

MULTIPLE CHOICE QUESTIONS

1. A common characteristic feature of plant sieve tube cells and most of the mammalian erythrocytes is

- a. Absence of mitochondria**
- b. Presence of cell wall**
- c. Presence of haemoglobin**
- d. Absence of nucleus**

Solution:

Option (d) is the answer.

2. Select one which is not true for ribosome

- a. Made of two sub-units**
- b. Form polysome**
- c. May attach to m+RNA**
- d. Have no role in protein synthesis**

Solution:

Option (d) is the answer.

3. Which one of these is not a eukaryote?

- a. Euglena**
- b. Anabaena**
- c. Spirogyra**
- d. Agaricus**

Solution:

Option (b) is the answer.

4. Which of the following stains is not used for staining chromosomes?

- a. Basic Fuchsin**
- b. Safranin**
- c. Methylene green**
- d. Carmine**

Solution:

Option (b) is the answer.

5. Different cells have different sizes. Arrange the following cells in an ascending order of their size. Choose the correct option among the followings

- i. Mycoplasma**
- ii. Ostrich eggs**
- iii. Human RBC**
- iv. Bacteria**

Options:

- a. i, iv, iii & ii**
- b. i, iii, iv & ii**
- c. ii, i, iii & iv**

d. iii, ii, i & iv

Solution:

Option (a) is the answer.

6. Which of the following features is common to prokaryotes and many eukaryotes?

- a. Chromatin material**
- b. Cell wall present**
- c. Nuclear membrane present**
- d. Membranes bound sub-cellular organelles present**

Solution:

Option (b) is the answer.

7. Who proposed the fluid mosaic model of the plasma membrane?

- a. Benda**
- b. Schleiden and Schwann**
- c. Singer and Nicolson**
- d. Robert Brown**

Solution:

Option (c) is the answer.

8. Which of the following statements is true for a secretory cell?

- a. Golgi apparatus is absent**
- b. Rough Endoplasmic Reticulum (RER) is easily observed in the cell**
- c. Only Smooth Endoplasmic Reticulum (SER) is present**
- d. Secretory granules are formed in the nucleus.**

Solution:

Option (b) is the answer.

9. What is a tonoplast?

- a. The outer membrane of mitochondria**
- b. The inner membrane of chloroplast**
- c. Membrane boundary of the vacuole of plant cells**
- d. The cell membrane of a plant cell**

Solution:

Option (c) is the answer.

10. Which of the following is not true of a eukaryotic cell?

- a. The cell wall is made up of peptidoglycans**
- b. 80S type of ribosomes is present in the cytoplasm**
- c. Mitochondria contain circular DNA**
- d. Membrane-bound organelles are present**

Solution:

Option (a) is the answer.

11. Which of the following statements is not true for plasma membrane?

- a. It is present in both plant and animal cell
- b. Lipid is present as a bilayer in it
- c. Proteins are presently integrated as well as loosely associated with the lipid bilayer
- d. Carbohydrate is never found in it

Solution:

Option (d) is the answer.

12. Plastid differs from mitochondria based on one of the following features. Mark the right answer.

- a. Presence of two layers of membrane
- b. Presence of ribosome
- c. Presence of thylakoids
- d. Presence of DNA

Solution;

Option (c) is the answer

13. Which of the following is not a function of cytoskeleton in a cell?

- a. Intracellular transport
- b. Maintenance of cell shape and structure
- c. Support of the organelle
- d. Cell motility

Solution:

Option (a) is the answer

14. The stain used to visualise mitochondria is

- a. Fast green
- b. Safranin
- c. Acetocarmine
- d. Janus green

Solution:

Option (d) is the answer

VERY SHORT ANSWER TYPE QUESTIONS

1. What is the significance of vacuole in a plant cell?

Solution:

A vacuole is a membrane-bound space found in the cytoplasm. It is found in both plant and animal cells but it is much larger in plants (occupies 90% of the space in plant cells). Help is in the storage, waste disposal, cell elongation and cell protection.

2. What does 'S' refer in the 70S & an 80S ribosome?

Solution:

The 'S' refers to Svedberg's unit or sedimentation coefficient. It is indirectly a measure of density and size.

3. Mention a single membrane-bound organelle which is rich in hydrolytic enzymes.

Solution:

Lysosomes are the single membrane-bound organelle which is rich in hydrolytic enzymes.

4. What are gas vacuoles? State their functions?

Solution:

Gas vacuoles are aggregates of hollow cylindrical structures called gas vesicles. They are storing metabolic gases and take part in buoyancy.

5. What is the function of a polysome?

Solution:

The function of a polysome is to translate an mRNA into proteins.

6. What is the feature of a metacentric chromosome?

Solution:

The metacentric chromosome has middle centromere forming two equal arms of the chromosome.

7. What is referred to as satellite chromosome?

Solution:

A few chromosomes have non-staining secondary constrictions at a constant location. This gives the appearance of a small fragment called the satellite. Such chromosomes are called satellite chromosomes.

SHORT ANSWER TYPE QUESTIONS

1. Discuss briefly the role of nucleolus in the cells actively involved in protein synthesis.

Solution:

It contains small spherical bodies which are known as the nucleolus. It is not a membrane-bound structure. It is a site for active ribosomal RNA synthesis. It also receives and stores ribosomal proteins formed in the cytoplasm.

2. Explain the association of carbohydrate to the plasma membrane and its significance.

Solution:

By glycosylation carbohydrates forms glycoproteins and glycolipids. They are biochemical involved in cell recognition and adhesion.

3. Comment on the cartwheel structure of centriole.

Solution:

The centromere is an organelle usually containing two cylindrical structures called centrioles. The centrioles present in a centrosome lie perpendicular to each other in which each as an organization like the cartwheel. Each of the peripheral fibrils is a triplet. The adjacent triplets are also linked.

4. Briefly describe the cell theory.

Solution:

Cell theory was given by Schleiden and Schwann which stated –

a) Bodies of all the plants and animals are made up of cells.

b) The cells are structural and functional units of life.

The modern cell theory by Rudolf Virchow is all living organisms are composed of cells and products of cells and all arise from pre-existing cells.

5. Differentiate between Rough Endoplasmic Reticulum (RER) and Smooth Endoplasmic Reticulum (SER).

Solution:

Rough Endoplasmic Reticulum(RER)	Smooth Endoplasmic Reticulum(SER)
They have ribosomes attached to it They help in the synthesis of proteins and enzymes It is mainly formed of cisternae and few tubules	They have no ribosomes attached Helps in synthesis of glycogen and lipids It is formed mainly vesicles and tubules.

6. Give the biochemical composition of the plasma membrane. How are lipid molecules arranged in the membrane?

Solution:

The plasma membrane is composed of proteins, lipids, water and carbohydrates. The ratio of lipids and proteins varies considerably in different types of cells. The major lipids are phospholipids that are arranged in a bilayer. They also contain cholesterol.

7. What are plasmids? Describe their role in bacteria?

Solution:

Plasmids are smaller DNA present in the bacteria outside the genomic DNA. The plasmid DNA grants certain phenotypic characters like resistance to antibiotics to such bacteria. DNA is used to monitor bacterial transformation with foreign DNA.

8. What are histones? What are their functions?

Solution:

Histones are highly alkaline proteins that are found in nuclei of eukaryotes. They package and order DNA into structural units. They also function as gene regulation.

LONG ANSWER TYPE QUESTIONS

1. What structural and functional attributes must a cell have to be called a living cell?

Solution:

A cell must have the following structural and functional attributes to be called a living cell

- a) Cell membrane – It is the outer membrane of the cell which is made up of phospholipids primarily.
- b) Cytoplasm – The liquid containing the controlled concentration of organic and inorganic compounds. They provide energy and material for reproduction.
- c) Nucleus – It contains DNA, the nuclear matrix or the nucleoplasm containing nucleolus and chromatin. They can be also known as the brain of the cell which controls all the activities.

2. Briefly give the contributions of the following scientists in formulating the cell theory

a. Robert Virchow

b. Scheiden and Schwann

Solution:

Rudolf Virchow's modern theory of cell is the cell divides and new cells are formed from the [pre-existing cells. He modified the hypothesis of Schleiden and Schwann to give the cell theory to its final.

1. All living organism is composed of cells and products of cells
2. All cells arise from pre-existing cells

In 1839, a British Zoologist Theodore Schwann studied a different type of animal cells and said that cell had a thin layer later known as the plasma membrane. He studied on plant cells and concluded that the presence of cell wall is a unique character of the plant cells.

3. Is extra genomic DNA present in prokaryotes and eukaryotes? If yes, indicate their location in both the types of organisms.**Solution:**

Yes, extra genomic DNA is present in prokaryotes and eukaryotes. In organisms like bacteria in addition to the genomic DNA, there is a small circular DNA outside the genomic DNA. They are called plasmids. This is a unique phenotypic character to such bacteria.

In eukaryotes, the extra genomic DNA is present in two organelles- Mitochondria and plastids.

4. Structure and function are correlatable in living organisms. Can you justify this by taking the plasma membrane as an example?**Solution:**

It is made up of proteins, carbohydrates and lipids. The lipids arranged with their hydrophilic polar head directed outwards and non-polar hydrophobic tails directed inwards providing fluidity to the membrane. This provides the cell membrane with its selective permeability.

5. Eukaryotic cells have organelles which may a. not be bound by a membrane**b. bound by a single membrane****c. bound by a double membrane****Group the various subcellular organelles into these three categories.****Solution:**

- a. Non-membrane bound cell organelles – Ribosomes, Centriole, nucleolus, Cytoskeletal structures
- b. Single membrane-bound cell organelles – Endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles, Thylakoid.
- c. Double membrane-bound cell organelles – Plastids, Mitochondria and nucleus.

6. The genomic content of the nucleus is constant for a given species whereas the extrachromosomal DNA is found to be variable among the members of a population. Explain.**Solution:**

Consider a human cell. It has 46 chromosomes and will be constant for all human beings. But the mitochondria present in the human will have a different amount of extrachromosomal DNA. As like in human beings, bacteria will have the same amount of genomic DNA but the extra genomic DNA contained in plastids and mitochondria will be different.

7. Justify the statement, “Mitochondria are powerhouses of the cell”**Solution:**

There are two membranes for each mitochondrion. They are Inner and outer membrane. The inner

membrane is called the matrix. They have their specific enzymes associated with their functions. They are the sites for aerobic respiration and produce cellular energy in the form of ATP and are called powerhouses of a cell.

8. Is there a species-specific or region-specific type of plastids? How does one distinguish one from the other?

Solution:

Plastids are species-specific or region-specific. They bear some specific pigments, thus imparting specific colours to the plants. According to the types of pigments, plastids are divided into three. chloroplasts, chromoplasts and leucoplasts.

The chloroplasts impart green colour as they contain chlorophyll and carotenoid pigments

The chromoplasts contain fat-soluble carotenoid pigments like carotene, xanthophylls and others are present.

The leucoplasts are the colourless plastids of varied shapes and sizes with stored nutrients

9. Write the functions of the following a. Centromere b. Cell wall c. Smooth ER d. Golgi Apparatus e. Centrioles

Solution:

a. Centromere - Centromere holds two chromatids or sister chromatids of a chromosome.

b. The cell wall is present in plant cells which gives shape and protection to the cell from mechanical damages.

c. Smooth ER – It is a major site for lipid synthesis. In animal cells, lipid-like steroidal hormones are synthesized at Smooth ER.

d. Golgi apparatus – It is an important site of formation of glycolipids and glycoproteins.

e. Centrioles – The basal body of cilia or flagella and spindle fibres that give rise to spindle apparatus.

10. Are the different types of plastids interchangeable? If yes, give examples where they are getting converted from one type to another.

Solution:

Yes, plastids are interchangeable in their form.

There are three types of plastids - Chloroplasts (green colour), Chromoplasts (red, yellow, orange colour), Leucoplasts (Colourless). Depending upon different circumstances, these plastids interchange.

For example: Due to the replacement of chloroplast with chromoplasts the colour of green tomatoes will change from red to blue.