

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

**Chapter
04**

Cells and Tissues

Multiple Choice Questions (M.C.Qs)

Encircle the correct answer:

1. What is responsible for the high resolution of the electron microscope?
(a) High magnification (b) Short wavelength of the electron beam
(c) Use of heavy metals stains (d) Very thin section
2. What is a function of the rough endoplasmic reticulum?
(a) Aerobic respiration (b) Intracellular digestion
(c) Synthesis of steroids (d) Synthesis of protein
3. Which statement about the fluid mosaic model of membrane structure is correct?
(a) The less unsaturated the fatty acid, the more fluid nature.
(b) The more unsaturated the fatty acid, the more fluid nature.
(c) Higher the temperature, less fluid nature.
(d) The lower the temperature, more fluid nature.
4. Which process allow movement in and out of cell
(i) Osmosis (ii) Diffusion (iii) Active transport
(a) i only (b) i and ii only (c) ii and iii only (d) i, ii and iii
5. All are postulates of cell theory except
(a) New cell is derived from pre-existing cells.
(b) Cell does not contain the hereditary material.
(c) All living organisms are made up of one or more cells.
(d) Cell is the fundamental unit of life.
6. Secondary wall is made up of
(a) Pectin and cellulose (b) Cellulose and protein
(c) Cellulose and lignin (d) Lignin and pectin
7. Select the odd one
(a) Active transport (b) Diffusion
(c) Facilitated diffusion (d) Osmosis
8. Trace the correct pathway of protein produce from protein factories
(a) RER → Ribosome → Golgi body → Lysosome
(b) Ribosomes → RER → Golgi body → Lysosome
(c) Golgi body → RER → Ribosome → Lysosome
(d) RER → Ribosome → Lysosome → Golgi body
9. Cell organelle found in animal cell and helps intracellular digestion
(a) Lysosome (b) Ribosomes (c) Mitochondria (d) Golgi apparatus
10. Select the mismatched
(a) Plastids → Storage of chemicals (b) Centriole → Help in cell division
(c) ribosomes → Synthesis of steroids (d) Mitochondria → Synthesis of ATP

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

11. *He is believed to be the first investigator to invent the compound microscope in 1590.*
(a) Zacharias Janssen (b) Van Leeuwenhoek
(c) Robert Hooke (d) Rudolf Virchow
12. *The parameters which are important in microscopy are:*
(a) two (b) three (c) four (d) five
13. *A photograph of an image taken through a microscope is called:*
(a) magnification (b) resolution (c) micrograph (d) objective
14. *Electron microscope has a resolution as small as:*
(a) 0.1 nanometer (b) 0.2 nanometer (c) 0.002 nanometer (d) 2 nanometer
15. *Electron microscope has a magnification upto:*
(a) 125,000 times (b) 150,000 times (c) 175,000 times (d) 250,000 times
16. *It is often used to obtain detailed images of the internal structure of cells.*
(a) Compound Microscope (b) Scanning Electron Microscope (SEM)
(c) Transmission Electron Microscope (TEM) (d) Simple Microscope
17. *The fundamental unit of living thing is:*
(a) atom (b) cell (c) tissue (d) molecule
18. *In 1665, cell was first observed by:*
(a) Robert Hooke (b) Robert Brown (c) Rudolf Virchow (d) Louis Pasteur
19. *In 1670, the first living cells were seen by:*
(a) Robert Hooke (b) Anton van Leeuwenhoek
(c) Theodor Schwann (d) Albercht von Roelliker
20. *In 1833, the center of the cell was seen by:*
(a) Robert Hooke (b) Robert Brown (c) Rudolf Virchow (d) Louis Pasteur
21. *In 1833, he discovered the nucleus in plant cells.*
(a) Robert Hooke (b) Robert Brown (c) Rudolf Virchow (d) Louis Pasteur
22. *In 1839, he presented a cell theory.*
(a) Robert Hooke (b) Robert Brown (c) Theodor Schwann (d) Carl Heinrich Braun
23. *He reached the conclusion that only not only plants, but animal tissue as well is composed of cells.*
(a) Rudolf Virchow (b) Louis Pasteur
(c) Carl Heinrich Braun (d) Theodor Schwann
24. *In 1840, he discovered that sperms and eggs are also cells.*
(a) Robert Hooke (b) Anton van Leeuwenhoek
(c) Theodor Schwann (d) Albercht von Roelliker
25. *In 1845, he reworked the cell theory, calling cells the basic unit of life.*
(a) Rudolf Virchow (b) Louis Pasteur
(c) Carl Heinrich Braun (d) Theodor Schwann
26. *They are not composed of cells.*
(a) viruses (b) prions (c) viroids (d) All of them
27. *These cells have a proper nucleus and membrane bound organelles.*
(a) Eukaryotic (b) Prokaryotic (c) Animal (d) Plant
28. *Plant and animal cells are:*
(a) eukaryotic (b) prokaryotic (c) viroid (d) prion
29. *These cells are generally a cubical shape.*
(a) Animal (b) Plant (c) Virus (d) Viroid

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

30. *These cells are usually spherical in shape.*
(a) Animal (b) Plant (c) Virus (d) Viroid
31. *Energy flow occurs in cells through the breakdown of:*
(a) fats (b) starch (c) carbohydrates (d) All of them
32. *The information necessary for the creation of new cells is known as:*
(a) offspring information (b) generation information
(c) hereditary information (d) All of them
33. *Hereditary information is contained within:*
(a) plasma (b) cytoplasm (c) RNA (d) DNA
34. *Organisms whose cells have a membrane bounded nucleus are called:*
(a) Eukaryotes (b) Prokaryotes (c) Animal (d) Plant
35. *Organisms whose cells do not have a membrane bounded nucleus are called:*
(a) Eukaryotes (b) Prokaryotes (c) Animal (d) Plant
36. *An animal cell does not have:*
(a) plastids (b) cell wall (c) plasmodesmata (d) All of them
37. *It is a tough, rigid non-living and permeable protective layer.*
(a) plasma membrane (b) cell membrane
(c) cell wall (d) None of them
38. *Cell wall is also present in:*
(a) fungi, algae & bacteria (b) fungi & algae
(c) fungi & bacteria (d) algae & bacteria
39. *In plants, the cell wall is composed mainly of:*
(a) strong fibers of cellulose (b) sugar and amino acid
(c) chitin, glucans & proteins (d) carbohydrates and starch
40. *Bacterial cell walls are composed of:*
(a) strong fibers of cellulose (b) sugar and amino acid
(c) chitin, glucans & proteins (d) carbohydrates and starch
41. *Peptidoglycan is:*
(a) plant cell wall (b) bacterial cell wall (c) fungal cell wall (d) None of them
42. *The main components of fungal cell walls are:*
(a) strong fibers of cellulose (b) sugar and amino acid
(c) chitin, glucans & proteins (d) carbohydrates and starch
43. *Plant cell walls may contain upto:*
(a) two layers (b) three layers (c) four layers (d) five layers
44. *It separates one cell from another.*
(a) Middle lamella (b) Primary cell wall
(c) Secondary cell wall (d) None of them
45. *It is a thin membranous layer on the outer side of the cell.*
(a) Secondary cell wall (b) Primary cell wall
(c) Middle lamella (d) None of them
46. *It is made up of sticky substance called pectin and cellulose.*
(a) Secondary cell wall (b) Primary cell wall
(c) Middle lamella (d) cell membrane

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

47. *It lies on the inside of the middle lamella and is mainly composed of cellulose.*
 (a) Secondary cell wall (b) Primary cell wall
 (c) plasma membrane (d) cell membrane
48. *Lignin is a:*
 (a) hard water proof substance (b) soft water proof substance
 (c) water soluble substance (d) tissue
49. *It is only found in cells which provide mechanical support in plants.*
 (a) Secondary cell wall (b) Primary cell wall
 (c) Middle lamella (d) cell membrane
50. *The openings in the cell wall are called:*
 (a) lignin (b) lamella (c) phospholipid (d) plasmodesmata
51. *It contains strands of cytoplasm that connect adjacent cells and allows molecules to travel between plant cells.*
 (a) lignin (b) lamella (c) phospholipid (d) plasmodesmata
52. *It is the outer most living boundary of all cells.*
 (a) Secondary cell wall (b) Primary cell wall
 (c) Middle lamella (d) cell membrane
53. *The cell membrane is also called:*
 (a) middle lamella (b) plasma membrane
 (c) primary cell wall (d) secondary cell wall
54. *It physically separates the intercellular space from the extracellular environment.*
 (a) Cell membrane (b) Plasma membrane
 (c) Both a & b (d) Only b
55. *The cell membrane is composed of a double layer of special lipids called:*
 (a) phospholipids (b) glycolipids (c) cholesterol (d) plasmodesma
56. *They proposed the Fluid Model of the cell membrane in 1972.*
 (a) Theodor Schwann & Schleiden (b) S.J. Singer & G.L. Nicolson
 (c) Rudolf Virchow & Heinrich Braun (d) Louis Pasteur & Rudolf Virchow
57. *It is the movement of substances from a region of high concentration to low concentration.*
 (a) Diffusion (b) Osmosis
 (c) Facilitated diffusion (d) Active transport
58. *It is said to occur down a concentration gradient.*
 (a) Active transport (b) Facilitated diffusion
 (c) Osmosis (d) Diffusion
59. *It is passive process which means it does not require any energy input.*
 (a) Diffusion (b) Osmosis (c) Only 'a' (d) Both 'a' & 'b'
60. *Plant cells use it to absorb water from soil and transport it to the leaves.*
 (a) Active transport (b) Facilitated diffusion
 (c) Osmosis (d) Diffusion
61. *In hypertonic conditions, a plant cell:*
 (a) gains water (b) loses water (c) gains oxygen (d) loses oxygen
62. *When a plant loses water, cytoplasm:*
 (a) expands (b) becomes dilute (c) shrinks (d) becomes thick

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

63. The shrinkage of cytoplasm is called:
(a) plasmolysis (b) cytoskeleton (c) kernel (d) plasmodesma
64. In the kidneys, it keeps the water and salt levels in the body and blood at the correct levels.
(a) Active transport (b) Facilitated diffusion
(c) Osmosis (d) Diffusion
65. It allows rapid exchange of specific substances.
(a) Active transport (b) Facilitated diffusion
(c) Osmosis (d) Diffusion
66. Particles are taken up by carrier proteins which change their shape in:
(a) diffusion (b) osmosis (c) active transport (d) facilitated diffusion
67. It is the movement of substances against a concentration gradient, from a region of low concentration to high concentration using an input of energy.
(a) diffusion (b) osmosis (c) active transport (d) facilitated diffusion
68. In biological systems, the form in which input of energy occurs is:
(a) ATP (b) ADP (c) RNA (d) DNA
69. It is the jelly-like substance that fills the cell.
(a) Protoplasm (b) Cytoplasm (c) Cytoskeleton (d) Nucleoplasm
70. Cytoplasm consists of up to:
(a) 60 % water (b) 70% water (c) 80% water (d) 90% water
71. It is a network of protein consists of microtubules and various filaments that spread out through the cytoplasm.
(a) protoplasm (b) cytoplasm (c) cytoskeleton (d) nucleoplasm
72. It provides both structural support and means of transport within the cell.
(a) cytoplasm (b) cytoskeleton (c) nucleoplasm (d) protoplasm
73. Microtubules are made of:
(a) tubulin (b) active protein (c) lipids (d) ATP
74. Filaments made up of:
(a) tubulin (b) active protein (c) lipids (d) ATP
75. It is the largest organelle in the cell.
(a) Vacuole (b) Mitochondria (c) Chloroplasts (d) Nucleus
76. It contains the entire cell's genetic information in the form of DNA.
(a) Vacuole (b) Golgi body (c) Nucleus (d) Mitochondria
77. Its presence is the primary factor that distinguishes eukaryotes from prokaryotes.
(a) Vacuole (b) Mitochondria (c) Chloroplasts (d) Nucleus
78. Inside nuclear envelope, a granular fluid is present called:
(a) nucleoplasm (b) cytoplasm (c) protoplasm (d) Glycoprotein
79. In nucleus an aggregation of RNA is also present called:
(a) nucleoplasm (b) nucleolus (c) cytoplasm (d) protoplasm
80. In non-dividing cell, the genetic material is found in the form of network in the nucleus called:
(a) cytoskeleton (b) Cristae
(c) chromatin network (d) endoplasmic reticulum
81. It is a membrane bound organelle found in eukaryotic cells.
(a) Mitochondria (b) Vesicles (c) Ribosomes (d) Cytoplasm

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

- 82. Mitochondria contain:**
 (a) one phospholipid bilayer (b) two phospholipid bilayers
 (c) three phospholipid bilayers (d) four phospholipid bilayers
- 83. The inner membrane of mitochondria contains many folds called:**
 (a) vesicle (b) cristernae (c) cristae (d) recticulum
- 84. It is the site of aerobic respiration.**
 (a) Nucleus (b) Ribosomes (c) Golgi Bodies (d) Mitochondria
- 85. During aerobic respiration, energy is produced in the form of:**
 (a) ADP (b) ATP (c) RNA (d) DNA
- 86. It is also called 'powerhouse' of a cell.**
 (a) Mitochondria (b) Ribosomes (c) Golgi body (d) Nucleus
- 87. The endoplasmic recticulum (ER) is an organelle found in:**
 (a) animal cells only (b) plant cells only
 (c) eukaryotic cells only (d) prokaryotic cells only
- 88. It has a double membrane consisting of a network of hollow tubes, flattened sheets, and rounds sacs.**
 (a) Mitochondria (b) Ribosomes
 (c) Golgi body (d) Endoplasmic reticulum
- 89. In ER, flattened, hollow folds and sacs are called:**
 (a) vesicle (b) cristernae (c) cristae (d) recticulum
- 90. The ER is located in the cytoplasm and is connected to the:**
 (a) Mitochondria (b) Ribosomes (c) Golgi body (d) Nuclear envelope
- 91. Types of endoplasmic recticulum are:**
 (a) two (b) three (c) four (d) five
- 92. It is involved in the synthesis of lipids, including oils, phospholipids and steroids.**
 (a) Golgi body (b) Rough ER (c) Smooth ER (d) Mitochondria
- 93. It is also responsible for metabolism of carbohydrates, regulation of calcium concentration and detoxification.**
 (a) Smooth ER (b) Rough ER (c) Mitochondria (d) Golgi body
- 94. It is covered with ribosomes.**
 (a) Golgi body (b) Rough ER (c) Smooth ER (d) Mitochondria
- 95. It is responsible for protein synthesis and plays a role in membrane production.**
 (a) Smooth ER (b) Rough ER (c) Mitochondria (d) Golgi body
- 96. Ribosomes are composed of:**
 (a) DNA and protein (b) DNA and RNA
 (c) RNA and carbohydrates (d) RNA and protein
- 97. The Golgi body is the:**
 (a) sorting organelle of the cell (b) storing organelle of the cell
 (c) respiratory organelle of the cell (d) excreting organelle of the cell
- 98. The Golgi body consists of a stack of flat membrane-bound sacs called:**
 (a) cristae (b) cisternae (c) lysosomes (d) leucoplasts
- 99. The cisternae within the Golgi body consist of:**
 (a) enzymes (b) protein (c) energy (d) carbohydrates

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

- 100.** *Proteins are transported from rough ER to the:*
 (a) nucleus (b) mitochondria (c) Golgi body (d) centriole
- 101.** *Proteins are modified in:*
 (a) nucleus (b) centriole (c) vacuole (d) Golgi body
- 102.** *It can be considered to be the 'post office' of the cell.*
 (a) vacuole (b) Golgi body (c) centriole (d) vesicles
- 103.** *They are small, membrane-bound spherical sacs which facilitate the metabolism, transport and storage of molecules.*
 (a) vacuole (b) Golgi body (c) centriole (d) vesicles
- 104.** *They are formed by the Golgi body and contain powerful digestive enzymes.*
 (a) Vesicles (b) Vacuoles (c) Lysosomes (d) Centrioles
- 105.** *They are fluid-filled spaces that occur in the cytoplasm of plant cells.*
 (a) Vesicles (b) Vacuoles (c) Lysosomes (d) Centrioles
- 106.** *A selective permeable boundary that surrounds the vacuole is called:*
 (a) tonoplast (b) cell sap (c) lysosome (d) Granum
- 107.** *A vacuole contains:*
 (a) tonoplast (b) cell sap (c) lysosome (d) Granum
- 108.** *It is a liquid consisting of water, mineral salts, sugars and amino acids.*
 (a) lysosome (b) granum (c) stroma (d) cell sap
- 109.** *It plays an important role in hydrolysis, excretion of cellular waste, storage of water, organic and inorganic substances.*
 (a) Vacuole (b) Granum (c) Stroma (d) Cell sap
- 110.** *It is a cylindrical tube-like structure that is composed of 27 microtubules.*
 (a) Lysosome (b) Vesicle (c) Centriole (d) Mitochondria
- 111.** *The site where two centrioles arranged perpendicular to each other is referred to as a:*
 (a) lysosome (b) centrosome (c) vesicle (d) cell sap
- 112.** *The centrosome plays a very important role in:*
 (a) transporting fluids (b) synthesizing ATP
 (c) synthesizing lipids (d) cell division
- 113.** *Plastids are found in the cells of:*
 (a) plants (b) algae (c) both 'a' & 'b' (d) only 'a'
- 114.** *Plastids often contain pigments used in:*
 (a) photosynthesis (b) synthesizing ATP
 (c) synthesizing lipids (d) cell division
- 115.** *They are green-coloured plastids found in plants and algae.*
 (a) Chloroplasts (b) Chromoplasts (c) Leucoplasts (d) All of them
- 116.** *They contain red, orange or yellow pigments and are common in ripening fruit, flowers or autumn leaves.*
 (a) Chloroplasts (b) Chromoplasts (c) Leucoplasts (d) None of them
- 117.** *They are colourless plastids.*
 (a) Chloroplasts (b) Chromoplasts (c) Leucoplasts (d) None of them
- 118.** *Within the double membrane of chloroplast is a gel-like substance called:*
 (a) lamella (b) thylakoid (c) granum (d) stroma

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

119. *It contains enzymes for photosynthesis.*
(a) granum (b) stroma (c) thylakoid (d) lamella
120. *Suspended in the stroma are stack-like structures called:*
(a) grana (b) chlorophyll (c) leucoplasts (d) lysosomes
121. *The chlorophyll molecules are found on the surface of the:*
(a) grana (b) lamella (c) thylakoid discs (d) None of them
122. *The smallest cells are bacteria called:*
(a) mycoplasmas (b) adipose (c) meristems (d) mesophyll
123. *The bulkiest cells are:*
(a) bacteria (b) muscle cells (c) nerve cells (d) bird eggs
124. *Waste production and demand of nutrients are directly proportional to cell:*
(a) length (b) width (c) volume (d) surface area
125. *In humans and other large multicellular animals, basic types of tissue are:*
(a) three (b) four (c) five (d) six
126. *The outer layer of our skin is a/an:*
(a) epithelial tissue (b) connective tissue (c) muscular tissue (d) nervous tissue
127. *The lining of small intestine are made up of:*
(a) epithelial tissue (b) connective tissue (c) muscular tissue (d) nervous tissue
128. *When the epithelium is composed of a single layer of cells, it is called:*
(a) squamous epithelium (b) cubical epithelium
(c) simple epithelial tissue (d) stratified epithelial tissue
129. *When the epithelium is composed of a single layer of cells, it is called:*
(a) squamous epithelium (b) cubical epithelium
(c) simple epithelial tissue (d) stratified epithelial tissue
130. *It is found in the alveoli of lungs.*
(a) Simple squamous epithelium (b) Stratified squamous epithelium
(c) Simple cuboidal epithelium (d) Simple columnar epithelium
131. *It is found in lumen of collecting ducts in the kidney and present in the thyroid gland around the follicles.*
(a) Simple squamous epithelium (b) Stratified squamous epithelium
(c) Simple cuboidal epithelium (d) Simple columnar epithelium
132. *It is found in the female reproduction system and in the digestive tract.*
(a) Simple squamous epithelium (b) Stratified squamous epithelium
(c) Simple cuboidal epithelium (d) Simple columnar epithelium
133. *They are found surrounding the ducts of many glands, including mammary glands in the breast and salivary glands in the mouth.*
(a) Stratified squamous epithelia (b) Stratified cuboidal epithelia
(c) Stratified columnar epithelia (d) transitional epithelia
134. *They are exclusively found in the excretory system.*
(a) Stratified squamous epithelia (b) stratified cuboidal epithelia
(c) stratified columnar epithelia (d) transitional epithelia
135. *It is a type of supporting connective tissue.*
(a) Cartilage (b) Bone (c) Both 'a' & 'b' (d) None of them

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

- 136. Adipose is type of:**
(a) connective tissue (b) muscle tissue (c) nervous tissue (d) plant tissue
- 137. Blood referred to as:**
(a) connective tissue (b) muscle tissue (c) nervous tissue (d) None of them
- 138. Types of muscle tissues are:**
(a) two (b) three (c) four (d) five
- 139. It is attached to bones by tendons.**
(a) Skeletal muscle (b) Cardiac muscle (c) Smooth muscle (d) All of them
- 140. It is found only in the walls of the heart.**
(a) Skeletal muscle (b) Cardiac muscle (c) Smooth muscle (d) All of them
- 141. It is found in the walls of blood vessels, as well as in the walls of the digestive tract, the uterus, the urinary bladder etc.**
(a) Skeletal muscle (b) Cardiac muscle (c) Smooth muscle (d) All of them
- 142. Nervous tissue is composed of:**
(a) neurons (b) spinal cord (c) nerves (d) All of them
- 143. In plants, major types of tissues are:**
(a) two (b) three (c) four (d) five
- 144. These plant tissues are composed of cells, which have the ability to divide.**
(a) Permanent tissues (b) Meristematic tissues
(c) Ground tissue (d) Compound tissue
- 145. Tissues present at the apex of roots and stems are:**
(a) Epidermal (b) Ground (c) Xylem (d) Apical meristems
- 146. The cells of these tissues do not have the ability to divide.**
(a) Permanent tissues (b) Meristematic tissues
(c) Ground tissue (d) Compound tissue
- 147. These tissues cover plant body.**
(a) Epidermal (b) Ground (c) Xylem (d) Apical meristems
- 148. On stem and leaves these tissue secrete cutin which prevents evaporation.**
(a) Lateral meristems (b) Apical meristems
(c) Epidermal (d) Xylem
- 149. Ground tissues are simple tissues made up of:**
(a) collenchyma cells (b) parenchyma cells
(c) mesophyll cells (d) sclerenchyma cells
- 150. They are found in cortex of young stems, in the midribs of leaves and in the petals of flowers:**
(a) Collenchyma tissues (b) Sclerenchyma tissues
(c) Xylem tissues (d) Epidermal tissue
- 151. Their cell walls are hardened with lignin, which is the main chemical component of wood.**
(a) Collenchyma tissues (b) Sclerenchyma tissues
(c) Xylem tissues (d) Epidermal tissue
- 152. A plant tissue composed of more than one type of cell is called:**
(a) Permanent tissues (b) Meristematic tissues
(c) Ground tissue (d) Compound tissue

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

- 153.** Xylem and phloem, found only in vascular plants, are examples of:
 (a) sclerenchyma tissue (b) ground tissue
 (c) compound tissue (d) collenchyma tissue
- 154.** It is responsible for the transport of water and dissolved substances from roots to the aerial parts.
 (a) Xylem tissue (b) Phloem tissue
 (c) ground tissue (d) collenchyma tissue
- 155.** Sieve tube cells and companion cells are found in:
 (a) Xylem tissue (b) Phloem tissue
 (c) ground tissue (d) collenchyma tissue

Answers

1. (b)	2. (d)	3. (a)	4. (d)	5. (b)	6. (c)	7. (a)	8. (b)
9. (a)	10. (c)	11. (a)	12. (a)	13. (c)	14. (b)	15. (d)	16. (c)
17. (b)	18. (a)	19. (b)	20. (b)	21. (b)	22. (c)	23. (d)	24. (d)
25. (c)	26. (d)	27. (a)	28. (a)	29. (b)	30. (a)	31. (c)	32. (c)
33. (d)	34. (a)	35. (b)	36. (d)	37. (c)	38. (a)	39. (a)	40. (b)
41. (b)	42. (c)	43. (b)	44. (a)	45. (c)	46. (c)	47. (b)	48. (a)
49. (a)	50. (d)	51. (d)	52. (d)	53. (b)	54. (c)	55. (a)	56. (b)
57. (a)	58. (d)	59. (d)	60. (c)	61. (b)	62. (c)	63. (a)	64. (c)
65. (b)	66. (d)	67. (c)	68. (a)	69. (b)	70. (d)	71. (c)	72. (b)
73. (a)	74. (b)	75. (d)	76. (c)	77. (d)	78. (a)	79. (b)	80. (c)
81. (a)	82. (b)	83. (c)	84. (d)	85. (b)	86. (a)	87. (c)	88. (d)
89. (b)	90. (d)	91. (a)	92. (c)	93. (a)	94. (b)	95. (b)	96. (d)
97. (a)	98. (b)	99. (a)	100. (c)	101. (d)	102. (b)	103. (d)	104. (c)
105. (b)	106. (a)	107. (b)	108. (d)	109. (a)	110. (c)	111. (b)	112. (d)
113. (c)	114. (a)	115. (a)	116. (b)	117. (c)	118. (d)	119. (b)	120. (a)
121. (c)	122. (a)	123. (d)	124. (c)	125. (b)	126. (a)	127. (a)	128. (c)
129. (d)	130. (a)	131. (c)	132. (d)	133. (b)	134. (d)	135. (c)	136. (a)
137. (a)	138. (b)	139. (a)	140. (b)	141. (c)	142. (a)	143. (a)	144. (b)
145. (d)	146. (a)	147. (a)	148. (c)	149. (b)	150. (a)	151. (b)	152. (d)
153. (c)	154. (a)	155. (b)					

Short / Detailed Answer Questions

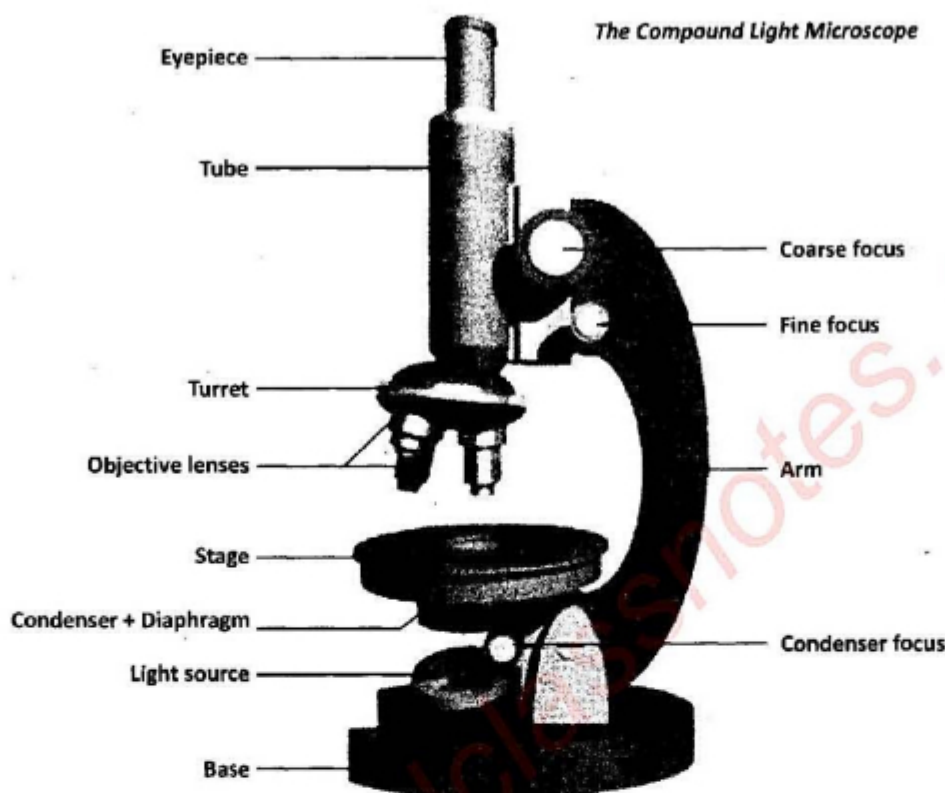
Q.1 What is Cell?

Ans: **Cell:** "All living organisms are composed of cells. It is the basic structural and functional unit of life. It is a set of organelles made up of proteins, carbohydrates, lipids and nucleic acids."

Q.2 What is a microscope? How many parameters are important in microscopy?

Ans: **Microscope:** Microscopes are instruments designed to produce magnified visual or photographic images of objects too small to be seen with the naked eye.

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)



Important Parameters in Microscopy: There are two parameters especially important in microscopy; magnification and resolution.

Magnification: The enlargement of an image is called magnification. By combining a number of lenses in the correct manner, a microscope can be produced that will yield very high magnification values.

Resolution: The resolution of a microscope is defined as the smallest distance between two points on a specimen that can still be distinguished as two objects. It helps to measure clarity of object.

Both magnification and resolution are very important if we want a clear picture of something less than 0.1. For example, if a microscope has high magnification but low resolution, all we'll get is a bigger version of a blurry image.

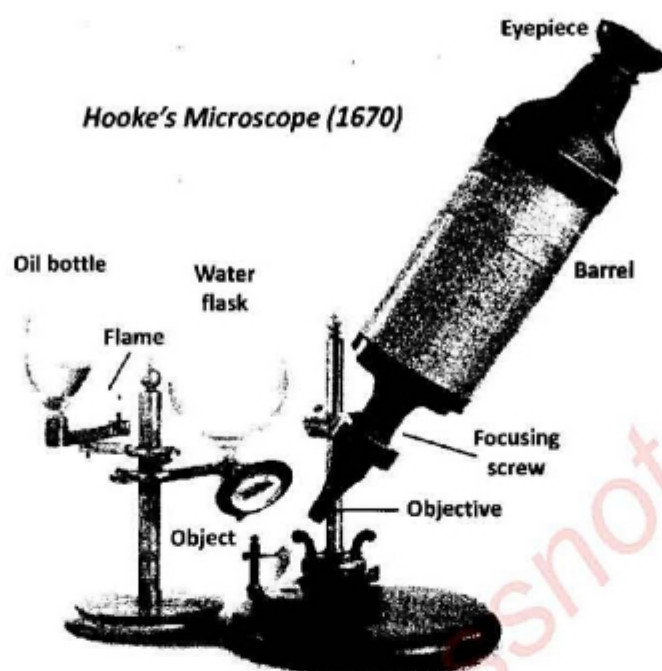
Q.3 Who invented the microscope?

Ans: Zacharias Janssen is generally believed to be the first investigator to invent the compound microscope in the 1590. It was simply a tube with lenses at each end and its magnification ranged from 3X to 9X.



BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

=====



Robert Hooke had improved his version of the compound microscope to observe organisms.

Q.4 Describe the types of microscope.

Ans: **Types of Microscope:** There are two types of microscope are used in microscopy:

- (i) light microscope (LM)
- (ii) electron microscope (EM)

(i) Light Microscope: In a light microscope, visible light passes through the specimen. The magnification of a light microscope is formed by using a mixture of the powers of the eye piece and the objective lens.

(ii) Electron Microscope: Electron microscope differs from light microscope, that they produce an image of a specimen by using a beam of electrons rather than a beam of light. Electrons have a much shorter wavelength than visible light, and this allows electron microscopes to produce higher resolution images than standard light microscopes. Electron microscopes can be used to examine not just whole cells, but also the subcellular structures and compartments within them. A live cell cannot be imaged by electron microscope.

Electron microscope has a resolution as small as 0.2 nanometer (nm) and magnification upto 250,000 times. There are two major types of electron microscopes.

- (a) Scanning electron microscopy (SEM)
- (b) Transmission electron microscopy (TEM)

(a) Scanning Electron Microscopy (SEM): In scanning electron microscopy, a beam of electrons moves back and forth across the surface of a cell or tissue, creating a detailed



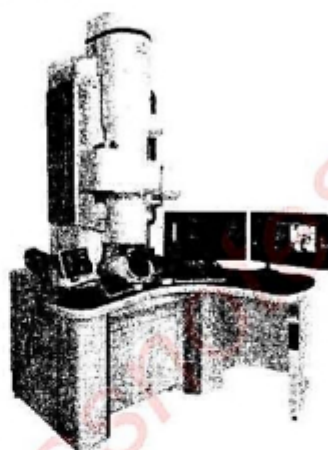
BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

image of the 3D surface.

(b) Transmission Electron Microscopy (TEM): In transmission electron microscopy, in contrast, the sample is cut into extremely thin slices before imaging, and the electron beam passes through the slice rather than skimming over its surface. TEM is often used to obtain detailed images of the internal structures of cells.



Mosquito face under electron Microscope



Electron Microscope

Q.5 Define the following terms:

- (i) Specimen (ii) Micrograph

Ans: (i) **Specimen:** It is a biological sample we are looking at.

(ii) **Micrograph:** A photograph of an image taken through a microscope is called micrograph.

Q.6 How can we calculate the total magnification of a compound light microscope?

Ans: In order to ascertain total magnification when viewing an image with a compound light microscope, take the power of the objective lenses, which is at 4x, 10x, 40x and multiply it by the power of the eye piece which is typically 10x. Therefore, a 10x eyepiece used with a 10x objective lens will produce a magnification of 100x. This means that the object can be magnified, 40x, 100x or 400x.

Q.7 Write the differences between light microscope and electron microscope.

Ans:

Light Microscope		Electron Microscope	
Source of Illumination			
1.	These microscopes use visible light as the source of illumination.	These microscopes use a beam of electrons as a source of illumination.	
Means of Magnification			
2.	Light microscope uses glass lenses for magnification.	It uses electromagnetic lenses instead of glass lenses.	
Image			
3.	The image of the specimen is projected into the human eye.	The image cannot focus in human eye, therefore, screen or photographic plates are used to review and focus the image.	

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Resolution	
4.	It achieves a resolution above 0.2m.
	It achieves a resolution of about 0.2nm, a thousand times improvement over light microscope.

Q.8 Compare resolution with magnification.

Ans:

Resolution	Magnification
1. Resolution is the capacity to separate adjacent objects.	Magnification is a means of increasing size of the object.
2. Resolution is maintained upto certain magnification.	By increasing magnification resolution is disturbed.
3. Resolution improves with the wave length of light.	Magnification improves with the focal length of the light.

Q.9 Describe the brief history of the development of cell theory.

Ans: **History of the Development of Cell Theory:** Ancient Greeks were the first to make comprehensive attempts to organize the data of the natural world. Aristotle presented an organized observation to support the idea that all animals and plants are somehow related. Later this idea gave rise to questions like 'is there a fundamental unit of structure shared by all organisms'? But before microscope was first used in 17th century, no one knew that living organisms do share a fundamental unit i.e. cell.

1665	Cell was first observed by Robert Hooke , an English scientist, discovered a honeycomb-like structure in a cork slice using a primitive compound microscope. He only saw cell walls as this was dead tissue. He coined the term "cell" for these individual compartments he saw.
1670	First living cells were seen by Anton van Leeuwenhoek , a Dutch biologist, from pond water with a microscope.
1683	Miniature animals: Anton van Leeuwenhoek made several more discoveries on a microscopic level, eventually publishing a letter to the Royal Society in which he included detailed drawings of what he saw. Among these was the first protozoa and bacteria discovered.
1833	The center of the cell was seen by Robert Brown , an English botanist, discovered the nucleus in plant cells.
1839	Cell theory: Theodor Schwann , a German botanist reached the conclusion that not only plants, but animals tissue as well is composed of cells. This ended debates that plants and animals were fundamentally different in structure. He also pulled together and organized previous statement on cells into one theory, which states: 1. Cells are organisms and all organisms consist of one or more cells. 2. The cell is the basic structure unit for all organisms.

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

1840	Albrecht von Roelliker discovered that sperm and eggs are also cells.
1845	Carl Heinrich Braun reworked the cell theory, calling cells the basic unit of life.
1855	3rd part to the cell theory added by Rudolf Virchow , a German physiologist/ physician/ pathologist. Added that cell is not Denovo structure. This translates mean that all cells develop only from existing cells.
1862	Louis Pasteur was a French biologist; microbiologist and chemist provided the experimental proof of this idea.

Q.10 How and when cell was discovered?

Ans: Cell was first observed by **Robert Hooke**, an English scientist, discovered a honeycomb-like structure in a cork slice using a primitive compound microscope. He only saw cell walls as this was dead tissue. He found small honey comb like chambers called 'cellula' for these individual compartments he saw which were later called cell by him.



Q.11 Who discovered the nucleus?

Ans: In 1833, Robert Brown, an English botanist, discovered a spherical body called nucleus in the cell of orchids.

Q.12 Who proposed the cell theory? Explain the salient features of cell theory.

Ans: **Cell Theory:** One of the most important concepts in biology is that a cell is a basic structural and functional unit of living organisms. This is known as a cell theory and was proposed jointly by two scientists in 1839. A Belgian Botanist called Schleiden and the German zoologist called Schwann. In 1855 Rudolf Virchow, a German physicians proposed an important extension of cell theory-that all living cells arise from pre-existing.

The postulates of cell theory are:

- (i) All Living organisms are made of one or more cells.
- (ii) The cell is the fundamental unit of structure and function in all living organisms.
- (iii) The new cell is derived from pre-existing cells dividing into two by cell division.
- (iv) The cell contains the hereditary material which is passed from generation to generation.

Q.13 Define Sub-cellular and Acellular Particles.

Ans: **Sub-cellular and Acellular Particles:** According to the first principle of the cell theory all organisms are composed of one or more cells.

Viruses, prions and viroids are not composed of cells rather they are sub-cellular or acellular particles but do not run any metabolic activity inside them. As they show some characteristics of living organisms i.e. they can increase in number and can transmit their characteristics to the next generations.

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Sub-cellular Particles: They are particles smaller than the living cell and are found suspended in the cytosol (of a cell) like the nucleus, Golgi complex and the mitochondria.

Acellular Particles: While acellular particles/organisms are particles that do not have a cell like the viruses, viroids and prions. They are not alive/inactive outside a living environment but become active immediately they are inside a living environment (like a cell).

Q.14 Write a few lines about a cell.

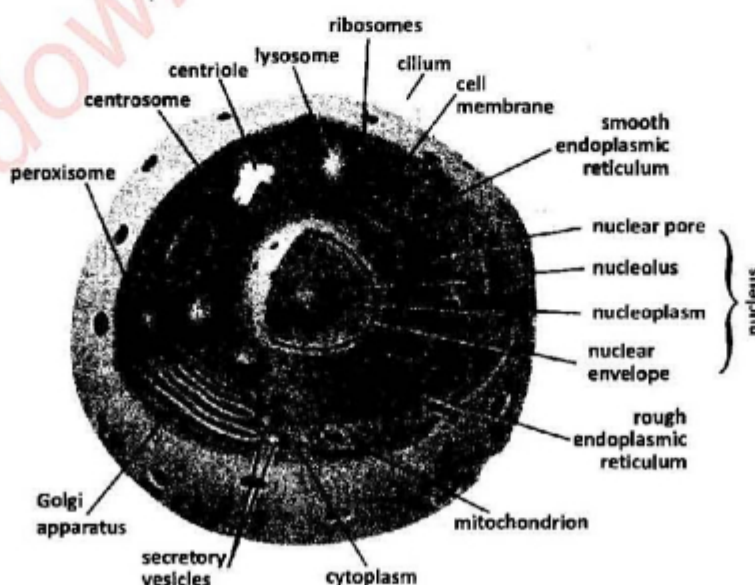
Ans: **Cell:** Cells are the basic units of organisms and all tissues and organs are composed of cells. There are different types of cells. Cells can either be prokaryotic or eukaryotic. Eukaryotic cells are eukaryotes. Plant cells are generally a cubical shape while animal cells are usually spherical. Plants cells and animal cells have evolved different organelles to perform specific functions.

The activity of an organism depends on the total activity of independent cells. Energy flow occurs in cells through the breakdown of carbohydrates by respiration. Cells contain the information necessary for the creation of new cells. This information is known as 'hereditary information' and is contained within DNA. DNA (the hereditary information of cells) is passed from 'parent' cells to 'daughter' cells during cell division.

The contents of cells from similar species are basically the same. Cells are the smallest form of life; the functional and structural units of all living things. Our body contains several billion cells, organized into over 200 major types, with hundreds of cell-specific functions. Some functions performed by cells are so vital to the existence of life that all cells perform them (e.g. cellular respiration). Others are highly specialized (e.g. Photosynthesis).

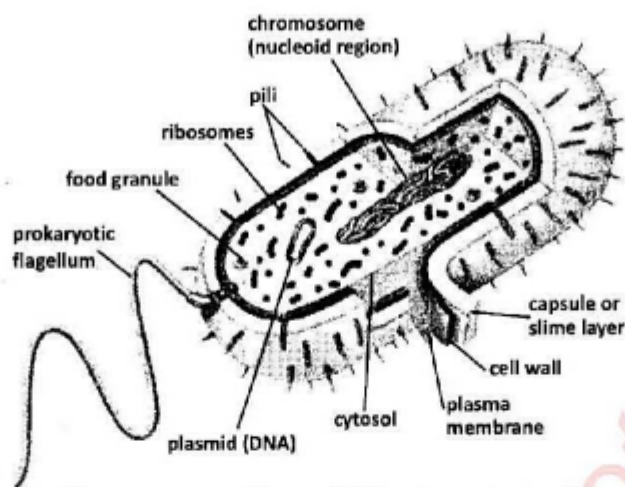
Q.15 How many types of cells are there? Name and define them.

Ans: **Prokaryotes:** Prokaryotes are organisms without a cell nucleus, or any other membrane bound organelles. Most are unicellular, but some prokaryotes are multicellular.



The structure of an animal (eukaryotes) cell

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)



The structure of bacterial (prokaryotes) cell

Eukaryotes: Eukaryotes are organisms whose cells are organized into complex structures by internal membranes and a cytoskeleton. The most characteristic membrane bound structure is the nucleus. Animals, plants, fungi, and protists are eukaryotes.

Q.16 Compare prokaryotes and eukaryotes in tabulated form.

Ans: Comparison between Prokaryotes and Eukaryotes:

Cellular Structures	Prokaryotic cell	Eukaryotic cell
Nucleus	Absent	Present
True Membrane Bound Nucleus	Absent	Present
Number of chromosomes	One--but not true chromosome: Plasmids	More than one
Number of cells	Usually unicellular (some cyanobacteria may be multicellular)	Usually multicellular but few are unicellular
Genetic Recombination	Partial, unidirectional transfers DNA	Meiosis and fusion of gametes
Lysosomes and Peroxisome	Absent	Present
Microtubules	Absent or rare	Present
Endoplasmic reticulum	Absent	Present
Mitochondria	Absent	Present
Cytoskeleton	May be absent	Present
Ribosomes	Smaller 70S	Larger 80S
Vesicles	Present	Present
Golgi Apparatus	Absent	Present
Chloroplasts	Absent (chlorophyll scattered in the cytoplasm)	Present in plants
Plasma membrane with steroid	Usually no	Yes

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Permeability of nuclear membrane	Not present	Selective
Vacuoles	Absent	Present
Cell Size	1-10 μm	1-100 μm
Cell Wall	Usually chemically complex	Only in plant cells and fungi (chemically simpler)
Flagella	Submicroscopic in size, composed of only one fiber	Microscopic in size; membrane bound
Example:	Bacteria and Cyanobacteria	Animals and plants

Q.17 Differentiate between prokaryotic and eukaryotic cell.

Ans:

	Prokaryotic Cell	Eukaryotic Cell
1.	Nuclear membrane is absent therefore prokaryotic cells do not possess distinct nucleus.	A double nuclear membrane is present. They have well defined nucleus.
2.	They do not have many membrane bound structures e.g. Mitochondria, endoplasmic Reticulum, Golgi apparatus etc.	They have membrane bounded structures (organelles).
3.	Ribosomes are of small size and freely scattered in cytoplasm.	Ribosomes are of large size and present either on endoplasmic reticulum or free in cytoplasm.
4.	Nucleoplasm is absent.	Nucleoplasm is present.
5.	Single chromosome is found.	Proper chromosomes in diploid numbers are present.
6.	Respiratory enzymes are located on the inner surface of the cell membrane.	Respiratory enzymes are present in mitochondria.
7.	These cells are simple and comparatively smaller in size i.e. average 0.5-10nm in diameter.	These cells are complex comparatively large in size i.e. 10-100nm in diameter average.
8.	Bacteria and cyanobacteria are examples of Prokaryotes.	Fungi, algae, animal and plants are examples of eukaryotes.

Q.18 Describe the cell as a structural and functional unit of life.

Ans: Cell as a Structural Unit:

- (i) All living organisms are composed of cells.
- (ii) Cells are the unit of structure of living organisms or the building block of which living things are made.
- (iii) Cells are of many different shape and sizes.

Cells as a Functional Unit:

- (i) Cells have to perform different functions.
- (ii) All basic functional activities, characteristics of living things occur in the cell.
- (iii) Therefore, cell is a unit of function of all living organisms.

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

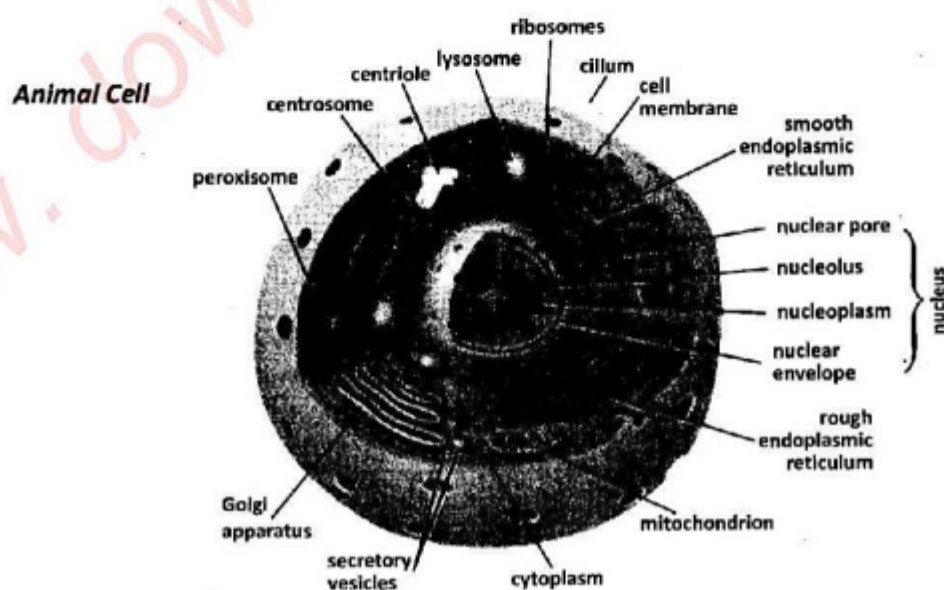
Q.19 Write the differences between plant cell and animal cell.

Ans: Difference Between Animal Cell and Plant Cell:

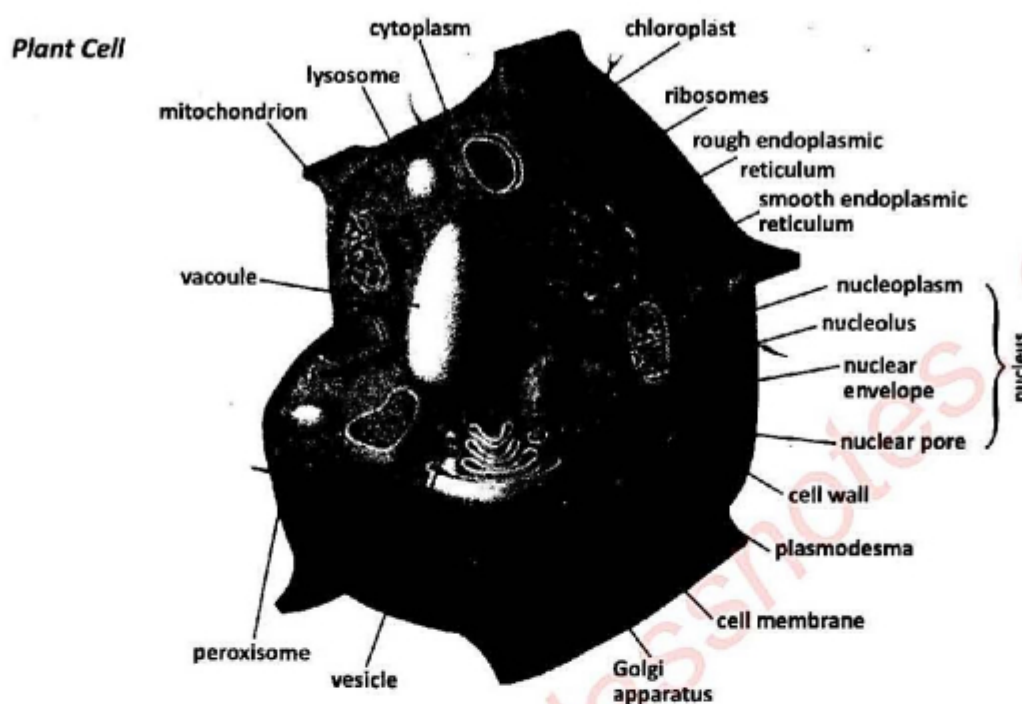
Animal Cell	Plant Cell
1. A cell wall is absent in animal cell but they have cell membrane which is made up of protein and lipid.	Plant cells have rigid cellulose cell wall in addition to the cell membrane.
2. Plastids are absent in animal cells.	Almost all plants cells contain plastids such as chloroplasts, chromoplasts and leucoplasts.
3. Animal cells usually have small vacuoles (if any).	Plant cells have a large central vacuole filled with cell sap in mature cells.
4. Centrosomes are present in animal cell which help in cell division.	Centrosomes are absent in plant cell.
5. The cytoplasm fills the cell.	Its cytoplasm is reduced to a thin lining.
6. Animals do not have plasmodesmata or pits.	Plant cells contain plasmodesmata or pits.
7. Nucleus is generally found at the centre of the cytoplasm.	Nucleus if found near the edge or periphery of the mature cell.
8. Animal cells possess lysosomes which contain enzymes that digest cellular macromolecules.	Plant cells rarely contain lysosomes as the plant vacuole handles molecule degradation.
9. Animal cells contain these cylindrical structures that organize the assembly of microtubules during cell division.	Plant cells do not typically contain centrioles.

Q.20 Draw and label plant cell and animal cell.

Ans:



BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)



Q.21 Name the organelles which are present in a typical cell.

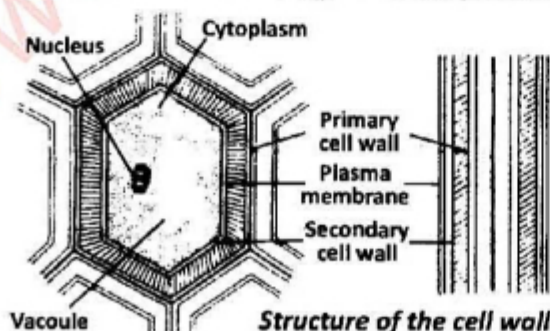
Ans: The organelles of a typical cell are:

1. Cell wall (only in plant cell)
2. Cell Membrane
3. Nucleus
4. Cytoplasm: It contains
 - (i) Mitochondria
 - (ii) Endoplasmic Reticulum
 - (iii) Golgi bodies
 - (iv) Ribosomes
 - (v) Centrioles (only in animal cell)
 - (vi) Plastids (only in plant cell)
 - (vii) Vacuoles

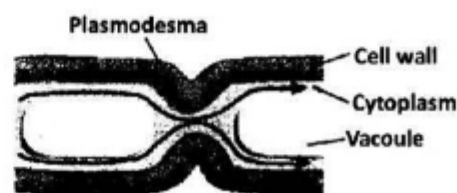
Q.22 Explain the structure and function of cell wall.

Ans: A cell wall is a tough, rigid non-living and permeable protective layer in some cell types. This outer covering is positioned next to the cell membrane (plasma membrane) in plant cells, fungi, algae and bacteria. The cell wall has many important functions in a cell including protection, structure and support.

Composition of Cell Wall: Cell wall composition varies depending on the organism. In plants, the cell wall is composed mainly of strong fibers of cellulose. Bacterial cell walls are composed of a sugar and amino acid called peptidoglycan. The main components of fungal cell walls are chitin, glucans and proteins. In plants, the wall is composed of cellulose.



Structure of the cell wall



Cell wall showing plasmodesma

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Structure of Cell Wall: It may consist up to three layers that help to support the plant. These layers include the middle lamella, the primary cell wall and the secondary cell wall.

Middle Lamella: It separates one cell from another. It is a thin membranous layer on the outer side of the cell and is made of a sticky substance called pectin and cellulose.

Primary Cell Wall: It lies on the inside of the middle lamella and is mainly composed of cellulose.

Secondary Cell Wall: It lies alongside the cell membrane. It is made up of a thick and tough material of cellulose which is held together by a hard, water proof substance called lignin. It is only found in cells which provide mechanical support in plants, i.e. some cells of xylem like tracheid and vessel.

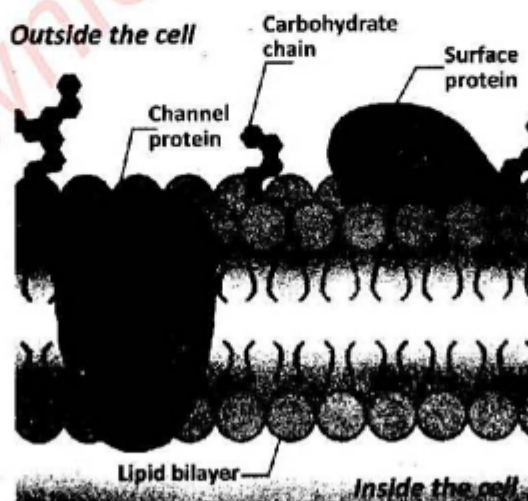
The opening in the cell wall is called plasmodesmata which contain strands of cytoplasm that connect adjacent cells. This allows cells to interact with one another, allowing molecules to travel between plant cells.

Functions of Cell Wall: The main function of the wall is to protect the inner parts of the plant cell, it gives plant cells a more uniform and regular shape and provides support for the plant body. The cell wall is completely permeable to water and mineral salts which allows distribution of nutrients throughout the plant.

Q.23 Explain the structure and function of cell membrane.

Ans: The cell membrane is the outer most living boundary of all cells. The cell membrane, also called the plasma membrane, physically separates the intracellular space (inside the cell) from the extracellular environment (outside the cell). The cell membrane surrounds and protects the cytoplasm.

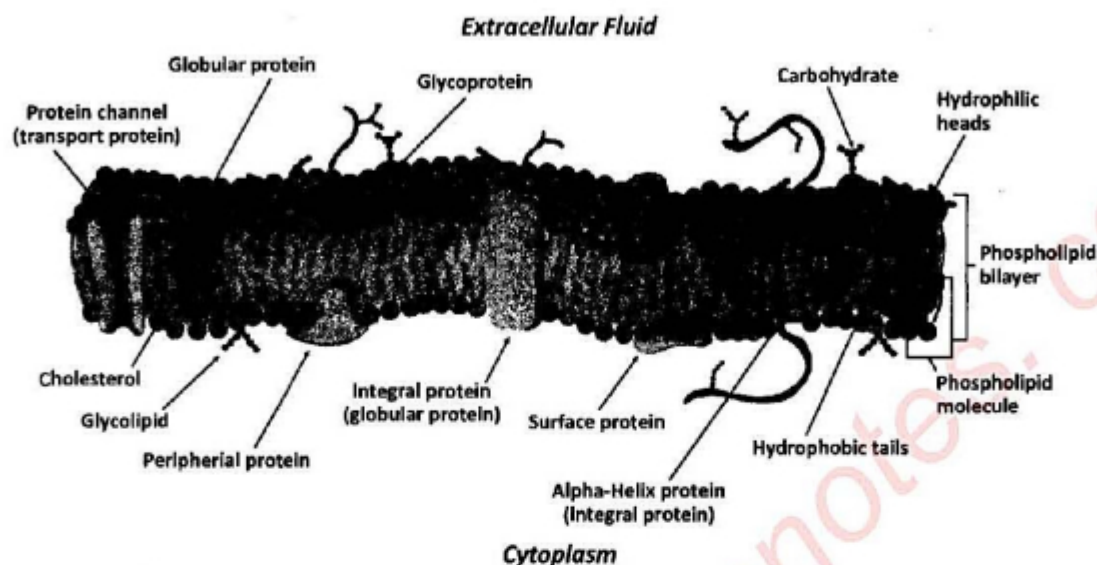
The cell membrane is composed of a double layer (bilayer) of special lipids called phospholipids.



Q.24 Describe the fluid mosaic model.

Ans: S. J. Singer and G. L. Nicolson proposed the Fluid Mosaic Model of the cell membrane in 1972. This model describes that phospholipids acting like matrix and conjugated glycoproteins (glucose and protein together) may float freely in this matrix.

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)



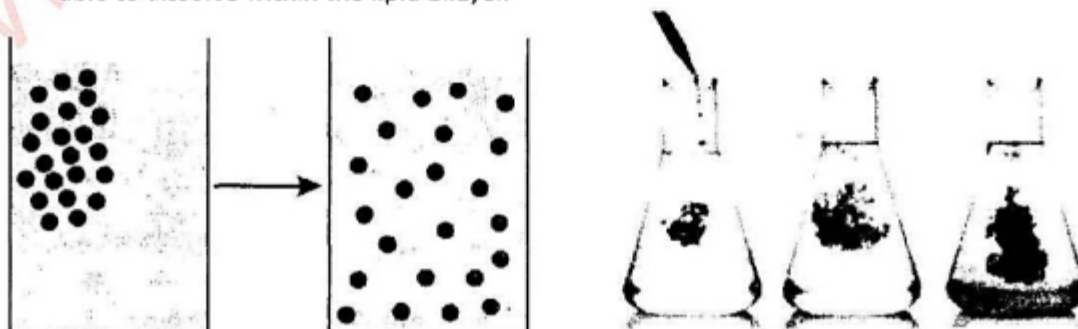
This model describes the structure of the cell membrane as a fluid structure with various protein and carbohydrate components floating freely in the membrane. All the exchange between the cell and its environment have to pass through the cell membrane. The cell membrane is selectively permeable to ions (e.g. hydrogen, sodium), small molecules (oxygen, carbon dioxide) and larger molecules (glucose and amino acids) and controls the movement of substances in and out of the cells. It performs many important functions within the cell such as osmosis, diffusion, transport of nutrients into the cell, processes of ingestion and secretion.

Q.25 How does movement across the cell membrane occur?

Ans: Movement Across the Membrane: Movement of substances across cell membranes is necessary as it allows cells to acquire oxygen and nutrients, excrete waste products and control the concentration of required substances in the cell (e.g. oxygen, water, hormones, ions, etc). This movement occurs by diffusion, osmosis, facilitated diffusion and active transport.

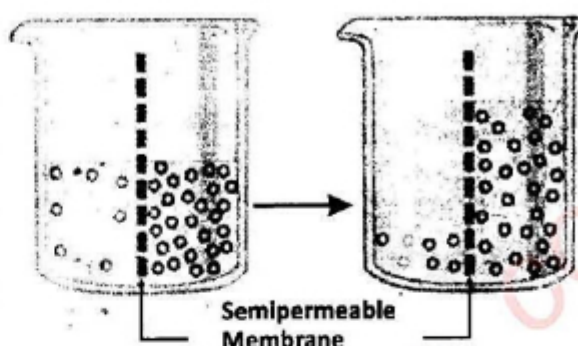
Diffusion: Diffusion is the movement of substance from a region of high concentration to low concentration. It is therefore said to occur down a concentration gradient. Diffusion is a passive process which means it does not require any energy input. It can occur across a living or non-living membrane and can occur in a liquid or gas medium.

Examples: Diffusion of carbon dioxide, oxygen, water and other small molecules those are able to dissolve within the lipid bilayer.

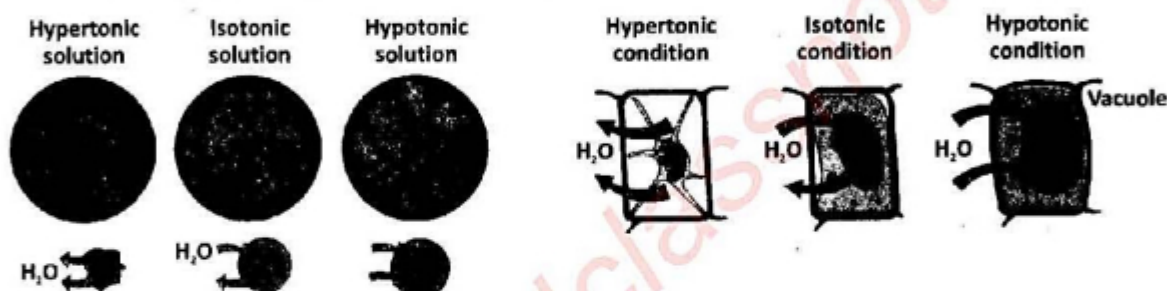


BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Osmosis: Movement of water always occurs down a concentration gradient, i.e., from dilute solution of concentrated solution. Osmosis is also passive process and does not require any input of energy. Cell membranes allow molecules of water to pass through, but they do not allow molecules of most dissolved substance, e.g. salt and sugar, to pass through it.



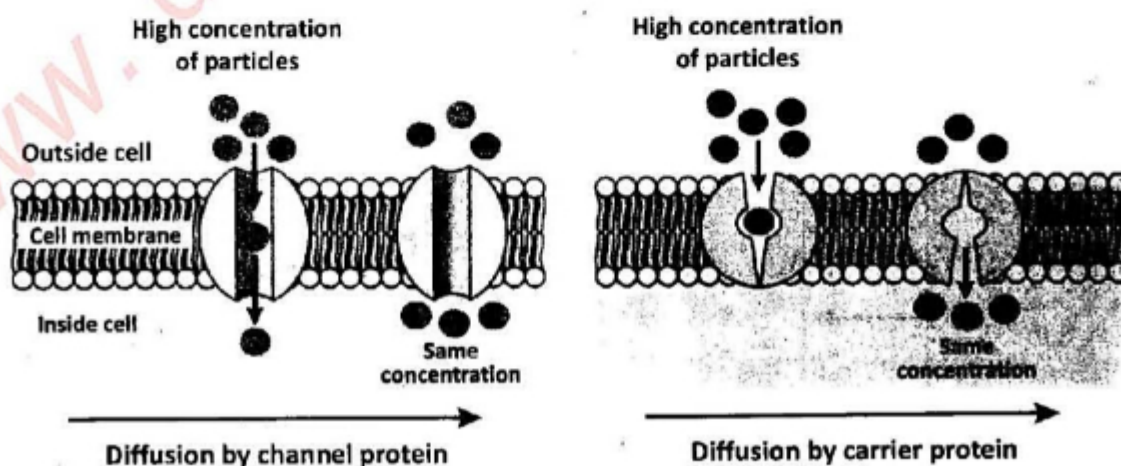
In biological systems, osmosis is vital to plant and animal cell survival. Following figure demonstrates how osmosis affects red blood cells and plant cell, when they are placed in three different solutions with different concentrations.



Plant cells use osmosis to absorb water from the soil and transport it to the leaves. In hypertonic conditions a plant cell loses water and cytoplasm shrinks and shrinkage of cytoplasm called plasmolysis. Osmosis in the kidneys keeps the water and salt levels in the body and blood at the correct levels.

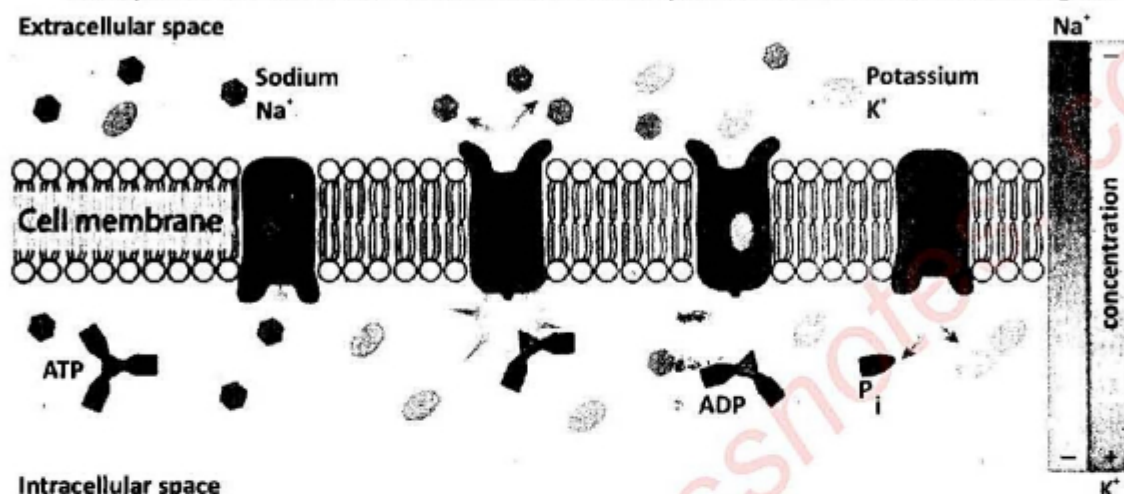
Facilitated Diffusion: Facilitated diffusion is a special form of diffusion which allows rapid exchange of specific substance. Particles are taken up by carrier proteins which change their shape as a result. The change in shape causes the particles to be released on the other side of the membrane.

Movement of particles from high to low concentration using a protein



BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Active Transport: Active transport is the movement of substance against a concentration gradient, from a region of low concentration to high concentration using an input of energy. In biological systems, the form in which this energy occurs is adenosine triphosphate (ATP). Examples of substance moved include sodium and potassium ions as shown in the figure.



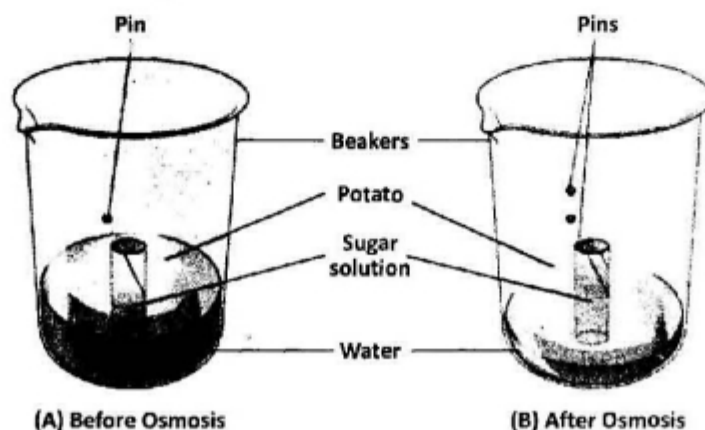
ATP and ADP are molecules involved with moving energy within cells.

Activity: Predicting the direction of osmosis apparatus:

- * Beaker
- * Large potato
- * Potato peeler/scalpel
- * Pins
- * Concentrated sucrose/sugar solution. To obtain this, add 100g of sugar to 200ml of water

Procedure:

1. Peel off the skin of a large sized potato with a scalpel/potato peeler.
2. Cut is one end to make the base flat.
3. Make a hollow cavity in the potato almost to the bottom of the potato.
4. Add the concentrated sugar solution into the cavity of the potato, filling it about half way. Mark the level by inserting a pin at the level of the sugar solution (insert the pin at an angle into the cavity at the level)(A).
5. Carefully place the potato in the beaker containing water.
6. Observe what happens to the level of the sugar solution in the potato.
7. After 15 to 20 minutes, mark the level by inserting the second pin at the level of the sugar solution (insert as the first pin)(B).



BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Question:

1. What do you observe happening to the level of the solution inside the potato?
2. What conclusion can you draw based on your observation?
3. What conditions were met in this experiment that makes this type of transport different to diffusion?

Q.26 Describe the composition and function of cytoplasm.

Ans: **Cytoplasm:** The cytoplasm is the jelly-like substance that fills the cell. It consists of up to 90% water. It also contains dissolved nutrients and waste products.

Functions: Its main function is to hold together the organelles which make up the cytoplasm. It also nourishes the cell by supplying it with salts and sugars and provides a medium for metabolic reactions to occur.

Q.27 What is the composition and function of cytoskeleton?

Ans: **Cytoskeleton:** A microscopic network of protein consists of microtubules and various filaments that spread out through are cytoplasm. Microtubules are made of tubulin while filaments made up of active protein.

Function: It provides both structural support and means of transport within the cell.

Q.28 Write a note on nucleus.

Ans: **Nucleus or Karyon:** It is the most important, the largest and visible organelle of a cell. It is present in the centre of the animal cell. It contains the entire cell's genetic information in the form of DNA. The presence of a nucleus is the primary factor that distinguishes eukaryotes from prokaryotes. It consists of the following four parts:

- | | |
|----------------------|------------------|
| (i) Nuclear Membrane | (ii) Nucleoplasm |
| (iii) Nucleolus | (iv) Chromosome |

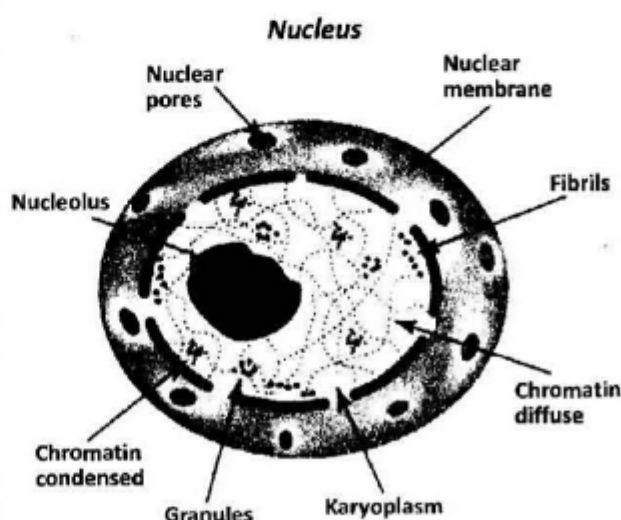
(i) **Nuclear Membrane:** Nucleus is covered by two phospholipids membranes known as nuclear envelope that separates the nucleus and its contents from the cytoplasm. Nuclear pores are found in the nuclear envelope and help to regulate the exchange of materials (such as RNA and proteins) between the nucleus and the cytoplasm.

Function: Various materials diffuse in and out of the nucleus through this membrane.

(ii) **Nucleoplasm:** Inside nuclear envelope, granular fluid is present called nucleoplasm. It contains nucleoli and a network of thread like structures called chromatin network.

The genetic material is found in chromatin network.

Function: It has few complex and important materials which help in the synthesis of DNA and RNA.



BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

(iii) **Nucleolus:** In nucleus an aggregation of RNA is also present called nucleolus. It is a small rounded body. It has no membrane.

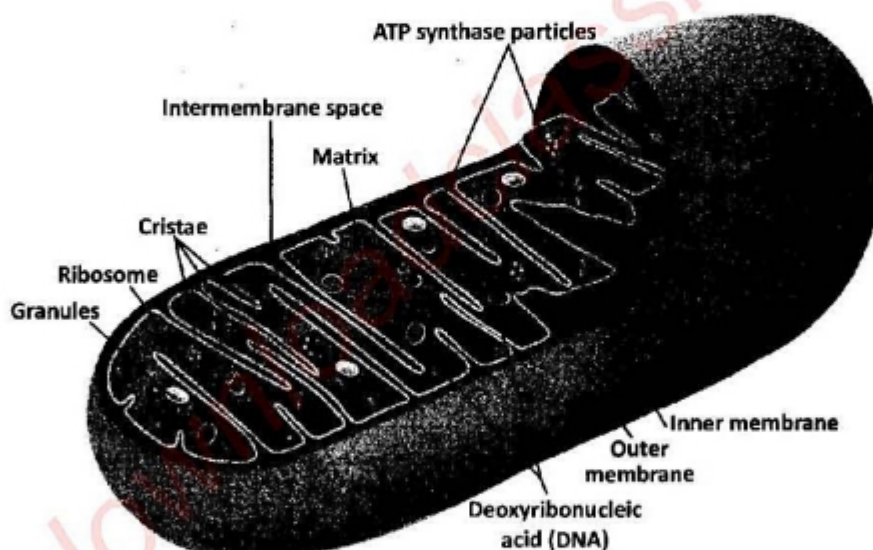
(iv) **Chromosomes:** They are large, elongated and thread like structures. They are composed of Deoxyribonucleic Acid (DNA) and protein. The number of chromosomes in the cells of all individuals of the same species always remains the same.

Function: They play significant role in the inheritance of characters as well as in controlling or regulating the cell activities.

Q.29 Explain the structure and function of mitochondria.

Ans: **Mitochondria (Singular; Mitochondrion):** A mitochondrion is a membrane bound organelle found in eukaryotic cells. Mitochondria contain two phospholipid bilayers: there is an outer membrane, and an inner membrane. The inner membrane contains many folds called cristae which contain specialized membrane proteins that enable the mitochondria to synthesize ATP. Inside the inner membrane is a jelly-like fluid called matrix.

Function: Mitochondria play an important role in respiration. They contain enzymes which break the food for the production of energy.



Q.30 Why mitochondria is also called power house of cell?

Ans: Mitochondria is the site of aerobic respiration. During aerobic respiration energy is produced in the form of ATP. Therefore the mitochondria is also called "Power house" of cell.

Q.31 Write a note on Endoplasmic Reticulum.

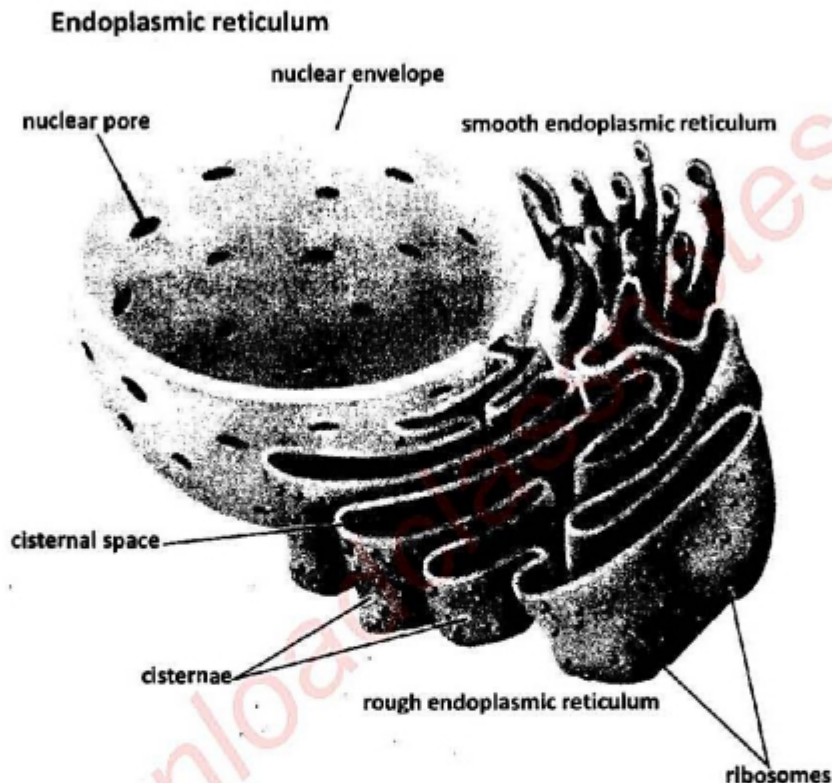
Ans: **Endoplasmic Reticulum:** The endoplasmic reticulum (ER) is an organelle found in eukaryotic cells only. The ER has a double membrane consisting of a network of hollow tubes, flattened sheets and round sacs. These flattened, hollow folds and sacs are called cisternae. The ER is located in the cytoplasm and is connected to the nuclear envelope. There are two types of endoplasmic reticulum: smooth and rough ER.

Smooth Endoplasmic Reticulum: It does not have any ribosomes attached. It is involved in the synthesis of lipids, including oils, phospholipids and steroids. It is also responsible for

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

metabolism of carbohydrates, regulation of calcium concentration and detoxification.

Rough Endoplasmic Reticulum: It is covered with ribosomes giving the endoplasmic reticulum its rough appearance. It is responsible for protein synthesis and plays a role in membrane production. The folds present in the membrane increase the surface area allowing more ribosomes to be present on the ER, thereby allowing greater protein production.

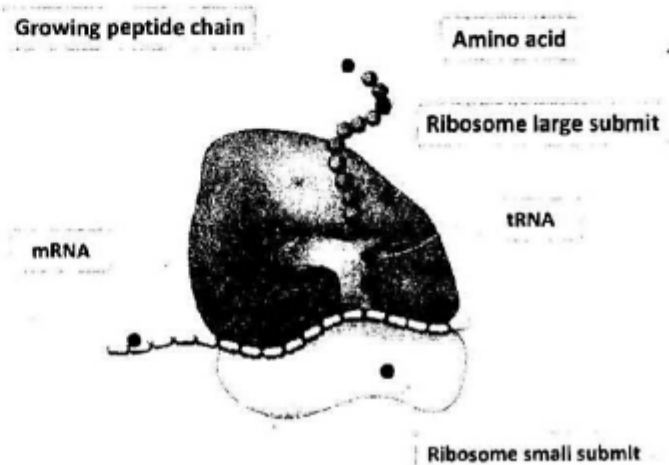


Q.32 Describe the structure and function of Ribosomes.

Ans: **Ribosomes:** They are tiny granular structures which are not bounded by membrane. They are composed of RNA and protein. Ribosomes may occur singly in the cytoplasm or in groups or may be attached to the endoplasmic reticulum thus forming the rough endoplasmic reticulum.

Function: They occur in the cytoplasm and are the sites where protein synthesis occurs. Therefore, they are called protein factories of the cell.

Diagram of a ribosome



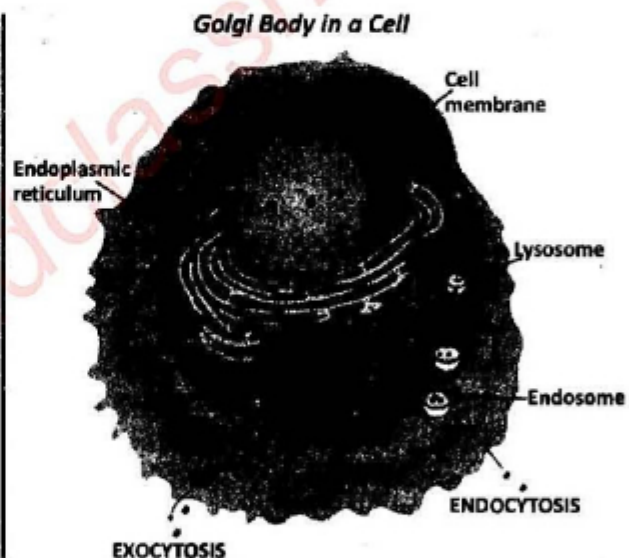
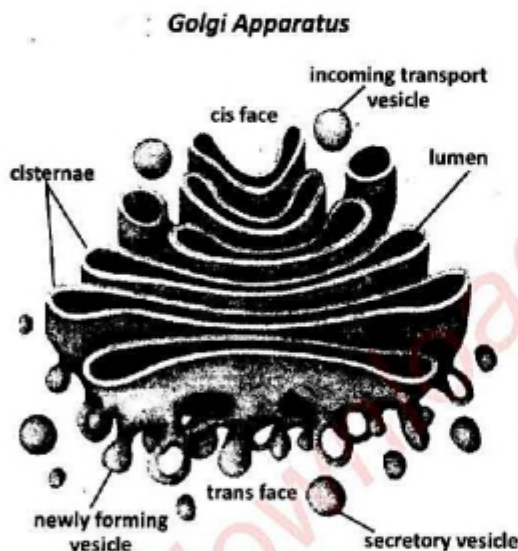
BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Q.33 Write a note on Golgi Body.

Ans: **Golgi Body:** The Golgi body was discovered by the Italian physician Camillo Golgi. It was one of the first organelles to be discovered and described in detail because its large size made it easier to observe. It is important for proteins to be transported through Golgi body from where they are synthesized to where they are required in the cell. The Golgi body is the sorting organelle of the cell.

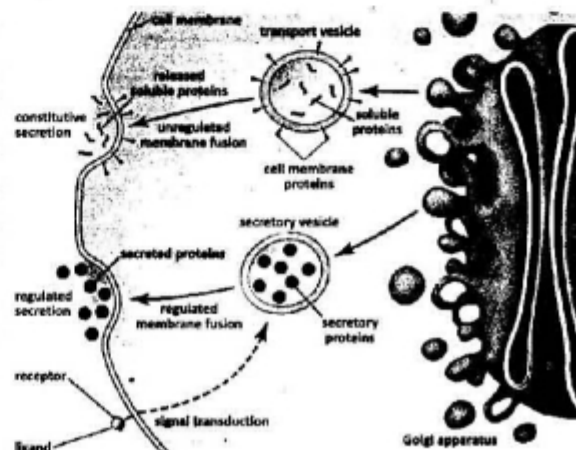
The Golgi body consists of a stack of flat membrane-bound sacs called cisternae. The cisternae within the Golgi body consist of enzymes which modify the packaged products of the Golgi body.

Function: Proteins are transported from the rough endoplasmic reticulum (RER) to the Golgi. In the Golgi, proteins are modified and packaged into vesicle. The Golgi body therefore receives proteins made in one location in the cell and transfers these to another location within the cell where they are required. For this reason the Golgi body can be considered to be the 'post office' of the cell.



Q.34 What do you know about vesicles?

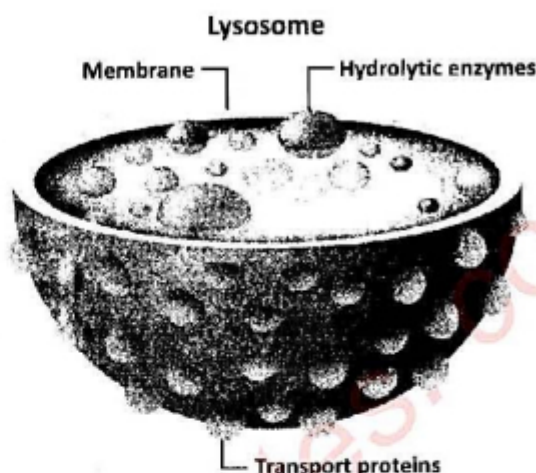
Ans: **Vesicles:** They are small, membrane bound spherical sacs which facilitate the metabolism, transport and storage of molecules. Many vesicles are made in the Golgi body and the endoplasmic reticulum, or are made from parts of the cell membrane. Vesicles can be classified according to their contents and function. Transport vesicles transport molecules within the cell.



BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Q.35 Write few lines about Lysosomes.

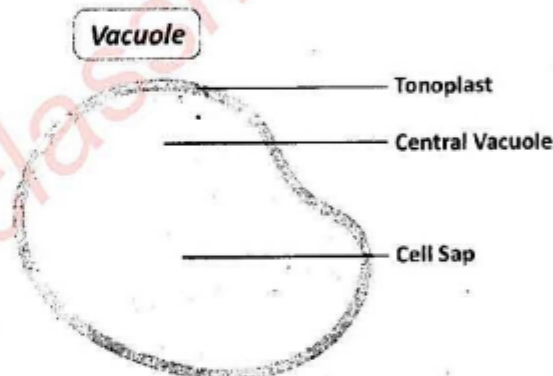
Ans: **Lysosomes:** They are formed by the Golgi body and contain powerful digestive enzymes that can potentially digest the cell. These powerful enzymes can digest cell structures and food molecules such as carbohydrates and proteins. Lysosomes are abundant in animal cells that ingest food through food vacuoles. When a cell dies, the lysosome releases its enzymes and digests the cell.



Q.36 Explain the structure and function of Vacuoles.

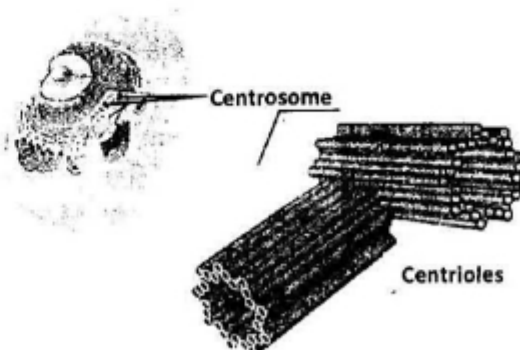
Ans: **Vacuoles:** Vacuoles are fluid-filled spaces that occur in the cytoplasm of plant cells, but are very small or completely absent in animal cells. Plant cells generally have one large vacuole that takes up most of the cell's volume in mature cell. A selectively permeable boundary called the tonoplast, surround the vacuole. The vacuole contains cell sap which is a liquid consisting of water, mineral salts, sugars and amino acids.

Function: The vacuole plays an important role in hydrolysis, excretion of cellular waste, storage of water, organic and inorganic substances.



Q.37 Explain the structure and function of centrioles.

Ans: **Centrioles:** Animal cells contain a special organelle called a centriole. The centriole is a cylindrical tube-like structure that is composed of 27 microtubules arranged in a very particular pattern of triplets in rows. The site where two centrioles arranged perpendicular to each other are referred to as a centrosome. The centrosome plays a very important role in cell division. The centrioles are responsible for organizing the microtubules that position the chromosomes in the correct location during cell division.



Q.38 Define Plastids and its types.

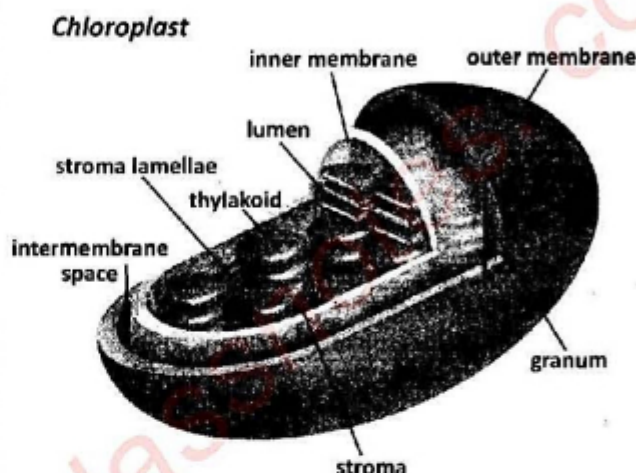
Ans: **Plastids:** Plastids are large cytoplasmic and major organelles found in the cells of plants and

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

algae. Plastids are the site of manufacture and storage of important chemical compounds used by the cell. Plastids often contain pigments used in photosynthesis, and the types of pigments present can change or determine the cell's colour. There are different types of plastids:

- (i) Chloroplast (ii) Chromoplast (iii) Leucoplast

(i) **Chloroplasts:** This is the most important type of plastid. Green-coloured plastids found in plants and algae. These are present in the green parts of the plant particularly in leaves. The chloroplast is a double-membraned organelle. Within the double membrane is a gel-like substance called stroma. Stroma contains enzymes for photosynthesis. Suspended in the stroma are stack like structures called grana (singular=granum). Each granum is a stack of thylakoid discs. The chlorophyll molecules (green pigments) are found on the surface of the thylakoid discs.



Function: Chlorophyll absorbs energy from the sun for photosynthesis and manufacture carbohydrates by the process of photosynthesis.

(ii) **Chromoplasts:** They have coloured pigments other than green such as red, orange or yellow. These are present in the petals of the flower, in the ripened fruit pigments, flowers of autumn leaves and other coloured parts of plant.

Function: Their function is to help the plant in pollination and dispersal of fruits.

(iii) **Leucoplasts:** They are colourless, triangular and tabular or of any other shape plastids. They are found in the cells of underground parts of plants.

Function: They store food in roots in the form of starch.

Q.39 Why iodine used to stain the onion peel?

Ans: Iodine is often used to stain onion cells before microscopic examination to enhance the visibility of the cells. It is used in staining cells of an onion peel on the slide due to following reason.

- Onion bulb is made up of scaly leaves which store starch granules in their cytoplasm of the cells.
- Iodine binds to starch in the granules and develops blue black colour.
- This procedure of staining onion cells with iodine makes the onion cells visible clearly. It also confirms the fact that onion stores reserve food material in the form of starch.

Q.40 Why cell membrane is semipermeable in nature?

Ans: Plants and animals are made up of cells. It is here that we find the most common example of a semipermeable membrane in action - a process called osmosis. Cells are surrounded by membranes. These membranes are made up of phospholipids (a type of lipid or fat) and proteins. Cell membranes are semipermeable, which means molecules can move through them. This is pretty important for cells to survive.

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Q.41 What is the difference between cell wall and cell membrane?

Ans:

Cell Wall		Cell Membrane
Definition		
1.	It is the outer most boundary of plant cells, bacterial cells and fungal cells.	It is the membrane which surrounds cytoplasm, but in plant cell it is surrounded by cell wall.
Chemical Composition		
2.	It is mainly composed of cellulose and pectin.	It is mainly composed of lipids and proteins.
Structure		
3.	It is made up of three main layers primary wall, middle lamella, secondary wall.	It is made up of protein and lipid bilayer in which protein molecules float.
Type of Membrane		
4.	It is permeable membrane. It gives definite shape and rigidity to plant.	It is selectively permeable membrane. In animal cells infolds of cell membrane take in materials in the form of vacuole.

Q.42 Write the differences between Mitochondria and Plastids.

Ans:

Mitochondria		Plastids	
1.	Mitochondria are found in both animal and plant cells.	Plastids are found in the cells of higher plants.	
2.	They do not contain pigments.	They contain different types of pigments.	
3.	They produce energy.	They capture (use) energy.	
4.	They contain enzymes which break the food.	They do not contain enzymes.	
5.	They help in respiration.	They help in photosynthesis.	
6.	They have no types.	There are three types of plastids.	

Q.43 Distinguish between Lysosome and Ribosomes.

Ans: Difference between Lysosome and Ribosome.

Ribosomes		Lysosomes	
They are found in both prokaryotic and eukaryotic cells (plant and animal cells).		They are found only in eukaryotic cells or animal cells.	
It is not enclosed by a membrane.		It is enclosed by a membrane.	

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

It is comparatively smaller in size than lysosomes, its size ranges from 20 to 30 nm.	It is larger in size than ribosomes, its size ranges from 0.1 to 1.2 micrometer.
It is made of rRNA and ribosomal proteins.	It is made of membrane proteins and digestive enzymes.
It can be found in the cytoplasm either bound to the endoplasmic reticulum or scattered in the cytoplasm.	It is evenly distributed in the cytoplasm.
It has two subunits: small and large subunit.	It lacks the segments.
It is actively involved in the translation of mRNAs.	It is involved in intracellular digestion.
It is a macromolecule.	It is a cell organelle.
It plays an important role in protein synthesis.	It plays an important role in intracellular digestion and destroys the dead cells.

Q.44 Explain cell size and shape and relate them with its surface area and volume ratio.

Ans: **Volume Ratio:** Cells are microscopic mostly because of this constraint; there are some physiological limits to how big a cell can grow. The scale, or size of a cell compared to other objects, is incredibly small.

The smallest cells are bacteria called mycoplasmas, with diameter between 0.1µm to 1.0µm. the bulkiest cells are bird eggs, and the longest cells are some muscle cells and nerve cells. Most cells lie between these extremes. Cell size and shape are related to cell function. Bird eggs are bulky because they contain a large amount of nutrient for the developing young. Long muscle cells are efficient in pulling different body parts together. Lengthy nerve cells can transmit messages between different parts of body. On the other hand, small cell size also has many benefits. For example human red blood cells are only 8 µm in diameter and therefore can move through our tiniest blood vessels i.e. capillaries. Most cells are small in size. In relation of their volumes, large cells have less surface area as compared to small cells. The given figure shows this relationship using cube-shaped cells. The figure shows 1 large cell and 27 small cells. In both cases, the total volume is same.

$$\text{Volume} = 30 \mu\text{m} \times 30 \mu\text{m} \times 30 \mu\text{m} = 27,000 \mu\text{m}^3$$

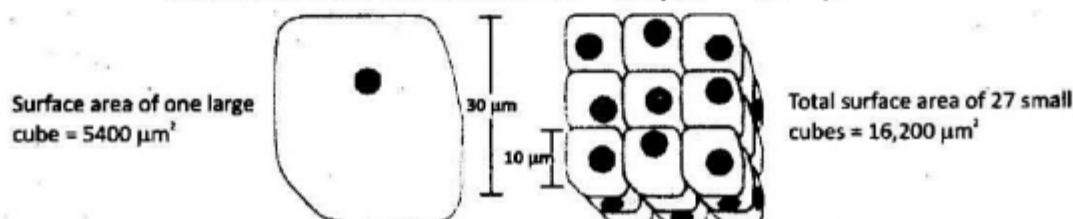
In contrast to the total volume, the total surface areas are very different. Because a cubical shape has 6 sides, its surface area is 6 times the area of 1 side.

The surface areas of cubes are as follows:

$$\text{Surface area of 1 large cube} = 6 \times (30 \mu\text{m} \times 30 \mu\text{m}) = 5400 \mu\text{m}^2$$

$$\text{Surface area of small cube} = 6 \times (10 \mu\text{m} \times 10 \mu\text{m}) = 600 \mu\text{m}^2$$

$$\text{Surface area of 27 small cubes} = 27 \times 600 \mu\text{m}^2 = 16,200 \mu\text{m}^2$$



BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

=====

Cell Size and Volume Ratio: Waste production and demand of nutrients are directly proportional to cell volume. Cell takes up nutrients and excretes waste through its surface cell membrane. So a large volume cell demands large surface area but as the figure shows, a large cell has a much smaller surface area relative to its volume than smaller cells have. Each internal region of the cell has to be served by part of the cell surface. As a cell grows bigger, its internal volume enlarges and the cell membrane expands. Unfortunately, the volume increases more rapidly than does the surface area, and so the relative amount of surface area available to pass materials to a unit volume of the cell steadily decreases. Hence we conclude that the membranes of small cells can serve their volumes more easily than the membrane of a large cell.

In life sciences it is important to note that whenever a structure has an increased surface area, there is an increase in the functioning of that structure.

Activity 1: Examining Plant Cells Under the Microscope:

To study the microscopic structures of plant cells.

Apparatus:

- | | | |
|---------------|-------------------------------|--------------------------|
| * Onion | * Blade | * Slides and cover slips |
| * Brushes | * Tissue paper | * Compound microscope |
| * Forceps | * Dropper | * Iodine solution |
| * Watch glass | * Petri dish containing water | |

Procedure:

1. Peel off the outer most layer of an onion carefully, using a pair of forceps.
2. Place the peeled layer in a watch glass containing water. Make certain that the onion peel does not roll or fold.
3. Using a scalpel or a thin blade, cut a square piece of the onion peel (about 1cm²).
4. Remove the thin transparent skin from the inside curve of a small piece of raw onion and place it on a drop of iodine solution on a clean slide.
5. Cover the peel with a cover slip ensuring that no bubbles are formed.
6. Using a piece of tissue paper wipe off any excess iodine solution remaining on the slide.
7. Observe the onion skin under low power of the microscope and then under high power.
8. Draw a neat diagram of 5-10 cells of the typical cells you can see.



Activity 2: Examining Animal Cells Under the Microscope:

To study the microscopic structures of human cheek cells under a compound microscope.

Apparatus:

- | | | | |
|--------------|----------------|------------------|--------------|
| * Cotton bud | * Clean slide | * Methylene blue | * Dropper |
| * Water | * Tissue paper | * Forceps | * Microscope |

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Procedure:

1. Place a drop of water on a clean glass slide.
2. Using a clean ear bud, wipe the inside of your cheek. The ear bud will collect a moist film.
3. Spread the moist film on a drop of water on a clean glass slide, creating a small smear on the slide.
4. Use a cover slip to cover the slide gently.
5. Place one or two drops of stain on the side of the cover slip.
6. Use a piece of tissue to remove the excess dye.
7. Observe the cheek cells under low power magnification and then under high power magnification.

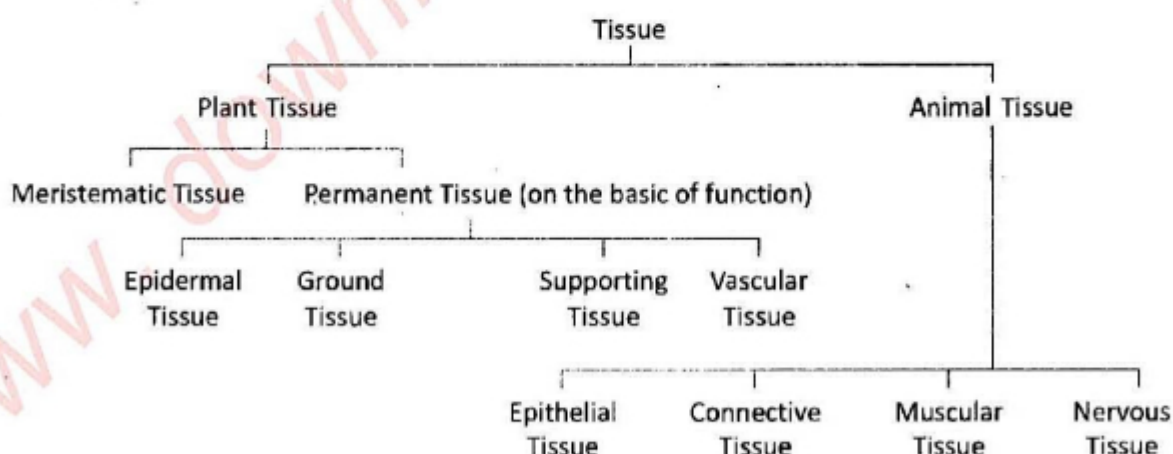


Questions:

1. What are the shapes of epidermal cells of onion peel and the human cheek cells?
2. Why is iodine used to stain the onion peel?
3. What is the difference between the arrangement of cells in onion cells and in human cheek cells?
4. Why is a cell considered the structural functional unit of living things?

Q.45 What is tissue? And mention the types of tissue.

Ans: Tissue: A group of cells which are similar in structure and function is called tissue.



Q.46 Name the types of animal tissues.

Ans: Animal Tissues: Humans and other large multicellular animals are made up of four basic types of tissue:

- | | |
|----------------------------|------------------------|
| (i) epithelial tissue | (ii) connective tissue |
| (iii) muscular tissue, and | (iv) nervous tissue. |

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Q.47 Describe the types of Epithelial Tissue in detail.

Ans: **Epithelial Tissue:** Epithelial tissue covers the surface of the body, lines the spaces inside the body and forms glands. For instance, the outer layer of our skin is an epithelial tissue and the lining of small intestine is made up of epithelial tissues.

Epithelial cells are polarized, means that they have a top and a bottom side.

There are different types of epithelial tissue depending on their function in a particular location. The simplest classification of these tissues is based on the number of cell layers.



Simple Epithelial Tissue: When the epithelium is composed of a single layer of cells, it is called simple epithelial tissue.

- (i) **Simple Squamous Epithelium:** It is found in the alveoli of lungs, and its structure is important for the exchange of gases between the blood and lungs.
- (ii) **Simple Cuboidal Epithelia:** They line the lumen of collecting ducts in the kidney and are present in the thyroid gland around the follicles that secrete thyroid hormones.
- (iii) **Simple Columnar Epithelia:** They are found in the female reproductive system and in the digestive tract.

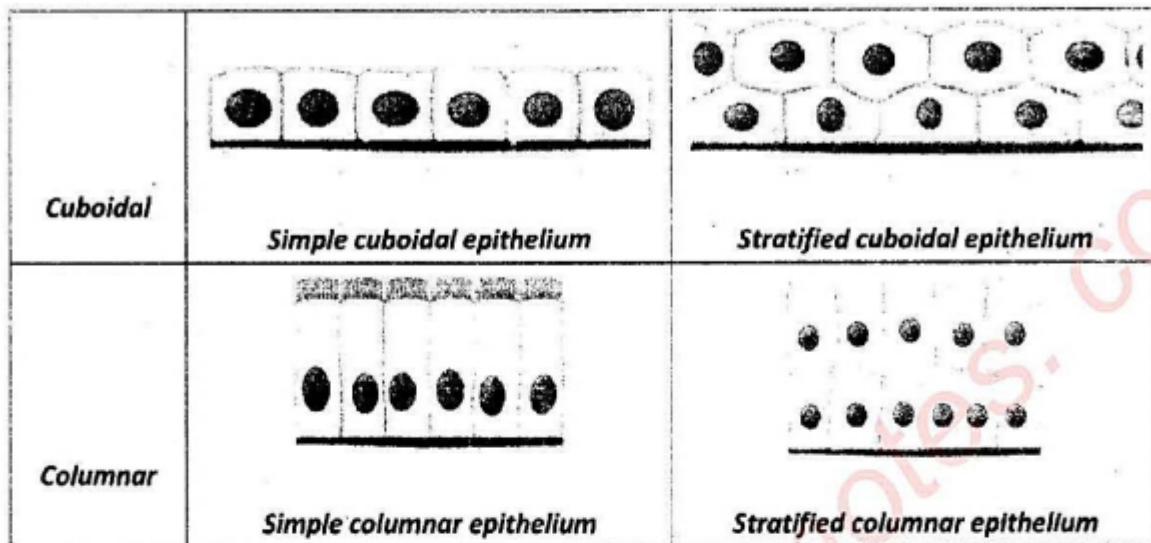
Stratified Epithelial Tissue: Stratified epithelia consist of more than one layer of cells and only one layer is in direct contact with the basement membrane.

- (i) **Stratified Squamous Epithelia:** They are found in skin, with many dead, keratinized cells providing protection against water and nutrient loss.
- (ii) **Stratified Cuboidal Epithelia:** They are found surrounding the ducts of many glands, including mammary glands in the breast and salivary glands in the mouth.
- (iii) **Stratified Columnar Epithelia:** They are a rare, found predominantly in some organs of the reproductive system.

Transitional Epithelia: They are a special subset of stratified epithelia. They are exclusively found in the excretory system.

	Simple	Stratified
Squamous	 Simple squamous epithelium	 Stratified squamous epithelium

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)



Q.48 Describe the Connective Tissue and its types.

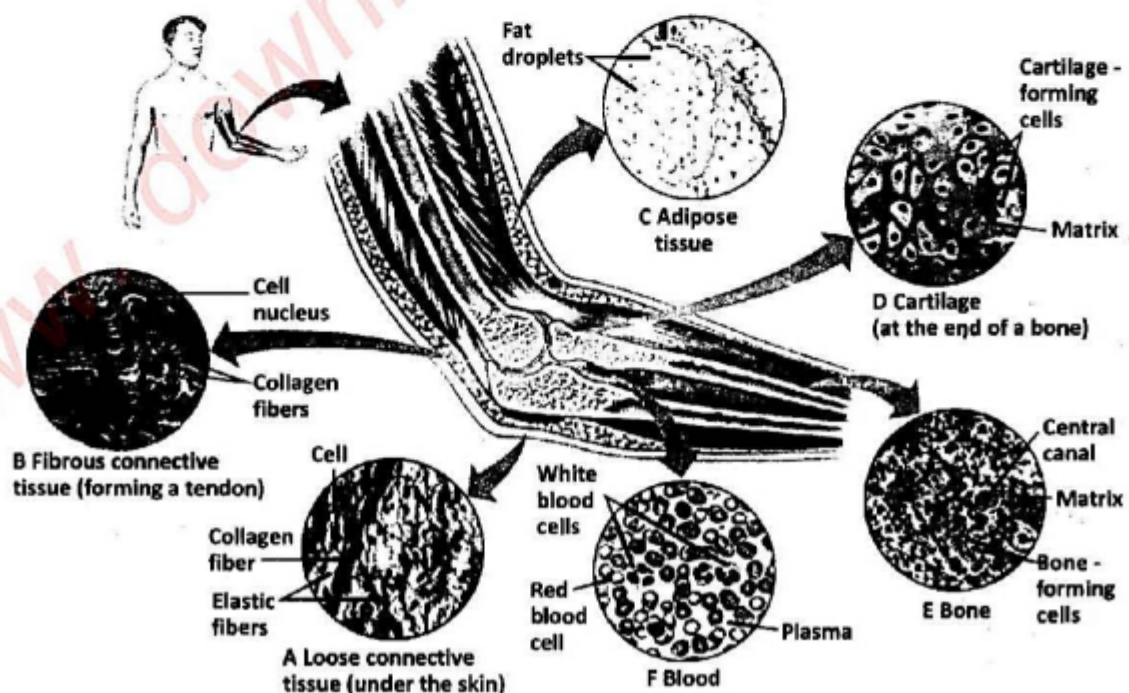
Ans: **Connective Tissue:** This tissue which connects or bind the different types of cells called connective tissues. They also bind other tissues of the body with each other. Connective tissue holds structures in the body together, such as tendons.

Cartilage: It is a type of supporting connective tissue. It is a dense connective tissue. Cartilage has limited ground substance and can range from semisolid to a flexible matrix.

Bone: It is another type of supporting connective tissue. Bone can either be compact (dense) or spongy (cancellous), and contains the osteoblasts or osteocytes cells.

Adipose: It is another type of supporting connective tissue that provides cushions and stores excess energy and fat.

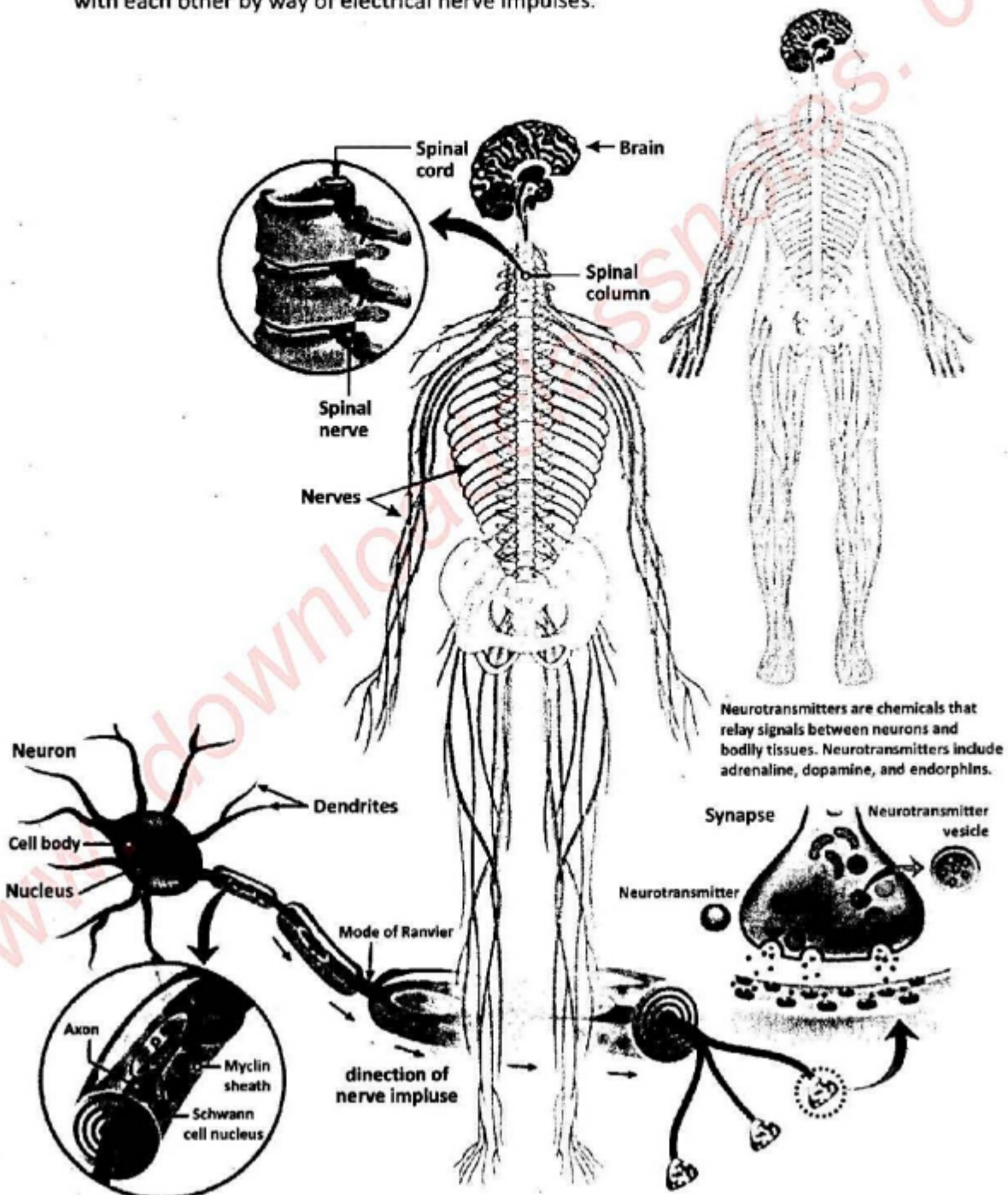
Blood: It referred to as connective tissue. It is a type of fluid connective tissue.



BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Q.49 Write a short note on nervous tissue.

Ans: **Nervous Tissue:** Nervous tissues are composed of neurons, which transmit information to other cells. Nervous tissue is found in the brain, spinal cord, and nerves. It is responsible for coordinating and controlling many body activities. It stimulates muscle contraction, creates an awareness of the environment, and plays a major role in emotions, memory, and reasoning. To do all these things, cells in nervous tissue need to be able to communicate with each other by way of electrical nerve impulses.



BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Q.50 What do you know about muscle tissue and its types?

Ans: Muscle Tissue: Muscle tissue contains the cells that are responsible for the contraction of muscles. There are three types of muscular tissues:

- (i) cardiac (ii) smooth (iii) skeletal

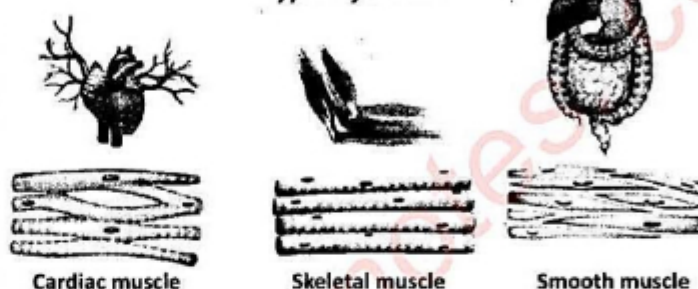
(i) **Skeletal Muscle:** Skeletal muscle which is also called striated (striped) muscle, is what we refer to as muscle in everyday life. Skeletal muscle is attached to bones by tendons. For instance, the muscles in our legs and our arms are skeletal muscle.

(ii) **Cardiac muscle:** It is found only in the walls of the heart. Like skeletal muscle, cardiac muscle is striated, or striped.

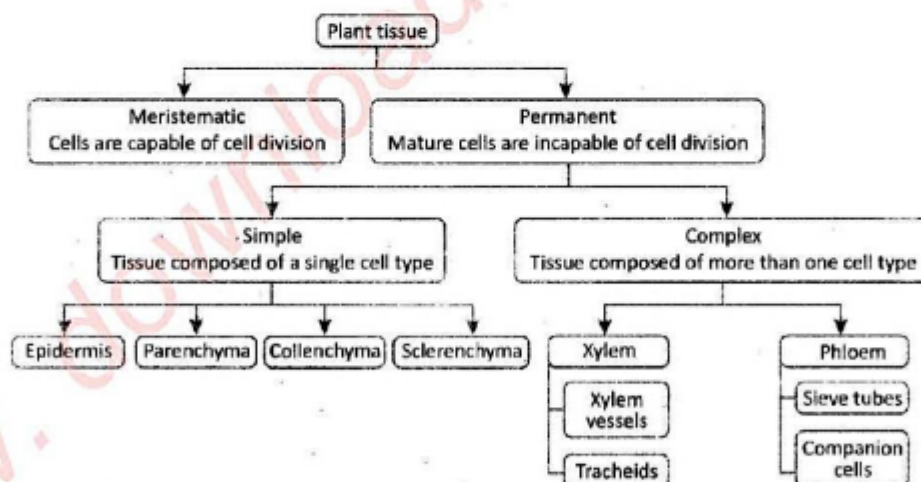
But it's not under voluntary control. It means we don't need to think about making your heart beat.

(iii) **Smooth muscle:** It is found in the walls of blood vessels, as well as in the walls of the digestive tract, the uterus, the urinary bladder, and various other internal structures. Smooth muscle is un-striped, (unstriated), it is involuntary, not under conscious control.

Types of Muscle



Q.51 Draw chart of plant tissues.



Q.52 Write down the types of plant tissue.

Ans: Plant Tissues: As same in animals, plant cells are grouped into tissues with characteristics functions such as photosynthesis, transport etc. There are two major categories of tissues in plants:

- (1) Meristematic tissue (2) Permanent tissues

(1) **Meristematic Tissue:** These tissues are composed of cells, which have the ability to divide. The cells are thin walled, have large nucleus and number of small vacuoles. Usually they do not have inter-cellular spaces, so the cells are arranged compactly. Two main types of meristematic tissues are recognized in plants.

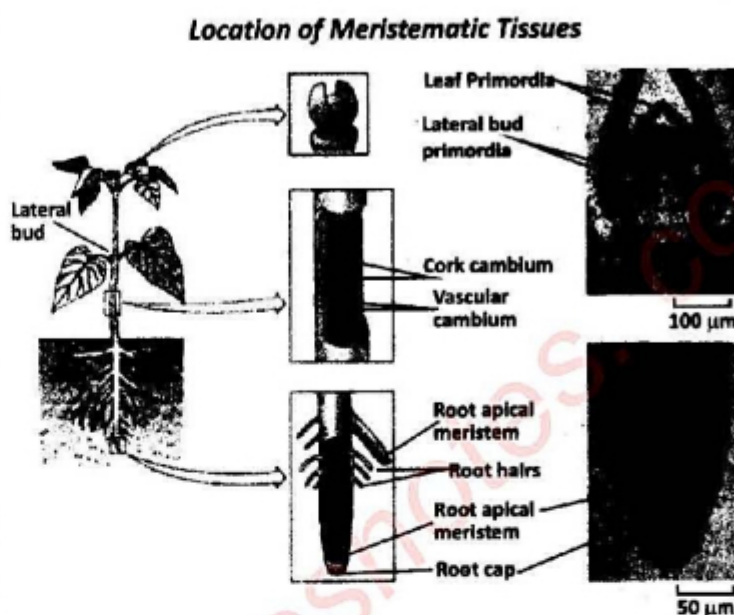
BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

(i) Apical Meristems:

These tissues are present at the apex of roots and stems. According to their position they are Apical meristems. Stem and root increase in length by the division of cells of these tissues. This type of growth is called primary growth.

(ii) Lateral meristems:

These tissues are located on the lateral sides of roots and shoot. By dividing, they are responsible for increase in growth of plant parts. This growth is called secondary growth.



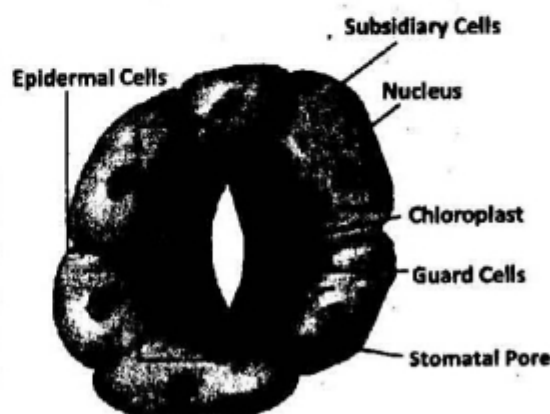
(2) Permanent Tissues: Permanent tissues originate from meristematic tissue. The cells of these tissues do not have the ability to divide and may have intercellular spaces in between cells. They are further classified into following types: either on the basis of position or composition. There are two types of permanent tissues

- (A) Simple permanent tissue (B) Compound or complex tissue.

(A) Simple Permanent Tissues: Simple permanent tissues are made up of only one type of cell.

(i) Epidermal Tissues: Epidermal tissues are composed of a single layer of cells and they cover plant body. They act as a barrier between environment and internal plant tissues. In roots, they are also responsible for the absorption of water and minerals. On stem and leaves they secrete cutin (the coating of cutin is called cuticle) which prevents evaporation.

Epidermal tissues also have some specialized structure that perform specific functions; for example root hairs and stomata.



(ii) Ground Tissues: Ground tissues are simple tissues made up of parenchyma cells. Parenchyma cells are the most abundant cells in plants. Overall they are spherical but flat at point of contact. They have thin primary cell walls and have large vacuoles for storage of food. In leaves, they are called mesophyll and are the sites of photosynthesis. In other parts, they are the sites of respiration and protein synthesis.

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

(iii) **Supporting Tissues:** These tissues provide strength and flexibility to plants. They are further of two types.

(a) **Collenchyma Tissues:** They are found in cortex (beneath epidermis) of young stems and in the midribs of leaves and in petals of flowers. They are made of elongated cells with unevenly thickened primary cell walls. They are flexible and function to support the organs in which they are found.

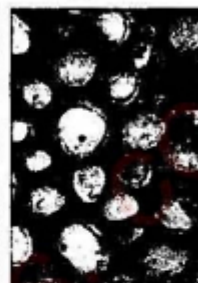
- Thin cell wall
- Storage & photosynthesis
- Uneven cell wall
- Flexible support
- Thick cell wall
- Strength and support



PARENCHYMA



COLLENGHYMA

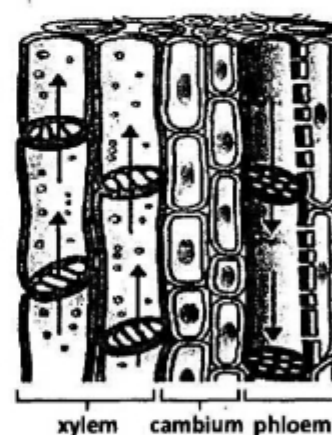
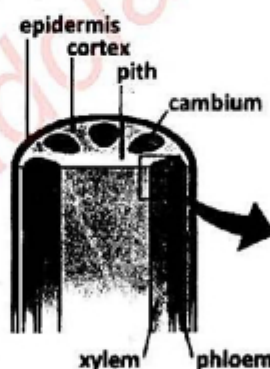


SCLERENHYMA

(b) **Sclerenchyma Tissues:** They are composed of cells with rigid secondary cell walls. Their cell walls are hardened with lignin, which is the main chemical component of wood. Mature sclerenchyma cells cannot elongate and most of them are dead.

(B) **Compound (Complex) Tissues:** A plant tissue composed of more than one type of cell is called a compound or complex tissue. Xylem and phloem tissues, found only in vascular plants, are examples of compound tissues.

(i) **Xylem Tissues:** Xylem tissue is responsible for the transport of water and dissolved substances from roots to the aerial parts. Due to the presence of lignin, the secondary walls of its cells are thick and rigid. That is why xylem tissue also provides support to plant body. Two main types of cell are found in xylem tissue i.e. vessel and tracheids.



Vessels have thick secondary cell walls. Their cells lack end walls and join together to form long tubes. Tracheids are made up of slender cells with overlapping ends.

(ii) **Phloem Tissues:** Phloem tissue is responsible for the conduction of dissolved organic matter (food) between different parts of plant body. Phloem tissue mainly contains sieve tube cells and companion cells. Sieve tube cells are long and their end walls have small pores. Many sieve tube cells join to form long sieve tubes. Companion cells are parenchymatous, narrow, elongated cells, and are closely associated with the sieve tube. Conduction with the sieve tube is done through the pores present on the walls of these cells. They help the sieve tubes in conduction of food materials and make proteins for sieve tube cells.

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

Solution of Review Questions

1. Encircle the correct answer:

See "Multiple Choice Questions (MCQs)" - Q.1 to Q.10

2. Fill in the blanks:

- (i) Microscopes are instrument designed to produce _____ visual image.
- (ii) Resolution of microscope is defined as the smallest distance between _____ points.
- (iii) Magnification of a light microscope is formed by using mixture of the power of the eyepiece and the _____ lens.
- (iv) Electron has a much shorter wavelength than visible light, and this allow electron microscopes to produce _____ images.
- (v) In plants, the cell wall is composed mainly of strong fibers of _____.
- (vi) Cell membrane is composed of _____ layer.
- (vii) Diffusion is a _____ process, which does not require energy input.
- (viii) Plant cell loses water and cytoplasm shrinks in a process called _____.
- (ix) Special type of movement of specific substances through carrier protein is _____.
- (x) The microtubules arranged in a very particular pattern to form centriole are _____ in number.

Answers

i.	magnified	iv.	high resolution	vii.	passive	x.	27
ii.	two	v.	cellulose	viii.	plasmolysis		
iii.	objective	vi.	a double	ix.	facilitated diffusion		

3. Define the following terms:

- (i) Exocytosis
- (ii) Vesicles
- (iii) Cartilage
- (iv) Nucleoplasm
- (v) Cyclosis
- (vi) Plasmolysis
- (vii) Resolution
- (viii) Tissue
- (ix) Magnification
- (x) Cisternae

Ans:

- (i) **Exocytosis:** Exocytosis is a form of active transport and bulk transport in which a cell transports molecules (e.g., neurotransmitters and proteins) out of the cell by secreting them through an energy-dependent process.
- (ii) See "Short/Detailed Answer Questions" – Q.34 (first paragraph)
- (iii) See "Short/Detailed Answer Questions" – Q.48

BIOLOGY (EM) NOTES FOR CLASS 9TH (FOR SINDH)

=====

- (iv) See "Short/Detailed Answer Questions" – Q.28 (ii)
- (v) **Cyclosis:** Cytoplasmic streaming, also called protoplasmic streaming and cyclosis, is the flow of the cytoplasm inside the cell, driven by forces from the cytoskeleton. It is likely that its function is, at least in part, to speed up the transport of molecules and organelles around the cell.
- (vi) See "Short/Detailed Answer Questions" – Q.25
- (vii) See "Short/Detailed Answer Questions" – Q.2
- (viii) See "Short/Detailed Answer Questions" – Q.45
- (ix) See "Short/Detailed Answer Questions" – Q.2
- (x) See "Short/Detailed Answer Questions" – Q.33

4. Distinguish between the following in tabulated form

- (i) **Prokaryotic cell and eukaryotic cell**
- (ii) **Mitochondria and Chloroplast**
- (iii) **Lysosome and Ribosomes**

- Ans:**
- (i) See "Short / Detailed Answer Questions" – Q.16
 - (ii) See "Short / Detailed Answer Questions" – Q.42
 - (iii) See "Short / Detailed Answer Questions" – Q.43

5. Write short answers of following questions.

- (i) **Why mitochondria is also called power house of cell?**

Ans: See "Short / Detailed Answer Questions" – Q.30

- (ii) **Why iodine used to stain the onion peel?**

Ans: See "Short / Detailed Answer Questions" – Q.39

- (iii) **How electron microscope is different from simple compound microscope?**

Ans: See "Short / Detailed Answer Questions" – Q.7

- (iv) **Why cell membrane is semipermeable in nature?**

Ans: See "Short / Detailed Answer Questions" – Q.40

- (v) **How facilitated diffusion is different from active transport?**

Ans: See "Short / Detailed Answer Questions" – Q.25

- (vi) **Why cell is considered as the structural and functional unit of living things?**

Ans: See "Short / Detailed Answer Questions" – Q.18

6. Write detailed answers of the following questions.

- (i) **Describe structure and function of nucleus with the help of diagram.**

Ans: See "Short / Detailed Answer Questions" – Q.28

- (ii) **What is microscope? Describe types of microscopes.**

Ans: See "Short / Detailed Answer Questions" – Q.2 & Q.4

- (iii) **Describe fluid mosaic model of cell membrane also draw the diagram.**

Ans: See "Short / Detailed Answer Questions" – Q.24

