

UNIT-III.Cell biology and Biomolecules

Chapter-6.The Unit of Life

- The two subunits of ribosomes remain united at critical ion level of
a. Magnesium b. Calcium c. Sodium d. Ferrous
- Sequences of which of the following is used to know the phylogeny.
a. mRNA **b. rRNA** c. tRNA d. Hn RNA
- Many cells function properly and divide mitotically even though they do not have.
a. Plasma membrane b. cytoskeleton c. mitochondria **d. Plastids**
- Keeping in view the fluid mosaic model for the structure of cell membrane, which one of the following statements is correct with respect to the movement of lipids and proteins from one lipid monolayer to the other.
a. Neither lipid nor proteins can flip-flop b. Both lipid and proteins can flip flop
c. While lipids can rarely flip-flop proteins cannot d. While proteins can flip-flop lipids cannot
- Match the columns and identify the correct option:

Column-I	Column-II
(a) Thylakoids	(i) Disc-shaped sacs in Golgi apparatus
(b) Cristae	(ii) Condensed structure of DNA
(c) Cisternae	(iii) Flat membranous sacs in stroma
(d) Chromatin	(iv) Infoldings in mitochondria

- (a) (b) (c) (d)
 (1) (iii) (iv) (ii) (i)
 (2) (iv) (iii) (i) (ii)
(3) (iii) (iv) (i) (ii)
 (4) (iii) (i) (iv) (ii)

II. Two, Three, Five mark questions:-

6. Bring out the significance of Transmission Electron Microscope.

- This is the most commonly used electron microscope which provides two dimensional image.
- The magnification is 1-3 lakhs times and resolving power is $2-10 \text{ \AA}$.
- It is used for studying detailed structure of viruses, mycoplasma, cellular organelles, etc.

7. State the protoplasm theory.

- Protoplasm is a complex colloidal system which was suggested by Fisher in 1894 and Hardy in 1899.
- It is primarily made of water and various other solutes like glucose, fatty acids, amino acids, hormones and enzymes.
- These solutes may be homogeneous or heterogeneous mass. which forms the basis for its colloidal nature.

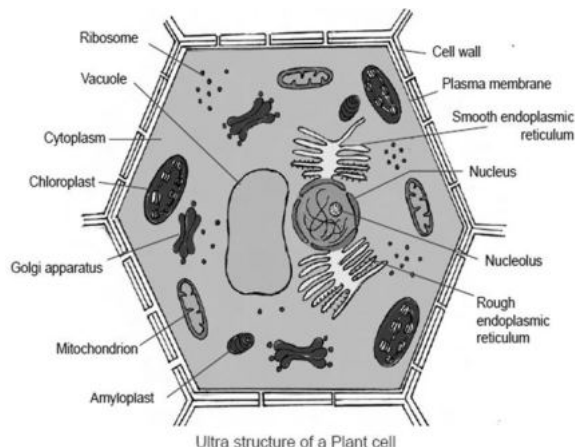
8. Distinguish between prokaryotes and eukaryotes.

Characters	Prokaryotes	Eukaryotes
1. Size	~1-5 μm	~10-100 μm
2. Ribosomes	50S + 30S	60S + 40S
3. Organelles	Absent	Present
4. Cell division	Binary fission	Mitosis, Meiosis
5. Example	Bacteria	Plants, Animals

9. Difference between plant and animal cell.

Plant Cell	Animal Cell
1. Larger than animal cell.	Smaller than plant cell.
2. Plasmodesmata present.	Plasmodesmata absent.
3. Chloroplast present.	Chloroplast absent.
4. Tonoplast present.	Tonoplast absent.
5. Lysosomes absent.	Lysosomes present.

10. Draw the ultra structure of plant cell.



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Chapter-7. Cell Cycle

I. Choose the correct answer:-

- The correct sequence in cell cycle is
a. S-M-G1-G2 b. S-G1-G2-M c. **G1-S-G2-M** d. M-G-G2-S
- If mitotic division is restricted in G1 phase of the cell cycle then the condition is known as
a. S Phase b. G2 Phase c. M Phase d. **G0 Phase**
- Anaphase promoting complex APC is a protein degradation machinery necessary for proper mitosis of animal cells. If APC is defective in human cell, which of the following is expected to occur?
a. Chromosomes will be fragmented b. Chromosomes will not condense
c. **Chromosomes will not segregate** d. Recombination of chromosomes will occur
- In S phase of the cell cycle.
a. **Amount of DNA doubles in each cell** b. Amount of DNA remains same in each cell
c. Chromosome number is increased d. Amount of DNA is reduced to half in each cell
- Centromere is required for
a. transcription b. crossing over c. Cytoplasmic cleavage d. **Movement of chromosome towards pole**
- Synapsis occur between
a. mRNA and ribosomes b. spindle fibres and centromeres
c. **two homologous chromosomes** d. a male and a female gamete
- In meiosis crossing over is initiated at
a. Diplotene b. **Pachytene** c. Leptotene d. Zygotene
- Colchicine prevents the mitosis of the cells at which of the following stage
a. **Anaphase** b. Metaphase c. Prophase d. interphase
- The pairing of homologous chromosomes on meiosis is known as
a. Bivalent b. **Synapsis** c. Disjunction d. Synergids

II. Two, Three, Five mark questions:-

10. Write any three significance of mitosis.

- Daughter cells are genetically identical to parent cells.
- New cells are identical to the existing cell.
- Damaged cells are replaced by new cells through mitosis.

11. Differentiate between mitosis and meiosis.

Mitosis	Meiosis
1. It takes place by one division.	It takes place by two divisions.
2. Chromosome number is same.	Chromosome number is halved.
3. Crossing over never occurs.	Crossing over occurs.
4. Daughter cells are genetically identical.	Daughter cells are genetically different from parent cell.
5. Two daughter cells are formed.	Four daughter cells are formed.

12. Given an account of G₀ phase.

1. Some cells exit G₁ and enter a quiescent stage called G₀.
2. Where the cell remains metabolically active without proliferation.
3. Cells can exist for long periods in G₀ phase.
4. In G₀, cells stop the growth with reduced rate of RNA and protein synthesis.
5. The G₀ phase is not permanent.

13. Differentiate cytokinesis in plant cells and animal cells.

Cytokinesis in Plant Cells:

1. Division of the cytoplasm often starts during telophase.
2. Cell plate grows from centre to lateral walls.
3. Phragmoplast contains microtubules, actin filaments and vesicles from Golgi apparatus and ER.
4. Cell plate eventually stretches right across the cell forming the middle lamella.
5. Cytokinesis forms the cell wall of two new plant cells.

Cytokinesis in Animal Cells:

1. It is a contractile process.
2. The ring consists of a bundle of microfilaments assembled from actin and myosin.
3. This fibril generates a contractile force.
4. Thus it divides the cell into two.

14. Write about Pachytene and Diplotene of Prophase I.

Pachytene:

1. At this stage bivalent chromosomes are clearly visible as tetrads.
2. Synapsis is completed and recombination nodules appear.
3. Crossing over takes place between non-sister chromatids of homologous chromosome.
4. Recombination of homologous chromosomes is completed by the end of this stage.
5. This is mediated by the enzyme recombinase.

Diplotene:

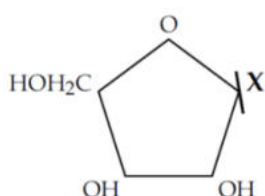
1. Synaptonemal complex disassembled and dissolves.
2. The homologous chromosomes remain attached.
3. The sites of crossing over are called Chiasmata.
4. Chiasmata are chromatin structures at sites where recombination has been taken place.
5. They are specialised chromosomal structures that hold the homologous chromosomes together.

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Chapter-8.Biomolecules

I.Choose the correct answer:-

- The most basic amino acid is
a. Arginine b. Histidine c. Glycine **d. Glutamine**
- An example of feedback inhibition is
a. Cyanide action on cytochrome
b. Sulpha drug on folic acid synthesiser bacteria
c. Allosteric inhibition of hexokinase by glucose-6-phosphate
d. The inhibition of succinic dehydrogenase by malonate
- Proteins perform many physiological functions. For example some functions as enzymes. One of the following represents an additional function that some proteins discharge:
a. Antibiotics b. Pigment conferring colour to skin
c. Pigments making colours of flowers **d. Hormones**
- Given below is the diagrammatic representation of one of the categories of small molecular weight organic compounds in the living tissues. Identify the category shown & one blank component "X" in it.



- | Category | Compound |
|----------------------|-----------------|
| a) Cholesterol | Guanine |
| b) Amino acid | NH ₂ |
| c) Nucleotide | Adenine |
| d) Nucleoside | Uracil |

II.Two, Three, Five mark questions:-

5.Distinguish between nitrogenous base and a base found in inorganic chemistry.

Nitrogenous base	Base found in inorganic chemistry
1.Nitrogenous base linked with pentose sugar through n-glycosidic linkage and forms a nucleoside.	Inorganic bases react with inorganic acids to form salts.
2.When a phosphate group is attached to a nucleoside it is called a nucleotide.	They are generally water soluble bases. Example: NaOH.
3. It is linked with biological reactions.	It is not linked with any biological reactions.

6.Write the characteristic feature of DNA.

- One strand runs in 5'-3' direction, other strand runs in 3'-5' direction.
- Both strands are antiparallel.
- The 5' end has the phosphate group and 3' end has the OH group.
- The narrow angle between the sugars generates a minor groove and the large angle on the other edge generates major groove.
- Each base is 0.34 nm apart and a complete turn of the helix comprises 3.4 nm.
- DNA helical structure has a diameter of 20 Å and a pitch of about 34 Å.
- Based on the helix and the distance between each turns, the DNA is of three forms – A DNA, B DNA and Z DNA.

7.Explain the structure and function of different types of RNA.

1.mRNA (messenger RNA):

- It is single stranded.
- It is unstable and comprises 5% of total RNA.
- Prokaryotic mRNA (Polycistronic) carry coding sequences for many polypeptides.
- Eukaryotic mRNA (Monocistronic) contains information for only one polypeptide.

2.tRNA (transfer RNA):

1. Translates the code from mRNA and transfers amino acids to the ribosome to build proteins.
2. It is highly folded into an elaborate 3D structure.
3. It comprises about 15% of total RNA.
4. It is also called as soluble RNA.

3.rRNA (ribosomal RNA):

1. It is made up of two subunits of ribosomes.
2. It constitutes 80% of the total RNA.
3. It is a polymer with varied length from 120–3000 nucleotides.
4. Genes for rRNA are highly conserved and employed for phylogenetic studies.

UNIT-IV.Plant Anatomy

Chapter-9.Tissue and Tissue System

I.Choose the correct answer:-

1. Refer to the given figure and select the correct statement.
 - i. A, B, and C are histogen of shoot apex
 - ii. A Gives rise to medullary rays.
 - iii. B Gives rise to cortex
 - iv. C Gives rise to epidermis

a. i and ii only b. ii and iii only **c. i and iii only** d. iii and iv only
2. Read the following sentences and identify the correctly matched sentences.
 - i. In exarch condition, the protoxylem lies outside of metaxylem.
 - ii. In endarch condition, the protoxylem lie towards the centre.
 - iii. In centarch condition, metaxylem lies in the middle of the protoxylem.
 - iv. In mesarch condition, protoxylem lies in the middle of the metaxylem.

a. i, ii and iii only b. ii, iii and iv only **c. i, ii and iv only** d. All of these
3. In Gymnosperms, the activity of sieve cells are controlled by
 - a. Nearby sieve tube members.
 - b. Phloem parenchyma cells
 - c. Nucleus of companion cells.
 - d. Nucleus of albuminous cells.**
4. When a leaf trace extends from a vascular bundle in a dicot stem, what would be the arrangement of vascular tissues in the veins of the leaf?
 - a. Xylem would be on top and the phloem on the bottom**
 - b. Phloem would be on top and the xylem on the bottom
 - c. Xylem would encircle the phloem
 - d. Phloem would encircle the xylem
5. Grafting is successful in dicots but not in monocots because the dicots have
 - a. Vascular bundles arranged in a ring
 - b. Cambium for secondary growth**
 - c. Vessels with elements arranged end to end
 - d. Cork cambium

II.Two, Three, Five mark questions:-

6.Why the cells of sclerenchyma and tracheids become dead?

1. They are dead cell and lacks protoplasm.
2. These cells are long or short, narrow, thick walled and lignified secondary walls.

7.Explain sclereids with their types.

1.Brachysclereids or Stone cells:

1. They are Isodiametric, with hard cell wall.
2. Found in bark, pith, cortex and fleshy portion of some fruits.
3. Example: Pulp of Pyrus.

2.Macroslereids:

1. They are elongated and rod shaped cells.
2. Found in the outer seed coat of leguminous plants.
3. Example: Crotalaria and Pisum sativum.

