

**St. Philomena's College (Autonomous), Mysore****PG Department of Biochemistry****Question Bank (Revised Curriculum 2020-21 onwards)****First Year- First Semester ( 2020-21 Batch)****Course Title (Paper Title): Cell & Membrane Biochemistry (HC) QP Code - 84123**

<b>Sl. No</b>	<b>Unit</b>	<b>Questions</b>	<b>Marks</b>
1	1	Give the drawbacks of Davson and Daniel membrane model.	2
2	1	Highlight salient features of Fluid Mosaic Model of cell membrane.	2
3	2	Enlist the physiochemical properties of plasma membrane.	2
4	2	Give the composition of plasma membrane.	2
5	2	Define hexagonal phase I and II lipids.	2
6	2	Differentiate between micelle phase and reverse micelle phase.	2
7	2	Differentiate between hexagonal one and hexagonal to lipid faces.	2
8	2	What are different lipid phases? Give examples.	2
9	2	What is phase transition temperature?	2
10	2	What are polarized cells?	2
11	2	Give the significance for the presence of phosphotidyl ethanolamine and phosphotidyl inositol in the inner leaflet.	2
12	2	What are negative curvature lipids? Give its biological importance	2
13	2	What are cylindrical lipids? Give example with biological importance	2
14	2	Membranes made of cylindrical lipids have higher melting temperature. Why?	2
15	2	Phosphotidylcholine and Sphingomyelin are generally present in the outer leaflet of the cell membrane. Justify the statement.	2
16	2	What are flippase?	2
17	2	Differentiate between flippase and floppase.	2
18	2	What are scramblases?	2
19	2	Give the significance for presence of phosphotidyl ethanolamine and phosphotidyl inositol in the inner leaflet	2
20	2	Give the importance of heat shock proteins in protein targeting to ER.	2
21	2	What are lipid rafts? Give its importance.	2
22	2	What is protein turnover?	2
23	2	What are karyopherins?	2
24	2	Give the role of v-SNARE and t-SNARE in vesicular trafficking.	2
25	2	What are signal peptides? Give its characteristic features.	2
26	3	What are liposomes? Give two applications	2
27	3	What is freeze etching? Give two applications.	2
28	3	What is FRAP. Give its application in membrane biology	2
29	3	Define FRET. Give two of its application	2
30	4	What are symporter and antiporters?	2
31	4	Rate of transport through ion channel is higher than carrier proteins. Why?	2
32	4	Differentiate between carrier and channel proteins.	2

33	4	Differentiate between pumps and carrier proteins.	2
34	4	What is a co-transporter? Give example.	2
35	4	Differentiate between primary and secondary active transport.	2
36	4	Differentiate between transporters and channel proteins with examples	2
37	4	K <sub>m</sub> of Glut1 is less than Glut2. Give physiological importance for this phenomenon.	2
38	4	Give the importance of beta subunit in sodium potassium ATPase pump	2
39	4	Differentiate between receptor mediated endocytosis and non receptor mediated endocytosis.	2
40	4	Justify the presence of amphipathic amino acids in the channel proteins.	2
41	4	Differentiate between voltage gated and ligand gated channels.	2
42	4	What are gated channels?	2
43	4	Differentiate between gated and non gated Ion channels.	2
44	4	What are aquaporins?	2
45	4	What are ionophores? Give an example	2
46	4	Differentiate between endocytosis and exocytosis.	2
47	5	Comment on the importance of electrochemical gradient across membrane during neurotransmission.	2
48	5	What is a cholinergic receptor? Give its types	2
49	5	What is membrane potential?	2
50	5	What is an action potential?	2
51	5	Differentiate between action potential and resting potential.	2
52	5	What is depolarization and repolarization?	2
53	5	What is refractory period?	2
54	5	What is saltatory conduction?	2
55	5	Differentiate between postsynaptic and presynaptic membranes.	2
56	5	What is a synapse?	2
57	5	What is muscarinic neuron?	2
58	5	What is nicotinic neuron?	2
59	5	What is NMDA? Give its role in pharmacology.	2
60	5	What is GABA? Give its function	2
61	6	What is a sarcomere?	2
62	6	Highlight the role of nebulin and titin in skeletal muscle.	2
63	6	Differentiate between H band and I band of a sarcomere.	2
64	6	Give two biological significance of phospholambdan.	2
65	6	Comment on the outcome, when the S phase cell is fused with mitotic phase cell.	2
66	6	Define restriction point in mammalian cell cycle.	2
67	6	Differentiate between early response genes and delayed response genes with respect to mammalian cell cycle.	2
68	6	What are Sic 1 proteins? Highlight its role in yeast cell cycle.	2
69	6	What happens when APC-cdc20 complex fails to work during cell cycle?	2
70	6	What are CDK-cyclin complex?	2
71	6	What are cyclins? Mention its significance in cell cycle.	2
72	6	Define the role of p21 and p27 in cell cycle regulation. Give its role in	2

		cancer.	
73	6	Define the role of APC in cell cycle regulation.	2
74	6	Highlight the role of CDC 14 and CDC 25 in cell cycle regulation.	2
75	6	Differentiate between CIP and INK inhibitors of cell cycle.	2
76	6	What are RB proteins? Give its role in cell cycle.	2
77	6	Differentiate between apoptosis and necrosis.	2
78	6	What are anti-apoptotic proteins? Highlight its function with an example.	2
79	6	What are pro-apoptotic proteins? Give example	2
80	6	Mention the morphological changes undergoing by an apoptotic cell.	2
81	6	What are caspases?	2
82	6	Define the role of p53 in apoptosis. Give its role in cancer.	2
83	6	What is an apoptosome?	2
84	6	What is aging?	2
1	1	Explain Groter and Grenel experiment.	5
2	1	Illustrate Danille and Davison model of membrane.	5
3	1	Describe any three earlier models proposed to explain the structure and composition of a cell membrane.	5
4	1	Describe Robertson model. What are its drawbacks?	5
5	1	Explain fluid mosaic model giving insight into the experimental proof for the model	5
6	2	Explain the physicochemical properties of a biological membrane.	5
7	2	Comment on the composition of bilayer membrane.	5
8	2	What is phase transition? Explain the importance of cholesterol and fatty acids in maintaining the cell membrane fluidity.	5
9	2	Write a note on functions of cholesterol in cell membranes.	5
10	2	Critically comment on importance of asymmetry of membrane proteins.	5
11	2	Comment on different types of transmembrane proteins with examples.	5
12	2	Detail the steps involved in post-translational targeting of ER proteins.	5
13	2	Give an account on protein targeting to mitochondrial outer membrane and inner membrane.	5
14	2	Write a note on membrane domains and their importance.	5
15	2	Explain the translocation of proteins to thylakoid.	5
16	2	Explain the translocation of proteins to nucleus.	5
17	2	Explain the translocation of proteins to peroxisomes.	5
18	2	Explain COPI coated vesicular trafficking.	5
19	2	Write a note on COPII coated vesicular trafficking.	5
20	2	Write a note on clathrin coated vesicular trafficking.	5
21	2	Discuss the role of t-snare and v- snare in vesicular docking of proteins.	5
22	2	Write a short note on biogenesis of peroxisomes.	5
23	3	Describe the importance of freeze fracture technique in analysis of membrane structure.	5
24	3	Explain FRAP technique. Mention its applications.	5
25	3	What is single particle tracking? Discuss its application in membrane dynamics study.	5

26	4	Comment on different isoforms of glucose transporters.	5
27	4	Write the structural and functional organization of glucose transporter.	5
28	4	What is active transport? Explain the mechanism of action of sodium potassium transporters.	5
29	4	Diagrammatically outline the mechanism of transport by Na <sup>+</sup> K <sup>+</sup> ATPase. Why is it called an electrogenic pump?	5
30	4	Explain bacterial phosphotransferase system.	5
31	4	Explain receptor-mediated endocytosis with an example.	5
32	4	Discuss exocytosis with an example.	5
33	4	Describe Gated Ion channels with an example.	5
34	4	Comment on the structure and specificity of potassium channel.	5
35	4	Describe non-gated ion channel with an example.	5
36	4	Write a note on structure and mechanism of action of aquaporin channel.	5
37	4	Write a short on channel and carrier ionophore.	5
38	5	Write a note on structure and mechanism of nerve impulse conduction by nicotinic acetylcholine receptor.	5
39	5	Give an account on neurotransmitters.	5
40	5	Explain the mechanism of transmission of nerve impulse across the synapse.	5
41	5	Discuss the role of a neuron in nerve impulse transmission.	5
42	5	Describe the generation and transmission of nerve impulse.	5
43	5	Discuss the role of myelinated sheath in conduction of an impulse.	5
44	5	Write a note on Patch Clamp Technique.	5
45	5	How does impulse transmission take place across cholinergic synapse?	5
46	5	Explain the structure and mechanism of action of ligand gated channel with an example.	5
47	5	Discuss the steps involved in impulse conduction by muscarinic acetylcholine receptor with an example.	5
48	5	Explain the structure and function of NMDA receptors highlighting it's pharmacological importance.	5
49	5	Give an account on structure and function of NMDA receptor.	5
50	6	Explain skeletal muscle contraction.	5
51	6	Discuss the role of troponin and tropomyosin in muscle contraction.	5
52	6	Explain the role of phospholamban in muscle contraction.	5
53	6	Discuss the importance of calmodulin in muscle contraction.	5
54	6	Comment on the role of calcium in muscle contraction. Explain the sliding filament model.	5
55	6	Write a note on phases of cell cycle.	5
56	6	Describe phases of cell cycle. Explain G1 to S phase transition in yeast cell.	5
57	6	Describe phases of cell cycle. Explain G2 to M phase transition in a mammalian cell.	5
58	6	Discuss S phase entry in mammalian cell cycle.	5
59	6	Explain G1 to S phase and G2 to M phase check point.	5
60	6	Explain G2 to M phase and spindle-assembly checkpoint check point.	5
61	6	Discuss on the role of cyclin dependent kinases in the regulation of cell cycle.	5

62	6	Write a note on mammalian cyclins and its regulatory role in cell cycle.	5
63	6	Describe intrinsic and extrinsic pathway for apoptosis.	5
64	6	How does necrosis differ from apoptosis? Explain apoptotic mechanism involving all mediators.	5
65	6	Describe cell senescence.	5
66	6	Describe phases of cell cycle. Explain S to M phase transition in a yeast cell.	5
67	6	Describe phases of cell cycle. Explain G1 to S phase transition in a mammalian cell.	5
68	6	Describe G1 to S phase checkpoint and spindle-assembly checkpoint	5
69	6	What are caspases? Explain the role of caspases in apoptosis.	5
70	6	Write a note on key player proteins in apoptosis.	5
1	1	Give the characteristic feature of Fluid Mosaic Membrane Model and put a light on the evidences provided to propose this membrane model.	10
2	1	Describe the evolutions in models of plasma membrane.	10
3	2	Explain in detail the targeting of proteins to mitochondria.	10
4	2	Explain targeting of proteins to endoplasmic reticulum.	10
5	2	Describe the composition and physicochemical properties of cell membranes.	10
6	2	Explain in detail the targeting of proteins to chloroplast (to stroma and thylakoid).	10
7	2	Describe the biogenesis of lyzosome and peroxisome.	10
8	2	Explain COPI and COPII coated vesicular trafficking.	10
9	2	Explain COPI and clathrin coated vesicular trafficking.	10
10	2	Describe the different phases a phospholipid can assume when placed in a polar solvent	10
11	3	What are liposomes? Discussion in detail its classification, preparation and applications.	10
12	3	Explain the application of FRET and FRAP technique in analysing cell membrane structure and function taking suitable a example.	10
13	4	Explain exocytosis and receptor-mediated endocytosis with an example	10
14	4	Describe different types of Ionophores with a suitable example.	10
15	4	Comment on different isoforms of glucose transporters. Explain the structure and mechanism of GLUT 1.	10
16	4	What are ligand gated and voltage gated ion channels? Explain the strucutre and mechanism of ligand gated and voltage gated ion channels with an example.	10
17	5	Explain in detail the structure and function of nicotinic acetylcholine and muscarinic acetylcholine receptors.	10
18	6	Discuss the role of troponin, tropomyosin and phospholambdan in muscle contraction.	10
19	6	Discuss the importance of calmodulin and phospholambdan in muscle contraction.	10
20	6	Describe cell-cycle regulation in mammalian cells	10
21	6	Describe cell-cycle regulation in yeast cells	10
22	6	Give an account on three check points of cell cycle	10

23	6	Give an account on DNA check points of cell cycle	10
24	6	How does necrosis differ from apoptosis? Explain apoptotic mechanism involving all mediators.	10

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<b>Model Question Paper</b>		
<b>St. Philomena's College (Autonomous), Mysore</b>		
<b>I Semester M.Sc-Final Examination</b>		
<b>Subject: Biochemistry</b>		
<b>Title: Cell &amp; Membrane Biochemistry (HC)</b>		
<b>Time: 3 Hours</b>		<b>Max Marks: 70</b>
<b>PART-A</b>		
<b>Answer any TEN of the following:</b>		<b>10x2=20</b>
1.	Give the drawbacks of Davson and Daniel membrane model.	2
2.	Highlight salient features of Fluid Mosaic Model of cell membrane.	2
3.	Define hexagonal phase I and II lipids.	2
4.	Membranes made of cylindrical lipids have higher melting temperature. Why?	2
5.	What is freeze etching? Give two applications.	2
6.	What is FRAP. Give its application in membrane biology	2
7.	K <sub>m</sub> of Glut1 is less than Glut2. Give physiological importance for this phenomenon.	2
8.	Give the importance of beta subunit in sodium potassium ATPase pump.	2
9.	What is saltatory conduction?	2
10.	Differentiate between postsynaptic and presynaptic membranes.	2
11.	Mention the morphological changes undergoing by an apoptotic cell.	2
12.	What are caspases?	2
<b>PART-B</b>		
<b>Answer any SIX questions:</b>		<b>6x5=30</b>
13.	Illustrate Danille and Davison model of membrane	5
14.	Explain the physicochemical properties of a biological membrane.	5
15.	Critically comment on importance of asymmetry of membrane proteins.	5
16.	What is single particle tracking? Discuss its application in membrane dynamics study.	5
17.	Diagrammatically outline the mechanism of transport by Na <sup>+</sup> K <sup>+</sup> ATPase. Why is it called an electrogenic pump?	5
18.	Give an account on neurotransmitters.	5
19.	Comment on the role of calcium in muscle contraction. Explain the sliding filament model.	5
20.	Describe phases of cell cycle. Explain G1 to S phase transition in yeast cell.	5
<b>PART-C</b>		
<b>Answer any TWO questions:</b>		<b>2x10=20</b>
21.	Describe the evolutions in models of plasma membrane.	10
22.	Describe the biogenesis of lyzosome and peroxisome.	10
23.	What is ligand gated and voltage gated ion channels? Explain the structure and mechanism of ligand gated and voltage gated ion channels with an example.	10

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