosis would be diploid leading to abnormal fertilization and genetic imbalance.

Q16 A farmer, Deepa, was very happy with the harvest of amla (Indian Gooseberry) and lemons on her farm. However, she could sell only one fourth of the produce in the local market. Recognising that a significant amount of produce may be lost post-harvest, she employed a traditional yet scientifically sound method to extend the shelf life of amla and lemons. She turned perishable produce into profitable products, such as pickles and sharbat. She used the excess produce to prepare pickles, murabbas , and sharbat by adding appropriate amounts of salt, sugar,or jaggery to small pieces of fruit and their juices. These were then stored in small glass bottles for sale, helping her prevent the wastage of post-harvest produce. This shift from farming to agro-processing would strengthen food security and boost the local economy, creating a sustainable model that cuts waste while increasing her income. Basedon the above passage answer the following questions:

(i) Which scientific concept has the farmer applied in the preservation of the farm produce?

(ii) How does the addition of high concentrations of salt and sugar create an environment that prevents the growth of spoilage-causing bacteria and fungi?

(iii) Suggest a healthy recipe of this kind for food preservation.

(iv) What are the scientific values addressed in this case?

16. (i) Concept: Osmosis and preservation by high solute concentration.
(ii) High salt/sugar causes plasmolysis of microbes.
(iii) Example: Pickle or fruit jam.
(iv) Scientific values: sustainability, food preservation, reducing waste.