

- All living organisms are composed of cells. Cell is structural and functional unit of life. Organisms are made up of a single cell known as unicellular organisms. Amoeba, Paramoecium, Bacteria, Yeast and Chlamydomonas are their examples. Organisms composed of many cells are known as multicellular organisms.
- Life of the organisms begins as a single cell called zygote. This cell divides repeatedly to produce new cells. This cell differentiates to form tissue, organs and organ systems. As zygote divides by mitotic divisions, the genetic make up of each cell in the body remains the same.
- Any cell of the body is capable of producing new individual, this character of cell is known as totipotency.

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- (1) The smallest, structural and functional unit of organisms known as
 (A) Tissue (B) Cell (C) Organ (D) Organelles
- (2) Which is the unicellular organisms ?
 (A) Chlamydomonas (B) Yeast (C) Bacteria (D) A, B, C All
- (3) In which type of cell division the genetic material of each cell in the body remains the same ?
 (A) Mitosis (B) Amitosis (C) Meiosis (D) A and B

Answers : (1-B), (2 -D), (3-A)

- **Cell and cell theory :**
 - *Robert Hooke (1665)* an English scientist observed a thin slice of cork under his crude microscope and describe that cork composed of small spaces surrounded by firm wall and gave the name cell.
 - *Robert Brown (1831)* discovered the nucleus in the cell.
 - In 1838 *Matthias Schleiden* a German Botanist and *Theodore Schwann*, a British zoologist proposed the cell theory.
 - In 1855 *Rudolf Virchow* first explained that new cells arise through cell division of preexisting cells.
 - Main points of cell theory :
 - (1) All organisms are made up of cells and cellular products.
 - (2) Cells is a structural and functional unit of organisms.
 - (3) New cells are formed through divisions of preexisting.
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- (4) Who proposed the cell theory first time ?
 (A) Robert Hooke (B) Robert Brown (C) Schleiden - Schwann (D) Robert Koch
- (5) Who proposed that new cell arise through cell division of preexisting cells ?
 (A) Robert Brown (B) Rudolf Virchow (C) Robert Hooke (D) Schleiden - Schwann
- (6) Who gave the name 'Cell' first ?
 (A) Robert Brown (B) Virchow (C) Robert Hooke (D) Schleiden - Schwann

- (7) Who discovered nucleus in the cell ?
 (A) Robert Brown (B) Schleiden - Schwann (C) Robert Hooke (D) Virchow
- (8) Matthias Schleiden and Theodore Schwann are respectively scientists of and country.
 (A) America, Canada (B) German, India (C) British, German (D) German, British

Answers : (4-C), (5-B), (6-C), (7-A), (8-D)

• **An overview of cell :**

- A cell is the smallest unit of living organisms. A typical plant cell has a cell wall as its outside and plasma membrane to its inner side. While a typical animal cell has only plasma membrane.
- All cells, except bacterial cells contain a nucleus and cytoplasm. The nucleus contains the chromosomes which contain the genetic material - DNA, it controls the cell's activities.
- Eukaryotic cells possess membrane-bound nuclei whereas prokaryotic cells lack a membrane-bound nucleus. Eukaryotic cells possess membrane-bound organelles whereas prokaryotic cells lack membrane-bound organelles. Non-membrane-bound organelles-ribosomes are found in prokaryotes, eukaryotes, chloroplasts and in mitochondria. Centrioles are found in animal cells, which are associated with cell division.

- (9) What is the specificity of plant cell ?
 (A) Mitochondria (B) Cell-wall (C) Cytoplasm (D) Ribosomes
- (10) Typical animal cell lacks which structure
 (A) Cell-wall (B) Cytoplasm (C) Mitochondria (D) Ribosomes
- (11) Which are the membrane-bound organelles ?
 (A) Chloroplast (B) Golgi complex (C) Mitochondria (D) A, B, C All
- (12) Which are the non-membrane-bound organelles ?
 (A) Ribosomes (B) Centrioles (C) A and B (D) None of these
- (13) Which one of the following is the largest animal cell ?
 (A) Bacteria (B) Cheek cell (C) Ostrich's egg (D) Mycoplasma
- (14) Which is the smallest cell ?
 (A) Bacteria (B) Mycoplasma (C) Cheek cell (D) A and C

Answers : (9-B), (10-A), (11-D), (12-C), (13-C), (14-B)

• **Prokaryotic cells :**

- Prokaryotes are unicellular organisms that lack a nuclear membrane and do not develop or differentiate into multicellular forms. Prokaryotic cells are smaller than eukaryotic cells, however their cell division is very rapid.
- Example : Bacteria, blue green algae, mycoplasma and pleuro pneumonia like organisms (PPLO). Bacteria possess four basic shapes like - Bacillus, coccus, vibrio and spirillum.
- Prokaryotes lack a nuclear membrane. Many bacterial cells have small circular DNA outside the genomic DNA is called plasmid. Prokaryotes lack the intracellular organelles like

mitochondria, chloroplast, endoplasmic reticulum, golgi bodies, centrioles.

- Prokaryotic cells have three architectural regions : (1) Appendages (2) Cell envelope (3) Cytoplasmic region.
- Appendages called flagellum, which are extended from cytoplasm. Pili or fimbriae arise from the surface of some bacteria. They play important role in conjugation. Flagellum is made up of flagellin protein.
- A cell envelope consisting of a capsule made up of a cell wall and a plasma membrane. Cell envelope demarcated into three layers. The outermost layer is made up of glycocalyx, the second layer is a cell wall and inner to cell wall is third layer called plasma membrane. Capsule serves as a protective layer against attack by phagocytes and by viruses.
- The plasma membrane functions as a selectively permeable layer. Energy production extra cellular polymer production, site of chromosome attachment and extension of plasma membrane into membranous structures.
- Gram named scientist developed two group of Bacteria on the basis of staining procedure. Those bacteria which take, up the gram stain are Gram positive and the other do not are called Gram negative bacteria.
- Prokaryotes possess Ribosome are dense particle of 20 nm in diameter. They are made up of two subunits 50 s and 30 s which combine to form 70 s Prokaryotic ribosomes. Ribosomes are the site of protein synthesis.
- In the cytoplasm a number of inclusion bodies occur called storage granules, which are not bounded by any membrane and lie free in cytoplasm e.g. Phosphate granules, cyanophycin granules and glycogen granules. Gas vacuoles are also reported in blue green and green photosynthetic bacteria.

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- (15) Which organism is included in Prokaryotes ?
(A) PPLO (B) Bacteria and Mycoplasma
(C) Blue-green algae (D) A, B, C All
- (16) How many basic shapes of bacteria are there ?
(A) three (B) four (C) one (D) five
- (17) Many bacterial cells have small circular DNA outside the genomic DNA is called as
(A) Pili (B) Fimbriae (C) Plasmid (D) Flagella
- (18) Prokaryotic cells lack architectural region known as
(A) Appendages (B) Cell envelope (C) Cytoplasmic region (D) Nuclear-membrane
- (19) The outermost layer of cell envelope is made up of which substance known as
(A) Glycocalyx (B) Mannans (C) Pectin (D) Lignin
- (20) Which one serve as a protective layer against attack by phagocytes and by viruses ?
(A) Cell wall (B) Capsule (C) Flagella (D) Pili
- (21) Which structure is formed in Prokaryotic organism due to extension of plasma membrane ?
(A) Mesosome (B) Vesicles
(C) Tubules and lamellae (D) A, B, C All
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- (22) Which is important for conjugation in bacteria ?
 (A) Pili (B) Fimbriae (C) Flagella (D) A and B
- (23) What is the diameter of Prokaryotic ribosome ?
 (A) 25 nm (B) 20 nm (C) 30 nm (D) 28 nm
- (24) Several ribosomes may attach to a single mRNA and form a chain called as...
 (A) Polysomes (B) Polymer (C) Polypeptide (D) Polysaccharide
- (25) Which granules are absent in Prokaryotes ?
 (A) Cyanophycean granules (B) Phosphate granules
 (C) Fat granules (D) Glycogen granules

Answers : (15-D), (16-B), (17-C), (18-D), (19-A), (20-B), (21-D), (22-D), (23-B), (24-A), (25-C)

• **Eukaryotic cells :**

- Eukaryotes include fungi, animals and plants as well as some unicellular organisms. They possess organized nucleus with nuclear membrane.
- Plant cell possess cell walls, plastids, large vacuoles which are absent in animal cells. Animal cell possess centriole which is absent in plant cell.

- (26) Which cell possess cell wall, Plastids and large vacuoles ?
 (A) Plant cell (B) Animal cell (C) Bacteria (D) A and C
- (27) Which cell possess centriole ?
 (A) Plant cell (B) Blue-green alga (C) Animal cell (D) A and B

Answers : (26-A), (27-C)

• **Plasma membrane :**

- Cell membrane or plasma membrane forms the outermost envelope of cytoplasm. It is composed of lipids and proteins. Each lipid molecule possesses a polar hydrophilic head on outer surface and a non-polar hydrophobic tail towards the inner surface. Proteins may be peripheral or integral. Peripheral protein are associated with surface while integral protein are partially or totally buried in the membrane.
- Robertson has proposed a unit membrane concept according to which an uneven protein layer occurs on both the sides of the lipid bilayer.
- *Singer and Nicolson (1972)* proposed fluid mosaic model which is widely accepted model. According to fluid mosaic model, the plasma membrane is made up of a continuous lipid bilayer and the proteins included unit. This membrane is semi fluid and functionally dynamic.
- The function of plasma membrane is the transport of the molecules across it. Plasma membrane behaves both as a semipermeable and as a selectively permeable membrane. Transport across the membrane occurs in two main ways - Passive transport and Active transport.

- (28) Cell membrane is made up of
 (A) Lipid (B) Protein (C) Carbohydrate (D) A and B

- (29) Which protein does not separate easily from cell membrane ?
 (A) Integral Protein (B) Peripheral Protein (C) Surface Protein (D) B and C
- (30) Who proposed unit membrane concept for plasma membrane ?
 (A) Robertson (B) Singer and Nicolson (C) Robert Brown (D) Robert Hook
- (31) Who proposed plasma membrane as an unit membrane ?
 (A) Singer (B) Nicolson (C) Robert Hook (D) Robertson
- (32) Which type of transport occurs by cell membrane ?
 (A) Active transport (B) Passive transport (C) Facilitated diffusion (D) A, B, C All

Answers : (28-D), (29-A), (30-A), (31-D), (32-D)

• **Cell wall :**

- Cell wall is a non-living rigid structure which forms an outer covering for the plasma membrane in plants. It gives the shape to the cell and also protects cell from mechanical damage and infection.
- Algae cell wall is made up of cellulose, galactans, Mannons and calcium carbonate, while in other plants it is made up of cellulose, hemicellulose, pectins and protein. The fungal cell wall is made up of chitin.
- The primary cell wall is made up of cellulose, above it a secondary wall is formed which is made up of hemicellulose, lignin and suberin. A middle lamella is made up of calcium pectate which occurs between primary wall of two adjacent cells.

- (33) What is the function of plant cell wall ?
 (A) To give shape to the cell (B) To protects the cell from mechanical damage and infection
 (C) To form an outer covering (D) A, B, C All
- (34) Algal cell wall is made up of which substance ?
 (A) Mannons and galactans (B) Cellulose
 (C) Calcium Carbonate (D) A, B, C All
- (35) In plant cell a secondary cell wall formed by deposition of which substance ?
 (A) Lignin (B) Suberin (C) Hemi cellulose (D) A, B, C All
- (36) In plant, cytoplasm of two neighbouring cells are connected through which structure ?
 (A) Middle lamella (B) Plasmodesmata (C) Pectin (D) A and C

Answers : (33-D), (34-D), (35-D), (36-B)

• **Endoplasmic membrane system :**

- All the membranous organelles in the cells together form an endomembrane system.
- Endoplasmic reticulum, golgi complex, lysosomes and vacuoles are considered as a membrane system.
- As the functions of mitochondria, chloroplast and peroxisomes are not co-ordinated with the above components these are not considered as part of endomembrane system.

- (37) Which is included in endomembrane system ?
 (A) Endoplasmic reticulum (B) Golgi complex (C) Lysosome (D) A, B, C All
- (38) Which organelle is not included in endomembrane system ?
 (A) Mitochondria (B) Peroxisome (C) Chloroplast (D) A, B, C All

Answers : (37-D), (38-D)

• **Endoplasmic reticulum :**

- A network of tubular structure spread throughout the cytoplasmic region is called endoplasmic reticulum. The tubules are double walled bag like structure.
- Endoplasmic reticulum maintain association with plasma membrane and nuclear membrane.
- The outersurface of endoplasmic reticulum possess ribosomes are called rough endoplasmic reticulum and those do not possess ribosomes on outer surface is called smooth endoplasmic reticulum.
- Rough endoplasmic reticulum (RER) synthesize protein and smooth endoplasmic reticulum (SER) synthesize lipid.

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- (39) A network of tubular structure spread throughout the cytoplasmic region is called
- (A) Lysosomes (B) Endoplasmic reticulum (C) Golgi-complex (D) Ribosomes
- (40) How many types of endoplasmic reticulum are there ?
- (A) One (B) Two (C) Three (D) Four
- (41) In which organelle the synthesis of lipid like Steroidal hormones occur ?
- (A) RER (B) SER (C) Golgi-complex (D) Ribosomes

Answers : (39-B), (40-B), (41-B)

• **Golgi-apparatus :**

- First in 1898 an Italian anatomist *Camillo Golgi* observed golgi-apparatus near the nucleus.
- Golgi-body is formed by a stackpile arrangement of flat membraneous bag like units or cisternae of 0.5 μm to 1.0 μm diameter. Four to eight unit occur in each stack pile. Towards their outer end round vesicles appear.
- Golgi body is a site for synthesis of Glycolipids and Glycoproteins.

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- (42) What is the diameter of cisternae in Golgi body ?
- (A) 0.5 μm to 1.0 μm (B) 0.1 μm to 1.0 μm
(C) 5.0 μm to 1.0 μm (D) 0.25 μm to 0.50 μm
- (43) Which substance is synthesized by Golgi body ?
- (A) Glycolipids (B) Glycoproteins (C) Glycol (D) A and B

Answers : (42-A), (43-D)

• **Lysosomes :**

- Lysosomes arise as vesicles separated from golgi bodies, which is surrounded by a single layered wall. They are associated with intracellular digestion.
- Lysosomes possess hydrolases enzyme. They are important in phagocytosis and pinocytosis like processes and also responsible for degradation of worn out cells so they are called 'suicide bags'.

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- (44) Lysosomes produce from which organelles ?
- (A) Golgi body (B) Ribosomes (C) Endoplasmic Reticulum (D) Mitochondria
- (45) Lysosomes are not connected with which functions ?
- (A) Pinocytosis (B) Respiration (C) Phagocytosis (D) Lysis

- (46) Which organelles of cell known as suicidal bag ?
 (A) Golgi body (B) Chloroplast (C) Lysosomes (D) Mitochondria
- (47) Which is the single layered organelle of cell ?
 (A) Mitochondria (B) Chloroplast (C) Golgi body (D) Lysosomes
- (48) Lysosomes possesses which types of enzyme ?
 (A) Lipases (B) Proteases (C) Carbohydrases (D) A, B, C All

Answers : (44-A), (45-B), (46-C), (47-D), (48-D)

• **Vacuoles :**

- The area in cytoplasm without any cytoplasm is called vacuole. In plant cell a large vacuole present but normally vacuole do not occur in animal cell.
- Vacuole surrounded by a semipermeable membrane is called tonoplast.
- In Paramoecium the vacuole is contractile. They create osmotic pressure in cells. Various substance are excreted or stored in them.

- (49) In cell the area in cytoplasm without any cytoplasm is known as
 (A) Golgi body (B) Vacuole (C) Ribosomes (D) Lysosomes
- (50) What is the nature of Tonoplast ?
 (A) Impermeable membrane (B) Permeable membrane
 (C) Semi permeable membrane (D) Selective permeable membrane
- (51) In which organism contractile vacuoles are present selectively ?
 (A) Paramoecium (B) Bacteria (C) Blue-green algae (D) Hydra
- (52) What is the function of contractile vacuole ?
 (A) Stores substances (B) Excrete the substances
 (C) Create osmotic pressure (D) A, B, C All

Answers : (49-B), (50-C), (51-A), (52-D)

• **Mitochondria :**

- Mitochondria is self replicating organelle that occur in various number, shapes and sizes in the cytoplasm of all eukaryotic cells. The number of mitochondria depends upon the physiological activity of the cells. They are fibrous, cylindrical or granular having diameter of 0.2 – 1.0 μm and length 1.0 – 4.1 μm .
- Each mitochondrion possesses a double walled envelope. The outer layer is continuous while the inner layer has many foldings are called cristae. Which possesses F_1 particle. F_1 particle is site for oxidative phosphorylation where synthesis of ATP takes place. The area without cristae is known as matrix. Matrix possesses ribosomes, circular DNA. Kreb's cycle occurs in Matrix of mitochondria.
- Mitochondria is known as power house of cell.

- (53) Which is the self replicating organelle of an organism ?
 (A) Lysosome (B) Mitochondria (C) Golgi body (D) Centriole
- (54) What is the length and diameter of mitochondria ?
 (A) 0.2 - 1.0 μm and 1.0 - 4.1 μm (B) 2.0 - 0.1 μm and 0.1 - 1.4 μm
 (C) 1.0 - 4.1 μm and 0.2 - 1.0 μm (D) 4 μm and 3 - 5 μm
- (55) Which process occurs in matrix and cristae in mitochondria respectively ?
 (A) Oxidative phosphorylation and Glycolysis (B) TCA cycle and Glycolysis
 (C) Krebs's cycle and oxidative Phosphorylation (D) Glycolysis and Krebs's cycle
- (56) Which necessary enzyme are present in cristae F_1 particle of mitochondria ?
 (A) Oxidative phosphorylation (B) Glycolysis
 (C) Krebs's cycle (D) Light reaction
- (57) Which organelles is known as power house of cell ?
 (A) Chloroplast (B) Lysosome (C) Ribosomes (D) Mitochondria

Answers : (53-B), (54-C), (55-C), (56-A), (57-D)

- **Plastids :**
 - Plastids are found in all plant cells. Based on the types of pigments plastids are of three types : Chromoplasts, Chloroplasts and leucoplasts.
- **Chromoplasts :**
 - These plastids possess pigments other than chlorophylls. They have pigments like carotene xanthophylls, anthocynin, etc. Various colours in flowers, fruits and seeds are due to their presence.
- **Chloroplasts**
 - Chlorophyll containg pigment is called chloroplasts. They carry out photosynthesis process. Majority of chloroplasts are present in the mesophyll of leaves.
 - Chloroplasts are lens shaped, oval, spherical, discoid or ribbon shaped. They are 5-10 mm in length and 2-4 mm in width. There number varies in various cells. Chlamydomonas possess one and mesophyll have 20 to 40 chloroplast per cells.
 - Chloroplast has a double layer wall. Outer layer is continuous and inner layer forms a highly folded membrane system, which forms a grana. The grana are interconnected by intergranum membrans. The region except the membrane is called stroma.
 - Each granum is made up of a stack of flat lamellar structure called thylacoids.
 - Normally one chloroplast contain 40 to 60 grana each granum possesses 02 to 100 thylakoids. Thylakoids possess chlorophyll and essential materials for synthesis of ATP through photophosphorylation. Stroma contains proteins, (70S) ribosomes, circular DNA and enzyme required in dark reaction.

- **Leucoplast :**

- They do not contain any pigments. They acts as food storing units those which store starch are called amyloplasts, Elaioplasts store fat or oil and aleuroplasts store proteins.

- (58) How many types of plastids are there ?
 (A) One (B) Two (C) Three (D) Four
- (59) The various colour of flowers, fruits and seeds are due
 (A) Carotene (B) Xanthophylls (C) Anthocyanin (D) A, B, C All
- (60) In which part of leaves the chloroplasts are present ?
 (A) Epidermis (B) Hypodermis (C) Mesophyll tissue (D) A, B, C All
- (61) What is the length of chloroplast ?
 (A) 5 - 10 mm (B) 5 - 10 μ m (C) 2 - 10 cm (D) 2 - 4 μ m
- (62) How many number of chloroplasts are present per cell of mesophyll ?
 (A) 20 to 40 (B) 30 to 40 (C) 10 to 20 (D) 25 to 35
- (63) Where does chloroplast materials essential for synthesis of ATP are present ?
 (A) In Stroma (B) In Thylakoid (C) A and B (D) Intergranum membrane
- (64) Which reaction occurs in grana and stroma of chloroplasts respectively ?
 (A) Dark reaction and Light reaction (B) Light reaction and Dark reaction
 (C) Light reaction and Glycolysis (D) Photooxidation and Photophosphorylation
- (65) How many thylakoids are present in each granum in chloroplast ?
 (A) 02 to 100 (B) 20 to 50 (C) 30 to 40 (D) 40 to 60
- (66) What is absent in stroma of chloroplast ?
 (A) Protein (B) 70S Ribosomes (C) Circular - DNA (D) 80S Ribosomes
- (67) Which substance is absent in leucoplasts ?
 (A) Protein (B) Starch (C) Plastids (D) Elaioplasts
- (68) What is the shape of chloroplast ?
 (A) Lens (B) Oval (C) Spherical (D) A, B, C All
- (69) How many chloroplast are present in Chlamydomonas ?
 (A) One (B) Two (C) Three (D) Four

Answers : (58-C), (59-D), (60-C), (61-B), (62-A), (63-B), (64-B), (65-A), (66-D), (67-C), (68-D), (69-A)

- **Ribosomes :**

- Ribosomes are granular structure found freely in the cytoplasm as well as associated with endoplasmic reticulum.
- In Eukaryotes ribosomes are 80 S types (60 S + 40 S) and In prokaryotes they are 70 S type (50 S + 30 S).
- In the structure of ribosome ribosomal RNA and Proteins are present. Ribosomes are associated with protein synthesis.

- Association of more than one ribosome with single molecule of mRNA is called polysome or polyribosome.

- (70) Which type of Ribosome respectively present in Eukaryotes and Prokaryotes ?
 (A) 80 S and 70 S (B) 60 S and 40 S (C) 50 S and 30 S (D) 70 S and 80 S
- (71) Which types of RNA present in structure of Ribosomes ?
 (A) m - RNA (B) r - RNA (C) t -RNA (D) A, B, C All
- (72) Which substances are synthesized by Ribosomes ??
 (A) Carbohydrates (B) Lipids (C) Proteins (D) Nucleic acids

Answers : (70-A), (71-B), (72-C)

• Cytoskeleton :

- Cytoskeleton is formed by three kinds of filaments (1) Microfilaments (2) Microtubules (3) Intermediate filaments.
- Microfilaments are made up of actin like proteins. They may be scattered or arranged in a network or in a parallel fashion. They are associated with cellular form and cellular movement. Amoeboid movement, cyclosis of protoplasm and transport of particulate are due to them.
- Microtubules are made up of the globular protein - tubulin. They are responsible to maintain cell shape, in cellular movement, cellular transport of materials and for chromosome movement.
- Intermediate filaments are strong and durable protein fibres. They form a basket and provide support to other filaments and tubules.

- (73) How many filaments is/are associated with structure of cytoskeleton ?
 (A) One (B) Two (C) Three (D) Four
- (74) Microfilaments are made up of which substance ?
 (A) Myosin (B) Actin (C) Tubulin (D) Carotene
- (75) What is present in microtubule ?
 (A) Actin (B) Tubulin (C) Carotene (D) Myosin
- (76) Which structure is related with cyclosis of protoplasm ?
 (A) Microtubules (B) Intermediate filaments (C) Microfilaments (D) A and B
- (77) Which structure is associated with chromosome movement ?
 (A) Microtubules (B) Intermediate filaments (C) Microfilaments (D) A and C
- (78) Which structure of cytoskeleton forms basket ?
 (A) Microtubules (B) Microfilaments (C) Stackpile (D) Intermediate filaments
- (79) Which substance is present in cytoskeleton ?
 (A) Carbohydrate (B) Protein (C) Lipids (D) Nucleic acid

Answers : (73-C), (74-B), (75-B), (76-C), (77-A), (78-D), (79-B)

• **Cilia and Flagella :**

- Cilia and flagella are associated with locomotion and movement. They are located on free surface of cells. There is a lot of similarity in their ultrastructure. Both originate in a basal body.
- Flagella are longer. They are one or two. Euglena possesses flagella.
- Cilia are short. They are many. Cilia are observed in Paramecium.
- Bacteria may be ciliated or flagellated.
- The axis of cilium and flagellum is called axoneme. It is made up of two central and nine pairs of microtubules along the circumference (9 + 2 arrangement). They are connected with the central microtubules through filaments.

- (80) Which are the functions of Cilia and flagella ?
 (A) Locomotion (B) Movement (C) Digestion (D) A and B
- (81) Which types of arrangement is structure of cilia and flagella ?
 (A) 9 + 2 (B) 9 + 0 (C) 2 + 9 (D) 0 + 9
- (82) Which organisms possesses cilia ?
 (A) Euglena (B) Paramecium (C) Amoeba (D) Opalina
- (83) Which organisms possesses flagella ?
 (A) Amoeba (B) Euglena (C) Opalina (D) Paramecium
- (84) From where are the Flagella and cilia originated ?
 (A) Centriole (B) Mitochondria (C) Basal body (D) Golgi body

Answers : (80-D), (81-A), (82-B), (83-B), (84-C)

• **Centrosome and Centrioles :**

- Centrosome containing two cylindrical structure, arranged right angle to each other called centrioles.
- Each centriole is organized like a wheel. Nine triplets forming angle of about 40° are arranged in peripheral region. Three microtubules are made up of tubulin. Each triplet are interconnected by protein fibres. At the centre there occurs proteinaceous hub. The microtubules of triplets are connected with the hub by filaments. The protoplast surrounding the centrioles is called centrosphere.
- All animal cells and some algae and fungi have centriole.
- Centrosome related with formation of bipolar spindle during cell division and in the formation of basal granules, cilia and flagella.

- (85) Which of following has Centriole ?
 (A) Animal cell (B) Some of algae (C) Some of fungi (D) A, B, C All
- (86) Which structure is formed by association with centrosome ?
 (A) Basal granules (B) Flagella (C) Cilia (D) A, B, C All
- (87) Two cylindrical structure of centrosome arranged right angle to each other then is known as
 (A) Centrosphere (B) Centrioles (C) Golgi-apparatus (D) Lysosome

- (88) Which organelles is associated with the formation of the bipolar spindle during cell division ?
 (A) Centriole (B) Flagella (C) Cilia (D) Golgi body
- (89) At which angle nine triplets of centrioles are arranged in peripheral region ?
 (A) 30° (B) 45° (C) 40° (D) 90°

Answers : (85-D), (86-D), (87-B), (88-A), (89-C)

• **Nucleus :**

- Nucleus is a regulatory centre of various cellular activities. Normally the cells are uninucleate but some cells are binucleate. e.g. zygote and some are multinucleate. e.g. Endosperm while Human RBC and sieve tubes lack nucleus.
- Nuclear membrane, nucleoplasm, nucleolus and chromatin occur in the structure of nucleus.
- Nuclear membrane is a double layered structure. Between two layers a space called perinuclear space. The outer layer associated with endoplasmic reticulum. It possesses ribosomes. Nuclearpores occur at various place and they are responsible for transfer of RNA and protein molecules between cytoplasm and nucleoplasm.
- Nucleus contain nucleoplasm and chromatin. It is a spherical shaped and no membrane surrounds it. They are formed on nucleolar organizer region of some specific chromosomes. Nucleolus is a site for active ribosomal RNA synthesis.

- (90) Which of the following is a regulatory centre of various cellular activities in cell ?
 (A) Centrioles (B) Nucleus (C) Golgi body (D) Chromosomes
- (91) Which cells are anucleated ?
 (A) Human RBC (B) Sieve tubes (C) Zygote (D) A and B
- (92) Which structure is associated with structure of nucleus ?
 (A) Nuclear membrane (B) Nucleolus (C) Chromatin (D) A, B, C All
- (93) Which organelle is amembranous ?
 (A) Nucleus (B) Chloroplasts (C) Lysosomes (D) Nucleolus
- (94) Nuclear organizer of some chromosome synthesized which RNA ?
 (A) r - RNA (B) m-RNA (C) t-RNA (D) s-RNA

Answers : (90-B), (91-D), (92-D), (93-D), (94-A)

• **Chromosomes :**

- Chromatin is made up of DNA, RNA, histone and non-histone kinds of protein.
- In an interphase of cell the chromosomes are spread as an indistinct network which is called chromatin. In eukaryotic cell during the metaphase of cell division chromosome appears distinct.
- Each chromosomes has a primary constriction disc shaped structure called Kinetochore. On the position of centromere chromosomes are base of four types :
 (1) Metacentric (2) Sub-metacentric (3) Acrocentric (4) Telocentric

- *Metacentric* : Centromere is located in the centre forming two equal arm of chromosome.
- In *sub-metacentric* chromosome centromere located some distance away from the centre resulting into one shorter and one longer arm of chromosomes.
- In *Acrocentric* chromosome from centromere one arm is short and other is very long, the short arm possesses stalk and satellite.
- In *Telocentric* centromere is located at the end of chromosome.
- **Microbodies** :
 - Membrane bound minute vesicle called microbodies that contain various enzymes are present in both plant and animal cells.

- (95) Which substance is present in Chromatin ?
 (A) DNA and RNA (B) Histone (C) Non Histone (D) A, B, C All
- (96) In which stage of cell division chromosomes are visible in distinct shape ?
 (A) Prophase (B) Metaphase (C) Anaphase (D) Telophase
- (97) Centromere is located at the end of chromosome is known as
 (A) Metacentric (B) Telocentric (C) Acrocentric (D) Sub-metacentric
- (98) The chromosomes which possesses stalk and satellite is known as
 (A) Acrocentric (B) Metacentric (C) Telocentric (D) Sub-metacentric
- (99) Which structure of plant and animal cell possesses various enzymes ?
 (A) Nucleus (B) Microbodies (C) Nucleolus (D) Lysosomes

Answers : (95-D), (96-B), (97-B), (98-A), (99-B)

• **True-False (T - F) type questions :**

Choose the correct option :

- (100) (1) Life of organisms begins from zygote.
 (2) Any cell of the body is capable of producing a new individual.
 (3) New cells are formed through divisions of pre-existing cells.
 (4) Mycoplasma is the smallest eukaryotic cell.
 (5) Bacteria and all other cell possesses nucleus and other organelles.
 (A) T, F, T, T, F (B) T, T, T, F, F (C) T, T, F, T, F (D) F, T, T, F, T,
- (101) (1) Prokaryotic cell possesses Mitochondria, Chloroplast, Endoplasmic reticulum and centriole.
 (2) Flagella is made up of carbohydrate named flagellin.
 (3) Prokaryotes possesses 70 s types and Eukaryotes possesses 80 s type of ribosomes.
 (4) Fluid-mosaic model was proposed by Robertson.
 (5) Mitochondria, Chloroplast and Peroxisomes are not considered as part of endomembrane system.
 (A) F, F, T, F, T (B) T, T, F, F, T (C) T, F, F, T, T (D) F, T, T, T, F

- (102) (1) The diameter of cisternae in golgi apparatus is $0.5\ \mu\text{m}$ to $1.0\ \mu\text{m}$.
 (2) Lysosome possesses single layer wall.
 (3) One chloroplast has 40-60 Grana.
 (4) Aleuroplasts stores starch.
 (5) All animal cells possesses centrioles.
 (A) F, T, T, F, T (B) T, F, T, F, T (C) T, T, T, F, T (D) T, T, F, T, T
- (103) (1) Microfilaments made up of protein.
 (2) Microtubules made up of Tubulin.
 (3) The arrangement of flagella in Euglena is $9 + 2$.
 (4) Nucleolus is membrane less structure.
 (5) The nucleus is absent in human RBC and sieve tube.
 (A) F, T, F, F, T (B) T, F, T, F, T (C) T, F, F, T, T (D) T, T, T, T, T
- (104) (1) The chromosomes are four types on the basis of function of centromere.
 (2) Chromatin is made up of histone and non-histone kind of proteins.
 (3) Acrocentric chromosome possesses satellite.
 (4) The Lysosomes known as suicidal bags of cells.
 (5) The Matrix of mitochondria and chloroplast possesses ribosomes and circular DNA.
 (A) F, T, T, F, T (B) F, T, T, T, T (C) F, F, T, T, T (D) T, F, T, T, F
- (105) (1) The endoplasmic reticulum is of two type : (1) RER (2) SER
 (2) Fimbriae plays important role in conjugation.
 (3) In bacteria outermost layer is made up of glycocalyx.
 (4) All living organisms are not made up of cells and their products.
 (5) Golgi body is a site for synthesis of glycolipids and glycoproteins.
 (A) T, F, T, T, F (B) T, T, F, T, F (C) T, T, T, F, T (D) T, T, T, F, F

Answers : (100-B), (101-A), (102-C), (103-D), (104-B), (105-C)

• **Assertion (A) and Reason (R) type questions :**

Select right options from following :

- (A) A and R both are true. R is correct explanation of A.
 (B) A and R both are true. R is not correct explanation of A.
 (C) A is true, R is false.
 (D) A is false, R is true.

(106) Assertion A : Cell is the structural and functional unit of living organisms.

Reason R : New cells are formed by cell division of pre existing cells.

- (A) (B) (C) (D)

- (107) Assertion A : Mitochondria is known as power house of cell.
Reason R : ATP is known as energy currency of the cell.
(A) (B) (C) (D)
- (108) Assertion A : Mitochondria is self replicating organelle.
Reason R : Mitochondria possesses circular DNA and ribosomes.
(A) (B) (C) (D)
- (109) Assertion A : Cilia and Flagella possesses 9 + 2 type of arrangement.
Reason R : Centriole does not possesse 9 + 0 type arrangement.
(A) (B) (C) (D)
- (110) Assertion A : Ribosome is associated with Protein synthesis.
Reason R : Ribosome is non membranous.
(A) (B) (C) (D)
- (111) Assertion A : Aleuroplasts stores proteins.
Reason R : Various colours in flowers, fruits and seeds are due to aleuroplasts.
(A) (B) (C) (D)
- (112) Assertion A : Mitochondria, Lysosome and chloroplast are parts of endomembrane system.
Reason R : In cell all the membranous organelles combine to form endomembrane system.
(A) (B) (C) (D)
- (113) Assertion A : Cytoplasms of two neighbouring cells are connected through plasmodesmata.
Reason R : Cell wall and middle lamella possesses plasmodesmata.
(A) (B) (C) (D)
- (114) Assertion A : Blue-green algae is a prokaryotic cell.
Reason R : In prokaryotic cell cell division occurs very rapidly.
(A) (B) (C) (D)
- (115) Assertion A : RER possesses ribosomes.
Reason R : Steroidal hormones are synthesized by RER.
(A) (B) (C) (D)
- (116) Assertion A : Mitochondria synthesize ATP.
Reason R : F1 particle is present in mitochondria.
(A) (B) (C) (D)
- (117) Assertion A : 20 to 40 chloroplasts are present per cell of mesophyll.
Reason R : Each chloroplast has Grana and stroma in their structure.
(A) (B) (C) (D)

Answers : (106-B), (107-B), (108-B), (109-C), (110-B), (111-C), (112-D), (113-B), (114-B), (115-C), (116-A), (117-B)

(118) Select correct option :

Column - I

- (a) Microtubules
- (b) Microfilaments
- (c) Flagella
- (d) Outer most layer of Bacteria

Column - II

- (i) Glycocalyx
- (ii) Actin
- (iii) Tubulin
- (iv) Flagellin

- (A) a - iv, b - iii, c - ii, d - i
- (B) a - iii, b - ii, c - iv, d - i
- (C) a - iii, b - iv, c - ii, d - i
- (D) a - ii, b - iv, c - i, d - iii

(119) Select correct option :

Column - I

- (a) Zygote
- (b) Human RBC
- (c) Endosperm
- (d) Typical plant cell

Column - II

- (i) Single nucleus
- (ii) Multi nucleate
- (iii) Binucleate
- (iv) Absence of nucleus

- (A) a - iii, b - iv, c - ii, d - i
- (B) a - iv, b - iii, c - i, d - ii
- (C) a - ii, b - iv, c - iii, d - i
- (D) a - iii, b - iv, c - i, d - ii

(120) Select correct option :

Column - I

- (a) Mitochondria
- (b) Lysosomes
- (c) Chloroplast
- (d) Golgi body

Column - II

- (i) Synthesis of Glycolipids
- (ii) ATP - formation and storage
- (iii) Suicidal bag
- (iv) Photosynthesis

- (A) a - ii, b - i, c - iv, d - iii
- (B) a - iii, b - ii, c - i, d - iv
- (C) a - iv, b - iii, c - ii, d - i
- (D) a - ii, b - iii, c - iv, d - i

(121) Select correct option :

Column - I

- (a) Robert Hooke
- (b) Robert Brown
- (c) Camillo Golgi
- (d) Schleiden and Schwann

Column - II

- (i) Cell theory
- (ii) Cell
- (iii) Nucleus
- (iv) Golgi body

- (A) a - ii, b - iii, c - iv, d - i
- (B) a - iii, b - iv, c - i, d - ii
- (C) a - iv, b - i, c - ii, d - iii
- (D) a - ii, b - i, c - iv, d - iii

(122) Select correct option :

Column - I

- (a) Chloroplast
- (b) Lysosome
- (c) Nucleolus
- (d) Contractile Vacuole

Column - II

- (i) Non-membranous structure
- (ii) Create osmotic pressure
- (iii) Two layered structure
- (iv) Single layered structure

- (A) a - ii, b - i, c - iv, d - iii
- (B) a - iii, b - iv, c - ii, d - i
- (C) a - iv, b - iii, c - ii, d - i
- (D) a - iii, b - iv, c - i, d - ii

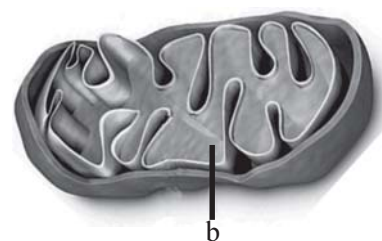
Answers : (118-B), (119-A), (120-D), (121-A), (122-D)

(123) Given diagram is known as

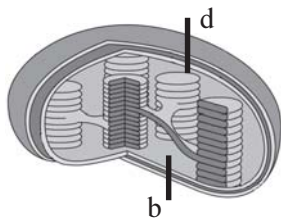
- (A) Mitochondria
- (B) Chloroplast
- (C) Golgi body
- (D) Ribosome

(124) Give the name of b in given diagram.

- (A) Cristae
- (B) Matrix
- (C) Mitochondria
- (D) F₁ Particle



(125) Which process occurs in b in given figure ?



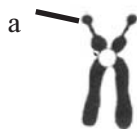
(A) Oxidative phosphorylation

(B) Dark reaction

(C) Light reaction

(D) Phosphorylation

(126) 'a' is significant of which chromosomes ?



(A) Metacentric

(B) Sub Metacentric

(C) Acrocentric

(D) Telocentric

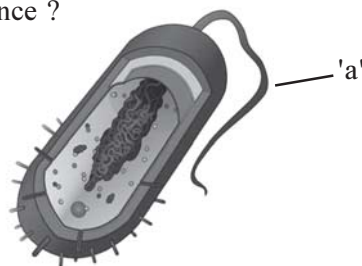
(127) In given diagram, a is made up of which substance ?

(A) Flagellin

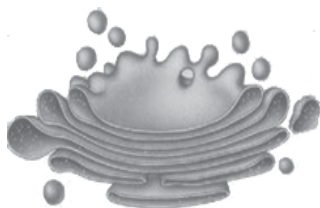
(B) Suberin

(C) Pectin

(D) Glycocalyx



(128) Given diagram is known as



(A) Golgi body

(B) Mitochondria

(C) Chloroplast

(D) Endoplasmic reticulum

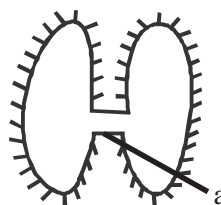
(129) In diagram a – related with which process ?

(A) Conjugation

(B) Protein Synthesis

(C) Digestion

(D) Excretion



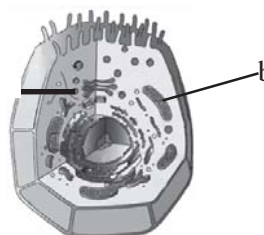
(130) In given diagram b is known as

(A) Crystals

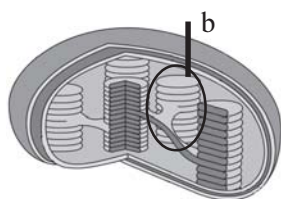
(B) Vacuoles

(C) Nucleus

(D) Mitochondria



(131) In given diagram b known as



(A) Grana

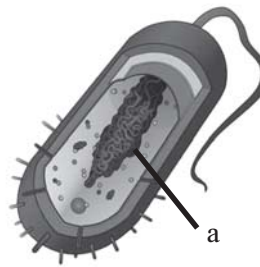
(B) Stroma

(C) Intergranum membrane

(D) Granum

(132) In given diagram 'a' known as

- (A) DNA (B) RNA
(C) Nucleoid (D) Nucleus



Answers : (123-A), (124-B), (125-B), (126-C), (127-A), (128-A), (129-A), (130-D), (131-A), (132-C)

• **Questions for NEET :**

- (133) Which substance is present in higher plant cell wall ?
(A) Lipoprotein (B) Cellulose (C) Peptidoglycan (D) Fungus cellulose
- (134) Which substance is synthesized by Granular endoplasmic reticulum (RER) ?
(A) Lipid (B) Protein (C) Carbohydrate (D) Nucleic acid
- (135) What is the similarity of prokaryotic and eukaryotic cell ?
(A) Histone (B) Gene (C) Mitosis (D) Endoplasmic reticulum
- (136) Which of the following is absent in prokaryotic cell ?
(A) Centrioles (B) Membranous organelles (C) Nucleus (D) A, B, C All
- (137) Which are the two sub units of ribosomes in Eukaryotic cell ?
(A) 50 S + 40 S (B) 30 S + 70 S (C) 60 S + 30 S (D) 60 S + 40 S
- (138) In which organelle DNA is absent ?
(A) Chloroplasts (B) Mitochondria (C) Ribosomes (D) Cytoplasm
- (139) Which organelle is related with formation of ATP ?
(A) Mitochondria (B) Golgi-apparatus (C) Ribosomes (D) Chloroplasts
- (140) Centrioles related with process known as
(A) Crossing over (B) Gene transcription (C) Chromosome movement (D) Cell-division
- (141) Where does the ribosomes synthesized ?
(A) Golgi-apparatus (B) Nucleolus (C) Cytoplasm (D) Cell-membrane
- (142) Aldolase enzyme is related with organelle ?
(A) Chloroplast (B) Ribosomes (C) Golgi-body (D) Lysosome
- (143) The fluid mosaic model is related with organelle
(A) Plasma membrane (B) Nucleus (C) Cytoplasm (D) Cell wall
- (144) In higher plants stroma of chloroplast possesses enzyme for
(A) Dark reaction (B) Light reaction
(C) Phosphorylation (D) A and C
- (145) The cristae is related with organelles
(A) Endoplasmic reticulum (B) Chloroplasts (C) Golgi-apparatus (D) Mitochondria

- (146) Where does the peptide synthesis occur in cell ?
 (A) Ribosome (B) Chloroplast (C) Mitochondria (D) Lysosome
- (147) Which organelles is related with synthesis of new protein and protein transport ?
 (A) Chloroplast (B) Endoplasmic reticulum (C) Mitochondria (D) Lysosome
- (148) Which is the self replicating organelles ?
 (A) Golgi body and Endoplasmic reticulum (B) Chloroplast and Golgi-body
 (C) Mitochondria and Chloroplast (D) Lysosome and Mitochondria
- (149) Which is false about Mitochondria ?
 (A) Outermost layer of mitochondria is permeable for all type of molecule.
 (B) Outermost layer possesses enzyme for oxidative phosphorylation (ETS).
 (C) Outermost layer of mitochondria possesses seive like pores.
 (D) Inner most layer possesses many folds.

Answers : (133-B), (134-B), (135-C), (136-D), (137-D), (138-C), (139-A), (140-D), (141-B), (142-D), (143-A), (144-A), (145-D), (146-A), (147-B), (148-C), (149-B)

