Q.6		Attempt any two:							
	i.	What are the checkpoints in the cell cycle, and how do they ensure proper cell division?	**5**	2	2	4	2		
	ii.	Compare and contrast mitosis and meiosis in terms of their processes and outcomes.	**5**	4	3	5	3		
	iii.	What are the molecular signals that trigger apoptosis, and how do they regulate cell death?	**5**	4	3	5	3		

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Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No.....

Faculty of Science
End Sem Examination Dec 2024
BT3CO02 Cell Biology

Programme: B.Sc. Branch/Specialisation: Biotechnology

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	**BL**	**PO**	**CO**	**PSO**
Q.1	i.	Cell recognition is primarily mediated by: (a) Lipids (b) Nucleic acids (c) Membrane proteins and carbohydrates (d) Cytoskeletal elements	**1**	1	1	1	2
	ii.	What is the term for the process by which cells engulf large particles or even whole cells? (a) Exocytosis (b) Phagocytosis (c) Pinocytosis (d) Simple diffusion	**1**	1	1	1	1
	iii.	What is the membrane surrounding a vacuole called? (a) Cytoplasm (b) Tonoplast (c) Endoplasmic reticulum (d) Plasma membrane	**1**	1	1	1	1
	iv.	How does the endoplasmic reticulum (ER) contribute to protein segregation? (a) By degrading misfolded proteins (b) By packaging proteins into vesicles for transport (c) By synthesizing lipids (d) By stabilizing microtubules	**1**	2	3	2	2

v.	The digestive enzymes found in lysosomes are activated at: (a) Neutral pH (b) Alkaline pH (c) Acidic pH (d) Variable pH	**1**	2	3	2	2
vi.	Which type of vacuole is most commonly found in plant cells? (a) Contractile vacuole (b) Food vacuole (c) Central vacuole (d) Secretory vacuole	**1**	1	2	2	2
vii.	The genome of mitochondria is most similar to: (a) Eukaryotic nuclear DNA (b) Fungal DNA (c) Bacterial genomes (d) Viral RNA	**1**	3	2	3	2
viii.	Which process is disrupted if the nuclear membrane is damaged? (a) Electron transport chain (b) Protein folding (c) RNA export and DNA protection (d) Photosynthesis	**1**	3	2	3	2
ix.	Which phase of the cell cycle is the longest? (a) G1 phase (b) S phase (c) G2 phase (d) M phase	**1**	1	1	1	1
x.	What is the role of caspases in apoptosis? (a) DNA replication (b) Membrane synthesis (c) Cleaving proteins to dismantle the cell (d) ATP production	**1**	2	2	3	2
Q.2 i.	Define prokaryotic and eukaryotic cells. What are the key differences in their structure?	**2**	2	2	2	1
ii.	Differentiate between passive and active transport mechanisms in biological membranes. Provide examples of each type.	**3**	2	2	2	1

iii.	Describe the Fluid Mosaic Model of cell membranes. How does this model explain the dynamic nature of membranes and the movement of proteins and lipids within the membrane?	**5**	4	3	3	2
OR iv.	Explain the concept of compartmentalization in eukaryotic cells. How does this structural feature facilitate cellular organization and function?	**5**	4	2	3	2
Q.3 i.	What are intermediate filaments? Discuss their structural role in cells.	**2**	4	3	3	2
ii.	Discuss the three main types of cytoskeletal filaments: microtubules, microfilaments, and intermediate filaments. Compare and contrast their structures, functions, and roles in cell motility.	**8**	4	2	3	2
OR iii.	Explain the organization and functions of the endoplasmic reticulum (ER) in eukaryotic cells, highlighting its role in protein synthesis, processing, and segregation.	**8**	4	2	3	2
Q.4 i.	Describe the biogenesis of the Golgi complex.	**3**	2,5	2	3	2
ii.	What is autophagy, and how do lysosomes contribute to it?	**7**	4	3	3	2
OR iii.	Describe the significance of the ribosome's large and small subunits in protein synthesis.	**7**	4	3	3	2
Q.5 i.	Explain how mitochondria produce ATP through oxidative phosphorylation.	**4**	3	2	3	2
ii.	Explain the light-dependent reactions occurring in the thylakoid membrane of chloroplasts.	**6**	3	2	3	2
OR iii.	Explain the organization of chromatin and how it forms chromosomes.	**6**	3	2	3	2

Marking Scheme
BT3CO02 (T) Cell Biology (T)

Q.1	i)	c) Membrane proteins and carbohydrates	**1**
	ii)	b) Phagocytosis	**1**
	iii)	b) Tonoplast	**1**
	iv)	b) By packaging proteins into vesicles for transport	**1**
	v)	c) Acidic pH	**1**
	vi)	c) Central vacuole	**1**
	vii)	c) Bacterial genomes	**1**
	viii)	c) RNA export and DNA protection	**1**
	ix)	a) G1 phase	**1**
	x)	c) Cleaving proteins to dismantle the cell	**1**

Q.2	i.	Define prokaryotic and eukaryotic cells. What are the key differences in their structure? Definition -1 marks Difference -1 marks	**2**
	ii.	Differentiate between passive and active transport mechanisms in biological membranes. Provide examples of each type. Definition -1 marks Explanation & diagram- 2 marks	**3**
	iii.	Describe the Fluid Mosaic Model of cell membranes. How does this model explain the dynamic nature of membranes and the movement of proteins and lipids within the membrane? Modal definition -1 marks Movement explanation -2 marks Diagram – 2 marks	**5**
OR	iv.	Explain the concept of compartmentalization in eukaryotic cells. How does this structural feature facilitate cellular organization and function? Definition -1 marks Explanation- 2 marks Diagram- 2 marks	**5**

Q.3	i.	What are intermediate filaments? Discuss their structural role in cells Definition -1 marks Explanation- 1 marks	**2**
	ii.	Discuss the three main types of cytoskeletal filaments: microtubules, microfilaments, and intermediate filaments. Compare and contrast their structures, functions, and roles in cell motility. Definition -1 marks Explanation- 2 marks Difference- 3 marks Diagram- 2 marks	**8**
OR	iii.	Explain the organization and functions of the endoplasmic reticulum (ER) in eukaryotic cells, highlighting its role in protein synthesis, processing, and segregation. Definition -1 marks Explanation- 3 marks Explanation protein synthesis - 4 marks	**8**

Q.4	i.	Describe the biogenesis of the Golgi complex. All the mechanism of biogenesis Golgi complex.-3 marks	**3**
	ii.	What is autophagy, and how do lysosomes contribute to it? Definition -1 marks Types of lysosomes-3 marks Process of autophagy-3 marks	**7**
OR	iii.	Describe the significance of the ribosome’s large and small subunits in protein synthesis. Definition -1 marks	**7**

Structure of ribosome's- 3 marks
Role in protein synthesis-3 marks

Q.5	i.	Explain how mitochondria produce ATP through oxidative phosphorylation. Mitochondria ATP definition – 1 marks Diagram -2 marks Explanation - 1 marks	**4**
	ii.	Explain the light-dependent reactions occurring in the thylakoid membrane of chloroplasts. Diagram – 4 marks Explanation - 2 marks	**6**
OR	iii.	Explain the organization of chromatin and how it forms chromosomes. Definition – 1 marks Diagram – 3 marks Explanation - 2 marks	**6**

Q.6 Attempt any two:

i.	What are the checkpoints in the cell cycle, and how do they ensure proper cell division? Definition checkpoints- 1 marks All points- 2 marks Diagram- 2 marks	**5**
ii.	Compare and contrast mitosis and meiosis in terms of their processes and outcomes. Points- 2 marks Diagram- 3 marks	**5**
iii.	What are the molecular signals that trigger apoptosis, and how do they regulate cell death? Definition - 1 marks Points- 2 marks Diagram- 2 marks	**5**

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