

St. Philomena's College (Autonomous), Mysore**PG Department of Biochemistry****Question Bank (Revised Curriculum 2018 onwards)****First Year- Second Semester (2019-20 Batch)****Course Title (Paper Title): Cell & Membrane Biology. QP Code: 54101**

Unit	Sl. No	Questions	Marks
1	1	Enlist the physiochemical properties of plasma membrane	2
1	2	Give the composition of plasma membrane	2
1	3	Define hexagonal phase I and II lipids	2
1	4	Differentiate between micelle phase and reverse micelle phase	2
1	5	Differentiate between hexagonal one and hexagonal II lipid phases	2
1	6	What are different lipid phases? Give examples.	2
1	7	What is phase transition temperature?	2
1	8	Give the drawbacks of Davson and Daniel membrane model.	2
1	9	What are polarized cells?	2
1	10	Highlight salient features of Fluid Mosaic Model of cell membrane.	2
2	11	Give the significance of phosphatidylethanolamine and phosphatidylinositol in the inner leaflet.	2
2	12	What are negative curvature lipids? Give its biological importance.	2
2	13	What are cylindrical lipids? Give example with biological importance.	2
2	14	Membranes made of cylindrical lipids have higher melting temperature. Comment.	2
2	15	Phosphatidylcholine and sphingomyelin are generally present in the outer leaflet of cell membrane. Justify the statement.	2
2	16	What are flippase?	2
2	17	Differentiate between flippases and floppase.	2
2	18	What are scrambles? Give example.	2
2	19	Give the significance of phosphatidylethanolamine and phosphatidylinositol in the inner leaflet.	2
2	20	Give the importance of t-snares and v-snares in protein trafficking.	2
2	21	What are lipid rafts? Give its importance.	2

2	22	Give the importance of heat shock proteins in protein targeting to ER.	2
2	23	What are karyopherins?	2
3	24	Comment on lipid transfer protein. Give its biological significance.	2
3	25	What are amino phospholipid translocators?	2
3	26	What are liposomes? Give two application.	2
3	27	What is freeze etching? Give two applications.	2
3	28	What is FRAP. Give its application in membrane biology.	2
3	29	Define FRET. Give two applications.	2
4	30	What are symporter and antiporters?	2
4	31	Rate of transport through ion channel is higher than carrier proteins. Why?	2
4	32	Differentiate between carrier and channel proteins.	2
4	33	Differentiate between pumps and carrier proteins.	2
4	34	What is co-transport? Give example.	2
4	35	Differentiate between primary and secondary active transport.	2
4	36	Differentiate between transpotores and channel proteins with examples.	2
4	37	Km of Glut1 is less than Glut2. Give physiological importance for this phenomenon.	2
4	38	Give the importance of beta subunit in sodium potassium ATPase pump.	2
4	39	Differentiate between receptor mediated endocytosis and non receptor mediated endocytosis.	2
4	40	Justify the presence of amphipathic amino acids in the channel proteins.	2
4	41	Differentiate between voltage gated and ligand gated channels.	2
4	42	What are gated channels?	2
4	43	Differentiate between gated and non gated Ion channels.	2
4	44	What are aquaporins?	2
4	45	What are ionophores? Give an example	2
5	46	What is diffusion? State the laws of diffusion.	2
5	47	Give the importance of electrochemical gradient across membrane during neurotransmission.	2

5	48	What is a cholinergic receptor? Give its types.	2
5	49	What is membrane potential?	2
5	50	What is an action potential?	2
5	51	Differentiate between action potential and resting potential.	2
5	52	What is depolarization and repolarization?	2
5	53	What is refractory period?	2
5	54	What is saltatory conduction?	2
5	55	Differentiate between postsynaptic and presynaptic membranes.	2
5	56	What is a synapse?	2
5	57	What are muscarinic neurons?	2
5	58	What are nicotinic neurons?	2
5	59	What is NMDA? Give its importance in pharmacology.	2
5	60	What is GABA? Give its function.	2
4	61	Differentiate between endocytosis and exocytosis.	2
6	62	What is a sarcomere?	2
6	63	Highlight the role of nebulin and titin in skeletal muscle	2
6	64	Differentiate between H band and I band of a sarcomere.	2
6	65	Give two biological significance of phospholambdan.	2
6	66	Comment on the outcome, when the S phase cell is fused with mitotic phase cell.	2
6	67	Define restriction point in mammalian cell cycle.	2
6	68	Differentiate between early response genes and delayed response genes with respect to mammalian cell cycle.	2
6	69	What are Sic 1 proteins? Highlight its role in yeast cell cycle.	2
6	70	What happens when APC-cdc20 complex fails to work during cell cycle?	2
6	71	What are CDK-cyclin complex?	2
6	72	What are cyclins? Mention its significance in cell cycle.	2
6	73	Define the role of p21 and p27 in cell cycle regulation. Give its role in cancer.	2
6	74	Define the role of APC in cell cycle regulation.	2
6	75	Highlight the role of CDC14 and CDC25 in cell cycle regulation.	2
6	76	Differentiate between CIP and INK inhibitors of cell cycle.	2
6	77	What are RB proteins? Give its role in cell cycle.	2

6	78	Differentiate between apoptosis and necrosis.	2
6	79	What are anti-apoptotic proteins? Highlight its function with an example.	2
6	80	What are pro-apoptotic proteins? Give example.	2
6	81	Mention the morphological changes undergoing by an apoptotic cell.	2
6	82	What are caspases?	2
6	83	Define the role of p53 in apoptosis. Give its role in cancer.	2
6	84	What is an apoptosome?	2
1	1	Write the physicochemical properties of biological membrane.	5
1	2	Give the physicochemical features of cell membrane.	5
1	3	Comment on the composition of bilayer membrane.	5
1	4	What is phase transition? Explain the importance of cholesterol and fatty acids in maintaining the cell membrane fluidity.	5
1	5	Explain Groter and Grenel experiment.	5
1	6	Illustrate Danille and Davison model of membrane.	5
1	7	Describe the evolution in models of plasma membrane.	5
1	8	Explain any two models proposed to explain the structure of cell membrane.	5
1	9	Describe Robertson model. What are its draw backs?	5
1	10	Explain fluid mosaic model giving insight into the experimental proof for the model	5
2	11	Write a note on function of sterols in membranes.	5
2	12	Critically comment on asymmetry of membrane proteins.	5
2	13	Explain the topology of a cell membrane protein. How would you determine the topology of a membrane protein?	5
2	14	Comment on importance of lateral diffusion of membrane lipids.	5
2	15	Illustrate de novo biogenesis of membrane lipids.	5
2	16	Comment on different types of trans membrane proteins with examples.	5
2	17	Detail the steps involved in post translational translocation of ER proteins.	5
2	18	Give an account on protein targeting to mitochondrial outer membrane inner membrane and matrix.	5

2	19	Write a note on importance of lipids in vesicular trafficking of proteins.	5
2	20	Write a note on membrane domains and their importance.	5
2	21	Explain the translocation of proteins to mitochondria.	5
2	22	Explain the translocation of proteins to thylakoid.	5
2	23	Explain the translocation of proteins to lysosome.	5
2	24	Explain the translocation of proteins to peroxisomes.	5
2	25	Explain COPI coated vesicular trafficking.	5
2	26	Write a note on COPII coated vesicular trafficking.	5
2	27	Write a note on clathrin coated vesicular trafficking.	5
2	28	Discuss the role of t-snare and v- snare in vesicular docking of proteins.	5
2	29	Explain biogenesis of mitochondria.	5
2	30	Write a note on biogenesis of ribosomes.	5
2	31	Describe biogenesis of sub organelles.	5
2	32	Write a short note on biogenesis of peroxisomes.	5
3	33	What are phospholipases? Describe the method used to analyse phospholipases activity.	5
3	34	What are lipid transfer proteins? Describe the method used to analyse lipid transfer protein activity.	5
3	35	Give an account on chemical methods used to study the membrane structure.	5
3	36	Explain biosynthesis of cardiolipin.	5
3	37	Discuss biosynthesis of phospholipids precursors by CDP-DG pathway.	5
3	38	Describe the importance of freeze fracture technique in analysis of membrane.	5
3	39	Explain FRAP technique. Mention its application	5
3	40	What is single particle tracking? Discuss its application in membrane dynamics study.	5
3	41	Comment on cell fusion assay as a tool to study biological membrane.	5
3	42	Describe the importance of calorimetry in structural analysis of membrane.	5

4	43	Comment on different isoforms of glucose transporters.	5
4	44	Write the structural and functional organization of glucose transporter	5
4	45	What is active transport? Explain the mechanism of action of sodium potassium transporter.	5
4	46	Diagrammatically outline the mechanism of transport by Na ⁺ K ⁺ ATPase. Why is it called an electrogenic pump?	5
4	47	Explain bacterial phosphotransferase system.	5
4	48	Write a note on receptor mediated endocytosis using one example.	5
4	49	Explain receptor-mediated endocytosis with an example.	5
4	50	Discuss exocytosis with an example.	5
4	51	Describe gated Ion channels with an example.	5
4	52	Comment on the structure and specificity of potassium channel.	5
4	53	Describe non gated ion channels.	5
4	54	Write a note on structure and mechanism of action of aquaporin.	5
4	55	Write a short on channel and carrier ionophore.	5
5	56	Write a note on structure and mechanism of impulse conduction by nicotinic acetylcholine receptor.	5
5	57	Give an account on neurotransmitters.	5
5	58	Explain the mechanism of transmission of nerve impulse across synapse.	5
5	59	Write a note on role of a neuron in nerve transmission.	5
5	60	Discuss the generation and transmission of nerve impulse.	5
5	61	Discuss the role of myelinated sheath in conduction of an impulse	5
5	62	Write a note on Patch Clamp Technique.	5
5	63	How does impulse transmission take place across cholinergic synapse?	5
5	64	Explain the structure and mechanism of action of ligand gated channel with an example.	5
5	65	Discuss the steps involved in impulse conduction muscarinic acetylcholine receptor with an example	5
5	66	Explain the structure and function of NMDA receptors. Highlight its pharmacological importance.	5
5	67	Give an account on structure and function of NMDA.	5
6	68	Explain skeletal muscle contraction.	5

6	69	Discuss the role of troponin and tropomyosin in muscle contraction	5
6	70	Explain the role of phospholamban in muscle contraction.	5
6	71	Discuss the importance of calmodulin in muscle contraction.	5
6	72	Comment on the role of calcium in muscle contraction. Explain the sliding filament model.	5
6	73	Write a note on phases of cell cycle. Explain how it is regulated.	5
6	74	Describe G1 to S phase transition and S to M phase transition in yeast cell cycle.	5
6	75	Describe G1 to S phase transition and G2 to M phase transition in mammalian cell cycle.	5
6	76	Comment on S phase entry in mammalian cell cycle.	5
6	77	Give an account on check points of cell cycle.	5
6	78	Give an account on DNA check points of cell cycle.	5
6	79	Discuss on the role of cyclin dependent kinases in the regulation of cell cycle	5
6	80	Write a note on mammalian cyclins and its regulatory role in cell cycle.	5
6	81	Describe intrinsic and extrinsic pathway for apoptosis.	5
6	82	How does necrosis differ from apoptosis? Explain apoptotic mechanism involving all mediators.	5

Question Paper Pattern- Model Question Paper

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St. Philomena's College (Autonomous) Mysore
II Semester M.Sc. - Final Examination : May - 2019

Subject: BIOCHEMISTRY

Title: CELL AND MEMBRANE BIOLOGY (HC)

Time: 3 Hours

Max Marks: 70

PART -A

Answer any TEN of the following:

10×2=20

1. a. Differentiate between simple and facilitated diffusion.
- b. What is exocytosis?
- c. Distinguish between voltage gated channels and ligand gated channels?
- d. What is membrane asymmetry with reference to lipids?
- e. What is G₀ phase of the cell cycle?
- f. What is membrane flow hypothesis?
- g. How does cholesterol affect the membrane fluidity?
- h. What is phospholamban? Give its importance.
- i. Comment on freeze etching as a tool to study biological membranes.
- j. What are ionophores? Give an example.
- k. List the important outcomes of Gorter and Grendel's model of membranes.
- l. What are aminophospholipid translocators?

PART -B

Answer any FIVE of the following:

5×10=50

2. a. Explain the phases of cell cycle. 5+5
- b. Discuss the physiochemical properties of biomembranes.
3. a. Describe intracellular protein targeting to mitochondria. 5+5
- b. Write the structural and functional organization of glucose transporter.
4. a. How does necrosis differ from apoptosis? Explain a apoptotic mechanism involving all mediators. 5+5
- b. Explain singer and Nicholson's model of membrane. Mention its demerits.
5. a. Write note on membrane domains and their importance. 5+5
- b. Give an account on structure and function of NMDA.

PTO

6. a. Explain skeletal muscle contraction. 5+3
b. Write note on receptor mediated endocytosis using any one example.
7. a. How does impulse transmission take place across cholinergic synapse? 5+3
b. Write note on (i) GABA (ii) Structural proteins of muscles
8. a. What is FRET? Explain its importance. 5+3
b. Give an account on check points of cell cycle.
