Chapter 1

Cell : The Unit of Life

Solutions (Set-1)

SECTION - A

School/Board Exam. Type Questions

Very Short Answer Type Questions :

1. Who expanded the cell theory and gave the statement *Omnis cellula e cellula*?

Sol. Rudolf Virchow.

2. Where do almost all cellular activities occur in a cell?

Sol. Cytoplasm.

3. Which structure provides some extra properties to bacteria like resistance to antibiotics?

Sol. Plasmid.

4. Which is the innermost component of the cell envelope of bacteria?

Sol. Plasma membrane.

5. Which part of a lipid molecule is hydrophilic in nature?

Sol. Polar end.

6. What is the shape of kinetochore?

Sol. Kinetochore is a disc shaped structure on centromere in chromosome.

7. Which type of ER is involved in steroid and lipid synthesis?

Sol. SER.

8. In which medium, the enzymes of lysosomes work?

Sol. Acidic medium.

9. Which stain is used to observe mitochondria?

Sol. Janus Green

10. Briefly describe hub in the structure of centriole.

Sol. The centre of the centriole possess a proteinaceous mass known as hub.

Short Answer Type Questions :

11. Explain the type of organisms on the basis of number of cells present in their body.

Sol. (i) **Unicellular organisms** – The body of these organisms is made of a single cell, *e.g.*, *Amoeba* bacteria etc.

(ii) **Multicellular organisms** – The body of these organisms is made of a many cells, *e.g.*, plants, animals etc.

12. How the study of cell and its detailed structure was made possible?

Sol. The study of a cell was made possible only with the help of microscope as a cell is too small to be seen by the naked eye. Electron microscope was later on invented to study all the structural details of the cell.

13. Mention the postulates of the theory given by Schleiden and Schwann in 1839.

Sol. The postulates of the theory given by Schleiden and Schwann in 1839 are :

(i) All living organisms are composed of cells and products of cells.

(ii) All cells arise from pre-existing cells.

14. Define the two types of cells on the basis of organisation of their nucleus.

Sol. On the basis of the organisation of the nucleus, the cells are of two types – **Prokaryotic** and **eukaryotic**. Cell which has a membrane-bound nucleus within it, is called eukaryotic and the cell which lacks a membrane-bound nucleus is called prokaryotic.

15. Are organelles without membrane present? Comment.

Sol. Yes, organelles without membrane are present such as ribosomes and centrioles. Ribosomes are found in both prokaryotic and eukaryotic cells. These are also found in two cell organelles – mitochondria and chloroplasts. Centrioles are found in animal cells.

16. Cells show great variation in their shape and size. Explain.

Sol. Different cells vary considerably in their shape in different organisms and in different tissues of the same organisms. They may be either polygonal (liver cells), spherical (egg of many animals), round and oval (mesophyll cells), elliptical (fat cell). The cells may be very small (microscopic) or very large (macroscopic) in size, for example - *Mycoplasma* is the smallest cell of 0.3 μm in length. Bacterial cell size ranges from 3 to 5 μm.

17. Write a short note on nuclear material of prokaryotes.

Sol. Due to the absence of nuclear membrane, nuclear material lies naked in the cytoplasm and the region where it is located is called nucleoid. The nuclear material is composed of the genomic DNA, which is circular and equivalent to a single chromosome.

18. Explain the ribosomes found in prokaryotic cells.

Sol. The non-membranous organelles found in prokaryotic cells are known as ribosomes. These are 70 S type and lie free in the cytoplasm or attached to the cell membrane. They are responsible for protein synthesis.

19. What are inclusion bodies?

Sol. Reserve material in the prokaryotic cells are stored in the cytoplasm in the form of inclusion bodies. These bodies are not bounded by any membrane system and lie free in the cytoplasm. For example phosphate granules, cyanophycean granules and glycogen granules.

20. Explain the cell wall of bacteria.

Sol. It is rigid but elastic covering of the bacterial cell that lies between glycocalyx and plasma membrane. Cell wall provides shape and protection to the bacterial cell. It also provides a strong structural support to prevent the bacterium from bursting or collapsing when placed in a hypotonic or hypertonic solution.

21. When will you suppose that the cell is dead?

Sol. Protoplasm is called 'physical basis of life' which provides the main arena for all metabolism of life and if protoplasm is dead then cell will be supposed dead.

22. Explain the different components of bacterial flagellum.

Sol. Bacterial flagellum is made of three parts – **filament, hook and basal body**. Basal body of the flagellum is a rod like structure which consists of rings. The hook is bent and thicker part of the flagellum just outside the cell wall. The filament is the longest portion that extends from cell surface to the outside.

23. Explain the types of proteins found in cell membrane. Who gave fluid mosaic model of plasma membrane?

Sol. The types of proteins found in cell membrane are integral and peripheral. The integral proteins pass into the lipid bilayer to different depths. They may be partially or totally buried in the membrane. The peripheral proteins lie on the surface of the membrane. Singer and Nicolson gave the fluid mosaic model.

24. Write a short note on facilitated diffusion.

Sol. Facilitated diffusion : It occurs through the agency of special membrane proteins *i.e*., carrier proteins. Energy is not required. The transport is along concentration gradient but carrier protein functions as facilitated pathways for the movement of substances.

25. Explain the secondary cell wall.

Sol. In mature plant cell, more layers of wall material are added internal to the primary wall. These layers are called the secondary cell wall. Addition of secondary wall brings about thickening of the cell wall. Thickening of cell wall occurs particularly in cells that form the harder woody parts of plants.

26. Give the differences between SER and RER.

Sol. Differences between SER and RER

SER	RER
1. SER does not bear ribosomes over the surface of its membrane.	1. RER possesses ribosomes attached to its membrane.
2. It is engaged in the synthesis of lipids and steroids. Thus, found in the cells actively involved in the synthesis of steroid and lipids.	2. It is engaged in the synthesis of proteins and enzymes and thus, found in the cells actively involved in the protein synthesis.

27. Write a short note on lysosomes.

Sol. Lysosomes are simple tiny spherical sac-like structures evenly distributed in the cytoplasm. These are formed by budding off vesicles from Golgi apparatus. They are bound by a single membrane. They are rich in hydrolytic enzymes such as hydrolases – lipases, proteases, carbohydrases, nucleases. These enzymes are capable of digesting carbohydrates, proteins, lipids and nucleic acids. These enzymes are active in acidic conditions and synthesised by RER.

28. (a) What is the difference between two membranes of mitochondria?

(b) What does mitochondrial matrix contain?

Sol. (a) The outer membrane is smooth and forms the continuous limiting boundary of the mitochondria whereas the inner membrane forms a number of infoldings called the cristae.

(b) The matrix contains single circular DNA molecule, a few RNA molecules, 70S ribosomes and the components required for the synthesis of proteins.

29. Draw a well-labelled diagram of chloroplast.

Sol.

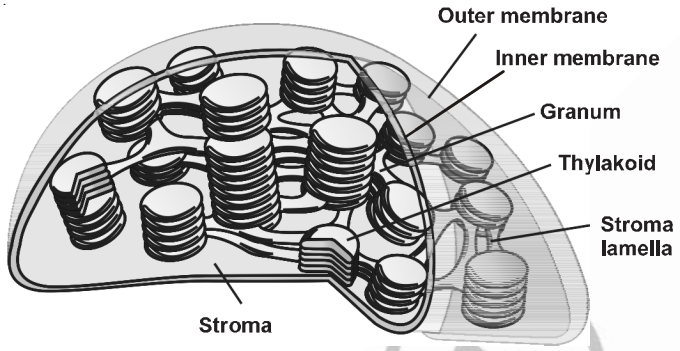


Fig. : Sectional view of chloroplast

30. Explain the structure found in nucleus which is responsible for rRNA synthesis.

Sol. Nucleolus : It is a spherical structure found in the nucleoplasm.

(i) It is not separated from rest of the nucleoplasm as it is not bound by a membrane.

(ii) It is the site for ribosomal RNA (rRNA) synthesis. Thus, nucleoli are larger and more numerous in cells that are actively involved in protein synthesis.

Long Answer Type Questions :

31. Write a contribution of the following scientists in the field of cytology.

(a) Anton Von Leeuwenhoek

(b) Robert Brown

(c) Camillo Golgi

(d) Rudolf Virchow

(e) Flemming

Sol. (a) **Anton Von Leeuwenhoek :** He was the first person to observe and describe the living cell.

(b) **Robert Brown :** He discovered the nucleus of a cell.

(c) **Camillo Golgi :** He was the first to observe Golgi complex.

(d) **Rudolf Virchow :** He expanded the cell theory and gave the statement *omnis cellula e cellula* which means all cells arise from pre-existing cells.

(e) **Flemming :** He discovered the chromatin present inside the nucleus of a cell.

32. What are the three basic structures of a cell ? Explain.

Sol. Plasma membrane, nucleus and cytoplasm

Plasma membrane forms the limiting boundary of the cell and separates its content from the external environment.

Nucleus, a dense membrane-bound structure present inside the cell. It contains the chromosomes that store the genetic information in the form of DNA.

Cytoplasm is the semifluid matrix occupying the maximum volume of the cell. It is the main site for all cellular activities, which include various chemical reactions that occur in the cytoplasm and provide a living state to the cell.

33. Explain the cell wall, plasma membrane and cytoplasm of a prokaryotic cell.

Sol. (1) **Cell wall and plasma membrane :** Almost all prokaryotic cells are encapsulated by a cell wall surrounding a plasma membrane. A cell wall is rigid in nature which provides additional strength and structural support to the prokaryotic cell. Plasma membrane of prokaryotic cell is semi-permeable that communicates with the external environment for exchange of materials. It is similar in structure to the plasma membrane of eukaryotic cells.

(2) **Cytoplasm :** The fluid present in the cell is called the cytoplasm. It contains various structures present in the cell.

34. Draw a well-labelled diagram of a plant cell.

Sol.

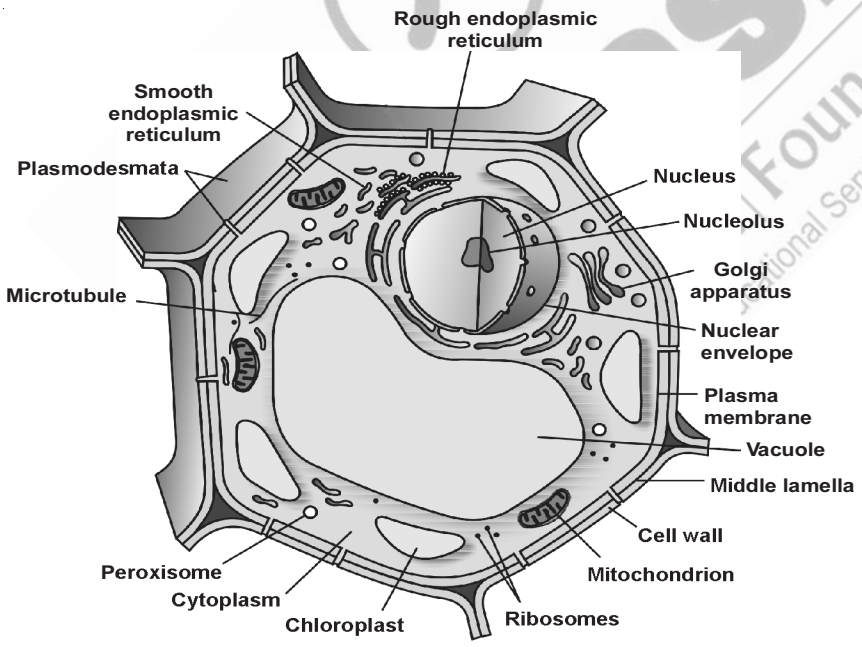


Fig. : Structure of a plant cell

35. Give differences between cis and trans face of Golgi Body.

Sol.

Cis face	*Trans* face
1. Towards nucleus, ER	1. Towards cell membrane
2. Forming face	2. Maturing face
3. Convex face	3. Concave face

36. Define the following

(a) Polyribosome

(b) Plasmids

(c) Cristae

Sol. (a) **Polyribosome :** Several ribosomes in bacteria may get attached to a single strand of mRNA and form a chain called polyribosome.

(b) **Plasmids :** The extra-chromosomal segments of circular DNA present in the cytoplasm of prokaryotic cells like bacteria, are called plasmids.

(c) **Cristae :** The inner membrane of mitochondria forms a number of infoldings called the cristae.

37. Mention five differences between plant and animal cell.

Sol.

Plant cell	Animal cell
1. Plant cells are larger than animal cells.	1. Animal cells are generally small in size.
2. Plasma membrane of plant cells is surrounded by a rigid cell wall made up of cellulose.	2. Cell wall is absent. The outermost covering of the animal cell is plasma membrane.
3. Plastids are present.	3. Plastids are absent.
4. Most mature plant cells have a permanent and large central sap vacuole.	4. Vacuoles in animal cells are many, small and temporary.
5. Plant cells have many simpler units of Golgi apparatus, called dictyosomes.	5. Animal cells have a single highly complex and prominent Golgi apparatus.
6. Most plant cells lack centrosome and centrioles.	6. Animal cells have centrosome and centrioles.

38. Explain the following

(a) Passive transport

(b) Active transport

Sol. (i) **Passive transport :** It is a mode of membrane transport where the cell does not spend any energy nor shows any special activity. Therefore, many molecules can move briefly across the membrane without any requirement of energy. In this way of transport, the cell membrane plays a passive role and the transport is according to the concentration gradient.

(ii) **Active transport :** It is uphill movement of materials across the membrane where the solute particles move against their concentration gradient *i.e.*, from their lower to higher concentration. Such a transport requires energy, which is obtained from ATP, Thus, it is an energy dependent process.

For example Na^+/K^+ pump in animal cells etc.

39. The composition of cell wall varies in different groups of living organisms. Comment.

Sol. 1. **Bacterial cell wall :** The bacterial cell wall consists of peptidoglycan which contains polymers of modified sugars (N-acetyl glucosamine and N-acetyl muramic acid), cross-linked by short peptides. Peptidoglycan is also called murein or mucopeptide.

2. **Fungal cell wall :** The fungal cell wall is generally composed of chitin, a polymer of acetylglucosamine units.

3. **Algal cell wall :** The algal cell wall is made up of cellulose, galactans, mannans and minerals like calcium carbonate.

4. **Plant cell wall :** The plant cell wall is chiefly composed of the insoluble polysaccharides, cellulose. Certain other compounds, such as hemicellulose, pectin and proteins also occur in the cell wall.

40. Describe the structure of Golgi apparatus.

Sol. Structure :

(i) It is a membranous organelle composed of flattened sac-like cisternae stacked on one another. There are usually 4–8 cisternae present in a stack. These cisternae resemble to smooth endoplasmic reticulum.

(ii) Cisternae form an extensive network and are arranged near the nucleus in a concentric pattern.

(iii) The shape, size and number of cisternae may vary in different cells but have a similar organisation in one type of cells. Their size may range from 0.5 μm to 1.0 μm in diameter.

(iv) The cisternae membranes are smooth and curved having either convex or a concave outline. The curved outlines provide a distinct property to the membranes and thus, represent two poles or faces of golgi. These two faces are *cis* or the forming face (convex) and *trans* or the maturing face (concave) that communicate with the membranes of the ER. These two faces of the golgi are entirely different, but interconnected and function as a single unit.

41. Mention the functions of Golgi apparatus.

Sol. Functions :

(i) The important function of Golgi apparatus is to package the material and prepare for secretions. The packaged material is delivered either to the intracellular targets *i.e*. within the cell or secreted extra cellular targets *i.e*., outside the cell. The material to be secreted moves from ER to the Golgi apparatus in the form of vesicles. These vesicles are then fuse with the *cis* face and move towards the maturing face of the golgi apparatus. Therefore, golgi apparatus is closely associated with ER in structural as well as functional aspects.

(ii) A number of proteins synthesised by ribosomes on the ER are transferred to Golgi apparatus. These proteins are then modified in the cisternae of Golgi apparatus before they are released from its ***trans*** face.

(iii) Golgi apparatus is the important site of formation of glycoproteins and glycolipids.

42. Explain the following vacuoles

(a) Sap vacuoles

(b) Contractile vacuoles

(c) Food vacuoles

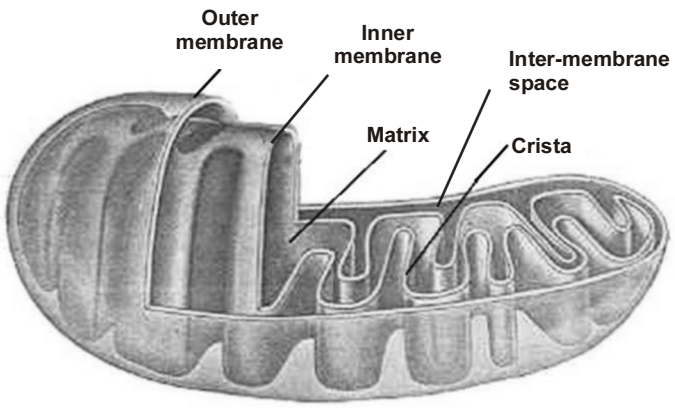
Sol. (a) **Sap vacuoles :** They store and concentrate mineral salts as well as nutrients.

(b) **Contractile vacuoles :** In protozoan like *Amoeba*, *Paramoecium* etc. these vacuoles are found which take part in osmoregulation and excretion.

(c) **Food vacuoles :** In many cells, as in protists, food vacuoles are formed by engulfing the food particles. They contain digestive enzymes with the help of which nutrients are digested.

43. Draw a well-labelled diagram of mitochondrion.

Sol.



44. Explain the structure of cilia and flagella.

Sol. Structure :

(i) Cilia and flagella are membrane-bound extensions of the plasma membrane. They arise from the centriole-like basal bodies present at their bases that anchor and control their movements.

(ii) They are cylindrical structures and their core is called axoneme which possess a number of microtubules running parallel to the long axis. The axoneme is made up of nine microtubule doublets arranged radially along the periphery and a pair of microtubules present in the centre. Such an arrangement of microtubules is referred as (9 + 2) organisation.

(iii) The pair of tubules present in the centre are connected to each other by a bridge and enclosed in common sheath called the central sheath.

(iv) The central sheath is connected to each peripheral doublet of microtubules by a radial spoke. Thus, there are total nine radial spokes.

(v) The peripheral doublets are also connected to each other via linkers.

45. Write a short note on nuclear envelope.

Sol. Nuclear envelope : It bounds the nucleus on the outside and separates it from the cytoplasm. It is made up of two membranes – outer and inner. The inner membrane is smooth whereas the outer membrane may be smooth or its cytoplasmic surface may bear ribosomes like the RER. The outer membrane is often connected to ER. These two membranes of the nuclear envelope are separated by a space known as **perinuclear space**. The space is 10 to 50 nm in width. Nuclear envelope contains a large number of pores which are formed by the fusion of its two membranes. The nuclear pores control the passage of substances to inside or outside of the nucleus *e.g.*, RNA, ribosomes, proteins.

SECTION - B

Model Test Paper

Very Short Answer Type Questions :

1. Who gave the statement *Omnis cellula e cellula*? What does it mean?

Sol. Rudolf Virchow. It means all cells arise from pre-existing cells.

2. What is a nucleoid?

Sol. The region where the genetic material is present in a prokaryotic cell is called nucleoid.

3. Define gram negative bacteria.

Sol. Bacteria that do not take up the Gram stain are called Gram negative bacteria.

4. Which membrane protein is involved in facilitated diffusion?

Sol. Carrier protein

5. Which cell organelle synthesises the enzymes of lysosomes?

Sol. RER

6. What are stroma lamellae?

Sol. The thylakoids of different grana are connected by flat membranous tubules called the stroma lamellae.

7. Mention the two subunits of ribosome of eukaryotic cell.

Sol. 60S and 40S

8. Which type of arrangement of fibrils is found in centrioles?

Sol. 9 + 0

Short Answer Type Questions :

9. Write two postulates of the cell theory.

Sol. (i) All living organisms are composed of cells and their products.

(ii) All cells arise from pre-existing cells.

10. What are plasmids? Where are they present?

Sol. Plasmids are extra-chromosomal or extra-nuclear segments of circular DNA present in the cytoplasm of bacterial cells.

The pasmid DNA confers certain unique phenotypic characters to such bacteria. One such character is resistance to antibiotics.

11. How chromosomes are formed from chromatin?

Sol. Chromatin is composed of DNA, RNA histone and nonhistone protein. Chromosome are formed by condensation *i.e*. coiling and supercoiling of chromatin.

12. Why are mitochondria known as semi-autonomous organelles?

Sol. Mitochondria are capable of making some of their own proteins as they contain their own ribosomes. However, they require few proteins from the cytoplasm which are formed under the influence of nucleus. Thus, functioning of mitochondria is partly controlled by themselves and partly by nucleus of the cell and availability of materials from cytoplasm. Hence, they are known as semi-autonomous organelles.

13. 'X' is a type of cell organelle found in plant cells. One of its type 'Y' gets converted into another type 'Z' that provides colour to plant products like fruits. Identify X, Y and Z. Give one common feature of 'X' and mitochondria.

Sol. (a) X–Plastid

Y–Chloroplast

Z–Chromoplast

(b) Both are double membrane-bound organelles.

14. Which type of proteins are formed by free and attached ribosomes?

Sol. Free ribosomes synthesise structural and enzymatic proteins for use inside the cell. The attached ribosomes synthesise proteins for transport.

15. What are secondary constrictions and satellite chromosomes?

Sol. A few chromosomes may have additional constrictions termed as secondary constrictions near their ends. The part of the chromosome beyond the secondary constriction is called satellite. The secondary constrictions are always constant in their positions and the chromosomes having secondary constrictions are known as satellite or SAT chromosomes.

Short Answer Type Questions :

16. Explain the terms related to a prokaryotic cell

(a) Mesosomes

(b) Chromatophores

Sol. Mesosomes : Mesosome is a special membranous structure formed by the extensions of plasma membrane into the cell. They are mainly associated with respiration, secretion processes, storage of enzymes, replication during cell division and increase in the surface area of the plasma membrane.

Chromatophores : In some prokaryotes like cyanobacteria, there are other membranous extensions into the cytoplasm called chromatophores which contain pigments.

17. Draw a well-labelled diagram of ER showing its types.

Sol.

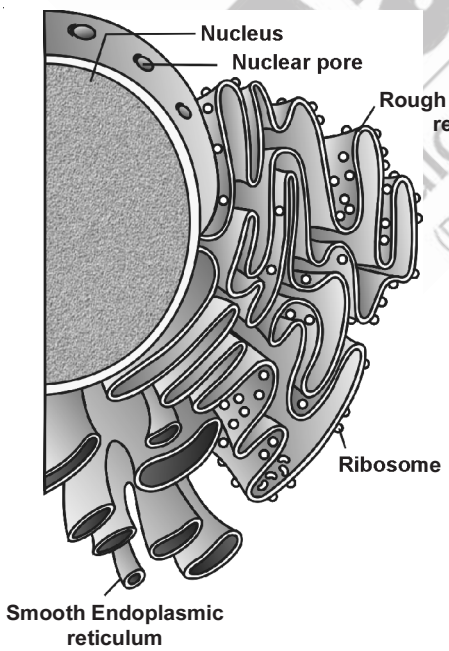


Fig. : Endoplasmic reticulum

18. Write the chemical composition of cell wall of

(a) Bacteria

(b) Fungus

(c) Alga

Sol. 1. **Bacterial cell wall :** The bacterial cell wall consists of peptidoglycan which contains polymers of modified sugars (N-acetyl glucosamine and N-acetyl muramic acid), cross-linked by short peptides.

2. **Fungal cell wall :** The fungal cell wall is generally composed of chitin, a polymer of acetylglucosamine units.

3. **Algal cell wall :** The algal cell wall is made up of cellulose, galactans, mannans and minerals like calcium carbonate.

19. Explain the structure of protein factories.

Sol. (i) Ribosomes are membraneless granular structures present in the cytoplasm.

(ii) Each ribosome is made up of two subunits – a large and a small subunit. A 70S ribosome is made up of 50S, large subunit and 30S, small subunit. A 80S ribosome is made up of 60S, large subunit and 40S, small subunit.

(iii) Chemically each ribosome is made up of ribonucleic acid (rRNA) and protein.

20. Give three differences between cilia and flagella.

Sol.

Cilia	Flagella
1. The number of cilia per cell is usually very large (300–14000).	1. The number of flagella per cell is usually 1–4.
2. They are smaller in size.	2. They are longer in size.
3. Cilia usually occur throughout or major part of the surface of a cell	3. Flagella are commonly found at one end of the cell.
4. Cilia help in locomotion, feeding, circulation etc.	4. Flagella help in locomotion.

21. (a) What is the composition of chromatin?

(b) What is the function of histone proteins?

Sol. (a) Chromatin contains DNA and some basic proteins called histones, some non-histone proteins and also RNA.

(b) The histone proteins are the packaging proteins that are associated with packaging of DNA into compact structure called chromosomes.

Long Answer Type Questions :

22. Differentiate between prokaryotic and eukaryotic cells on the basis of

(a) Nucleus

(b) Membrane-bound organelles

(c) Nucleolus

(d) Ribosomes

(e) Plasmids

Sol.

Prokaryotic cell	Eukaryotic cell
a. **Nucleus :** It is absent in these cells. Nucleoid (genetic material) is not surrounded by a nuclear membrane and is in direct contact with the cytoplasm.	a. Distinct nucleus is present. Nuclear material is surrounded by a nuclear membrane and is not in direct contact with cytoplasm.
b. Membrane-bound organelles are absent.	b. Membrane-bound organelles (*e.g.* mitochondria, plastids, endoplasmic reticulum, golgi apparatus, lysosome etc.) are present.
c. Nucleolus is absent.	c. Nucleolus is present.
d. Ribosomes are of 70S type.	d. Ribosomes are of 80S type.
e. Additional small circular DNA segment or plasmids may occur.	e. Plasmids are absent.

23. (i) Draw a well-labelled diagram of T.S. of centriole.

(ii) Give the functions of centriole.

Sol. (i)

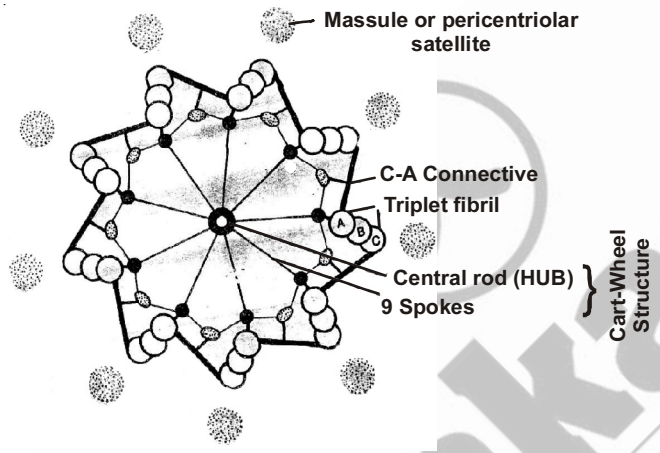


Fig. : T.S. of Centriole

(ii) The centrioles form the basal body of the cilia and flagella and spindle fibres that give rise to spindle apparatus during cell division in animal cells.

❑ ❑ ❑

Solutions (Set-2)

Objective Type Questions

(What is a Cell)

1. Robert Hooke discovered the_____ of a cell

(1) Cell membrane (2) Nucleus (3) Cell wall (4) Cytoplasm

Sol. Answer (3)

Nucleus → Robert Brown

Cell membrane → Schwann (1838)

Cytoplasm → Strasburger (1882)

(Cell Theory)

2. The statement *Omnis cellula e cellula*, which means all cells arise from pre-existing cells was given by

(1) Rudolf Virchow

(2) Schleiden

(3) Robert Brown

(4) Anton Von Leeuwenhoek

Sol. Answer (1)

Cell Lineage theory → Rudolf virchow.

(An overview of Cell)

3. The smallest cell of 0.3 μm in length is

(1) Ostrich egg (2) Cyanobacteria

(3) Bacteria (4) *Mycoplasma*

Sol. Answer (4)

Bacteria = 3 to 5 μm

Ostrich → Largest isolated single cell.

(Prokaryotic Cells)

4. Which of the following cell organelles is non-membrane bound and found in both prokaryotes and eukaryotes?

(1) Lysosomes (2) Ribosomes

(3) Centrioles (4) Mitochondria

Sol. Answer (2)

Ribosomes are cell organelles which are non membrane bound and found in both prokaryotes and eukaryotes. Rest all are membrane bound cell organelles.

5. Which of the following structure is present only in prokaryotic cell?

(1) Plasmid (2) Nucleus

(3) Mitochondria (4) Ribosomes

Sol. Answer (1)

Plasmid is present only in prokaryotic cell. Yeast is the only eukaryote having plasmid.

6. The genomic DNA of a bacterium is

(1) Circular (2) Linear

(3) Segmented (4) Rod shaped

Sol. Answer (1)

Circular *i.e.*, close ends

7. Which of the following component provides sticky character to the bacterial cell?

(1) Cell wall (2) Nuclear membrane

(3) Plasma membrane (4) Glycocalyx

Sol. Answer (4)

Glycocalyx $\rightarrow$ Outermost coating of mucous or polysaccharides

8. The subunits of ribosomes of a prokaryotic cell are

(1) 60S and 40S (2) 20S and 90S

(3) 50S and 30S (4) 30S and 60S

Sol. Answer (3)

Prokaryotic ribosomes 70S $\rightarrow$ 50S + 30S

9. The genetic material of a prokaryotic cell is known as

(1) Nucleus (2) Centrosome (3) Nucleoid (4) Mesosome

Sol. Answer (3)

Nucleoid as it diffused and not enclosed within nuclear envelope.

10. Which of the following cell organelle is known as protein factory?

(1) Lysosome (2) Mitochondria (3) Nucleolus (4) Ribosome

Sol. Answer (4)

Ribosomes $\rightarrow$ Protein factory (Site for protein synthesis)

Lysosome $\rightarrow$ Suicidal bags as they contain hydrolytic enzymes

Nucleolus $\rightarrow$ Site for rRNA synthesis.

Mitochondria $\rightarrow$ Power house of cell. So, it is site for ATP synthesis.

11. Which type of vacuoles provide buoyancy to bacteria?

(1) Sap vacuoles (2) Contractile vacuoles (3) Gas vacuoles (4) Food vacuoles

Sol. Answer (3)

Gas vacuoles $\rightarrow$ Provide buoyancy to bacteria and help in floating.

Sap vacuoles $\rightarrow$ Found in plants

Contractile vacuoles $\rightarrow$ Osmoregulation

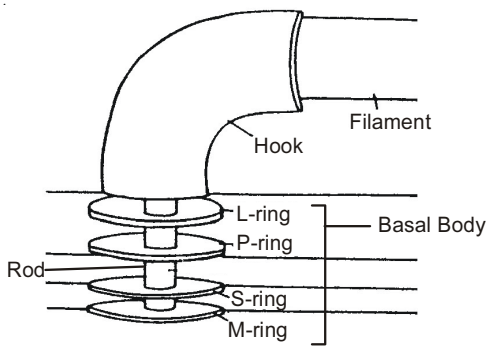
Food vacuoles $\rightarrow$ Digestion

12. Which of the following is not a structure of prokaryotic flagella?

(1) Filament (2) Centriole (3) Hook (4) Basal body

Sol. Answer (2)

Centriole is not present in a prokaryotic flagella.



A prokaryotic flagella
(sectional view)

13. The _____ are small bristle like fibres sprouting out of the bacterial cell.

(1) Pili (2) Mesosomes (3) Cilia (4) Fimbriae

Sol. Answer (4)

Pili – Elongated tubular structures (of protein pilin)

Cillia – Fine hair-like outgrowth of membrane

Mesosome – Invagination of plasma membrane into cell

14. Gas vacuoles are found in

(1) Blue green algae (2) Green and purple bacteria

(3) *Bacillus* (4) More than one option is correct

Sol. Answer (4)

Gas vacuoles or pseudovacuoles are present in BGA, green and purple bacteria.

(Eukaryotic Cells)

15. The animal cell is different from a plant cell in having

(1) Ribosomes (2) Nucleus (3) Golgi apparatus (4) Centrosomes

Sol. Answer (4)

Centrosome or centrioles are present in only animal cells.

16. The model given by Singer and Nicolson in_____ was_____ for plasma membrane.

(1) 1982, fluid mosaic model (2) 1992, bilayer model

(3) 1972, fluid mosaic model (4) 1952, bilayer model

Sol. Answer (3)

Fluid mosaic model proposed by Singer and Nicolson.

17. The main chemical component of fungal cell wall is

(1) Peptidoglycan (2) Chitin (3) Hemicellulose (4) Pectin

Sol. Answer (2)

Peptidoglycan → Found in cell wall of bacteria

Hemicellulose + Pectin → Plant cell wall

18. Which of the following statement is incorrect?

(1) Middle lamella is chiefly made up of calcium and magnesium pectate

(2) Secondary cell wall is found in harder woody parts of a plant

(3) Plasmodesmata are cytoplasmic bridges that connect the neighbouring plant cells

(4) Secondary wall is formed on the outer side of the cell

Sol. Answer (4)

Secondary wall formed on inner side of cell or primary wall of cell.

19. Which of the following cell organelles is not considered as a part of an endomembrane system?

(1) Mitochondria (2) ER (3) Golgi complex (4) Lysosomes

Sol. Answer (1)

Mitochondria is not a part of endomembrane system because endomembrane system includes → Endoplasmic reticulum, Golgi bodies, Lysosomes and Vacuoles.

20. A cell organelle 'X' is divided into two types on the basis of a cell organelle 'Y', that helps in the protein synthesis. Identify 'X' and 'Y' respectively

(1) Golgi complex and ribosome (2) ER and mitochondria

(3) ER and ribosome (4) Lysosome and ER

Sol. Answer (3)

ER is divided into two types on the basis of ribosomes (helps in protein synthesis)

ER having ribosomes – Rough ER

ER without ribosomes – Smooth ER

21. The surface of RER has

(1) Lysosomes (2) Ribosomes (3) Golgi complex (4) Plastids

Sol. Answer (2)

22. Which of the following cell organelle is responsible for the synthesis of steroids and lipids?

(1) SER (2) RER (3) Mitochondrion (4) Ribosome

Sol. Answer (1)

RER → Protein synthesis facilitation

Mitochondrion → ATP synthesis site

Ribosome → Protein synthesising machinary

23. Large number of RER are found in the cells actively involved in

(1) Lipid synthesis (2) Steroidogenesis (3) Protein synthesis (4) Starch synthesis

Sol. Answer (3)

RER – Protein synthesis

24. Which of the following statement is **incorrect** w.r.t. Golgi apparatus?

(1) It is non-membrane bound organelle (2) It is composed of flattened sacs called cisternae

(3) Cisternae resemble with SER (4) Golgi apparatus has two faces – *cis* and *trans*

Sol. Answer (1)

Golgi apparatus is unit membrane bound organelle.

25. Which of the following is common to both ER and Golgi complex?

(1) Both are double membrane bound (2) Both have cisternae

(3) Both contain their own DNA (4) Both are semi-autonomous organelles

Sol. Answer (2)

Both ER and Golgi complex have cisternae

26. A number of proteins synthesised by ribosomes present on the ER are transferred to

(1) Vacuoles (2) Lysosomes (3) Plastids (4) Golgi apparatus

Sol. Answer (4)

Proteins synthesised by ribosomes are transferred to Golgi appratus for modification and packaging

27. Which of the following statement is **incorrect** w.r.t. lysosomes?

(1) Lysosomes are simple tiny spherical sac-like structures

(2) They are distributed in the cytoplasm of the cell

(3) The enzymes of lysosomes work in basic condition

(4) The enzymes of lysosomes are synthesised by RER

Sol. Answer (3)

Enzymes of lysosome work in acidic pH.

28. Which of the following cell organelle is involved in the synthesis of the cell organelle that contains hydrolytic enzymes?

(1) Mitochondrion (2) Golgi apparatus (3) Plastids (4) Nucleus

Sol. Answer (2)

Golgi appratus is involved in the synthesis of lysosomes that contain hydrolytic enzymes.

29. Which of the following vacuoles help in osmoregulation in *Amoeba*?

(1) Gas vacuoles (2) Food vacuoles (3) Contractile vacuoles (4) Sap vacuoles

Sol. Answer (3)

Contractile vacuoles – help in osmoregulation in *Amoeba*.

30. The vacuoles which help in the digestion of food particles engulfed by protists are

(1) Contractile vacuoles (2) Gas vacuoles (3) Sap vacuoles (4) Food vacuoles

Sol. Answer (4)

Food vacuoles help in the digestion of food particles engulfed by protists.

31. Which of the following stain is used to observe mitochondria?

(1) Methylene blue (2) Safranin (3) Janus green (4) Gram stain

Sol. Answer (3)

Stain used to observe mitochondria is Janus green.

32. Which of the following cell organelle is known as power house of the cell?

(1) Golgi apparatus (2) ER (3) Lysosome (4) Mitochondrion

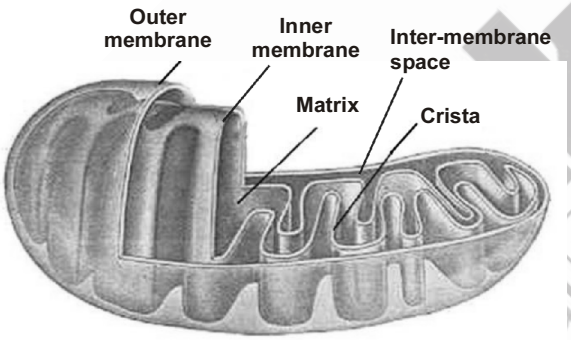
Sol. Answer (4)

Cell organelle known as power house of the cell is Mitochondrion.

33. The inner membrane of mitochondria forms a number of infoldings called

(1) Cisternae (2) Cristae (3) Microtubules (4) Mesosomes

Sol. Answer (2)



The inner membrane of mitochondrion forms a number of infoldings called cristae.

While Cisternae → Long, flattened, parallel sac-like interconnected structures.

Microtubules → Cytoskeleton

Mesosomes → Invagination of plasma membrane of bacterial cell.

34. The type of ribosomes found inside the mitochondria is

(1) 90S (2) 60S (3) 80S (4) 70S

Sol. Answer (4)

Mitochondrial ribosomes (70S) are smaller in size than cytosotic ribosomes.

35. The plastids which store proteins are

(1) Aleuroplasts (2) Elaioplasts (3) Amyloplasts (4) Chromoplasts

Sol. Answer (1)

Elaioplasts → Plastids which store oil and fats.

Amyloplasts → Plastids which store starch.

36. Which of the following plastid is coloured and contains carotenoids?

(1) Aleuroplast (2) Elaioplast (3) Amyloplast (4) Chromoplast

Sol. Answer (4)

Chromoplast - coloured plastids

37. Which type of plastid contains chlorophyll and responsible for photosynthesis?

(1) Chloroplast (2) Chromoplast (3) Aleuroplast (4) Elaioplast

Sol. Answer (1)

38. The orange colour of carrot root is due to the presence of

(1) Aleuroplast (2) Elaioplast (3) Chromoplast (4) Amyloplast

Sol. Answer (3)

Chromoplast contains carotenoids and are coloured.

39. Thylakoids are present in

(1) Mitochondria (2) Vacuoles (3) Chloroplast (4) Ribosomes

Sol. Answer (3)

Thylakoid are sac-like structures containing pigments for photosynthesis.

40. Which of the following statement is **incorrect** w.r.t. ribosomes?

(1) The type of ribosomes of prokaryotes is 70S (2) Ribosomes were discovered by George Palade

(3) They are made up of RNA only (4) Ribosomes are also known as protein factories

Sol. Answer (3)

They are made up of rRNA and ribosomal proteins.

41. Centrosome is an organelle containing two cylindrical structures called

(1) Cristae (2) Cisternae (3) Centrioles (4) Thylakoids

Sol. Answer (3)

Centrioles are arranged perpendicularly to each other.

42. The nucleus was discovered by _____ in _____.

(1) Robert Hooke, 1931 (2) Anton van Leeuwenhoek, 1906

(3) Robert Brown, 1831 (4) Schleiden, 1981

Sol. Answer (3)

Robert Brown discovered nucleus in 1831.

43. What is common in mitochondria, chloroplast and nucleus?

(1) They are double membrane bound organelles (2) They are single membrane bound organelles

(3) They are included in endomembrane system (4) They have 80S ribosomes.

Sol. Answer (1)

Double membrane bound cell organelles.

44. The structure present inside the nucleus responsible for ribosomal unit formation is

(1) Mesosomes (2) Nucleoplasm (3) Nucleolus (4) DNA

Sol. Answer (3)

Mesosomes → DNA replication, respiration, cell division etc.

Nucleoplasm → Matrix of nucleus

DNA → Genetic material

45. Chromatin found in nucleus was discovered by

(1) Flemming (2) Schleiden (3) Schwann (4) Robert Brown

Sol. Answer (1)

Schleiden and Schwann → Cell theory

Robert Brown → Nucleus

46. Chromatin is essentially composed of

(1) DNA only (2) DNA and histones (3) RNA only (4) RNA and ribosomes

Sol. Answer (2)

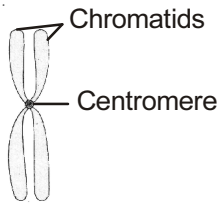
Interphase nucleus has chromatin.

47. The chromatids of a chromosome are held together at a point called

(1) Centrosome (2) Centriole (3) Satellite (4) Centromere

Sol. Answer (4)

Centriole → Non-membranous cell organelle present in animal cells.



Satellite → Portion of chromosome beyond secondary constriction

48. An elaborate network of filamentous proteinaceous structure present in the cytoplasm which helps in the maintenance of cell shape is called

(1) Thylakoid (2) Endoplasmic reticulum (3) Plasmalemma (4) Cytoskeleton

Sol. Answer (4)

Thylakoid → Sac-like structure present inside chloroplast.

ER → Responsible for helping protein synthesis

Plasmalemma → Plasma membrane

49. Select the **incorrect** statement w.r.t. mitochondria

(1) They divide by fission (2) The matrix possesses single circular DNA

(3) The cristae decrease the surface area (4) They produce cellular energy in the form of ATP

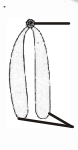
Sol. Answer (3)

Cristae increase surface area for enzymatic activities.

50. The chromosomes having centromere at terminal end are called

(1) Sub-metacentric (2) Metacentric (3) Telocentric (4) Acrocentric

Sol. Answer (3)

Telocentric → 

Sub-metacentric → Centromere shifted a little towards one end. 

Metacentric → Centromere in the middle 

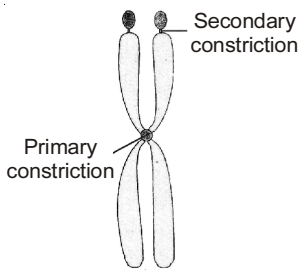
Acrocentric → Centromere near one end 

51. Satellite chromosomes have

(1) Primary constriction only (2) Secondary constriction only

(3) Tertiary constriction only (4) Both primary and secondary constriction

Sol. Answer (4)



52. Microbodies are

(1) Membrane bound minute vesicles (2) Non-membrane bound organelles

(3) Present only in animals (4) Present only in plants

Sol. Answer (1)

Microbodies are present in both animals and plants.

53. Which of the following organelles show polymorphism?

(1) Golgi apparatus (2) Lysosome (3) Mitochondria (4) Chloroplast

Sol. Answer (2)

Lysosomes show polymorphism *i.e.*, change their shape.

54. Which structure is/are considered as semi-autonomous organelle?

(1) Ribosome (2) Golgi body

(3) Mitochondria and chloroplast (4) Mitochondria only

Sol. Answer (3)

Mitochondria and chloroplast are semi-autonomous organelle as they have circular DNA and 70S ribosome.

55. **Incorrect** statement in relation to nucleolus is

(1) It is a spherical structure

(2) It is separated from nucleoplasm by nuclear envelope

(3) It is the site of rRNA synthesis

(4) They are larger and more numerous in cells actively engaged in protein synthesis

Sol. Answer (2)

It is not membrane bound.

56. Microfilaments perform all the following functions**, except**

(1) Provide support to plasma membrane (2) Involved in cyclosis

(3) Help in cell plate method during cell division (4) Help in pseudopodia formation

Sol. Answer (3)

It is done by a small fragment of Golgi body or ER which is known as phragmoplasts.

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