



Name:  
Enrolment No:

**UPES**  
**End Semester Examination, December 2023**

**Course:** Cell Biology  
**Program:** B. Tech (Biotechnology/ Biomedical Eng)  
**Course Code:** HSMB 2018

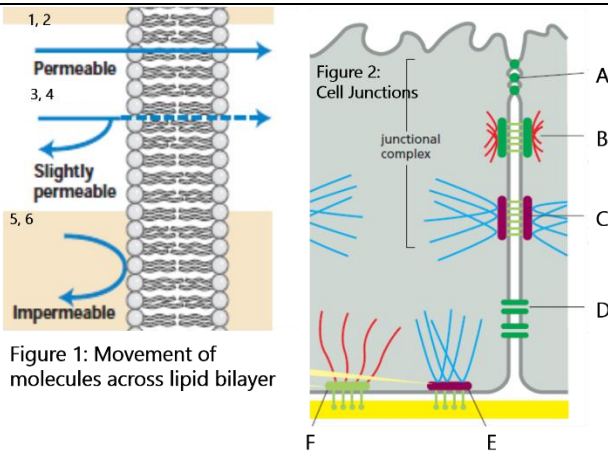
**Semester:** IIIrd  
**Time :** 03 hrs.  
**Max. Marks:** 100

**Instructions: Answer all questions**

Q.No	Section A MCQs/Short answer questions/True &False	(20x1.5= 30 Marks)	COs
Q	Statement of question (each question carries 1.5 marks)		CO
1	Fill in the blanks:  Hydrophobic molecules are uncharged and form few or no ....., and so do not dissolve in water.	1.5	CO1
2	This tissue includes the blood tissue  (a) Muscle tissue (b) Connective tissue (c) Epithelial tissue (d) Nervous tissue	1.5	CO1
3	Pick the correct statement from these regarding the cell membrane:  a) Lipids are arranged in a bilayer with polar heads towards the inner part b) Na <sup>+</sup> and K <sup>+</sup> ions move across cell membrane by passive transport c) Fluid mosaic model of the cell membrane was proposed by Singer and Nicolson d) Proteins make up 60-70% of cell membrane	1.5	CO1
4	Animal cells are interconnected by (a) Plasma membrane (b) Cell wall (c) Desmosomes (d) Plasmodesmat	1.5	CO2
5	Name the organelle that helps the chromosomes split in the mitosis process?	1.5	CO1
6	The function of nucleolus is the synthesis of .....subunits.	1.5	CO3
7	..... Organelle is referred to as the “sorting centre of the cell”.	1.5	CO2
8	Compare between peripheral proteins and Lipid anchored proteins.	1.5	CO2

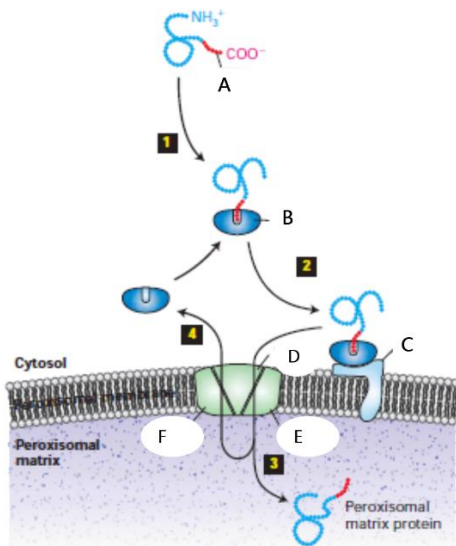
9	In 70S ribosomes S stands for  a) Sedimentation rate b) Svedberg unit c) Solubility factor d) S.I unit	1.5	C03
10	Proteins required in the cytosol like the enzymes of glycolysis are synthesized on  a) Ribosomes on ER b) SER c) Free ribosomes in cytosol d) Ribosomes on nuclear membrane	1.5	C03
11	Fill in the blanks: Secretory proteins are synthesized by ..... on .....	1.5	C02
12	Which molecule activates the formation of a transport vesicle?  a) G-protein b) Lactose c) DNA helicase d) Inducer	1.5	C03
13	COPII-coated vesicles move the materials from _____ to _____  a) ERGIC, Golgi complex b) Golgi complex, ERGIC c) ER, Golgi complex d) Golgi complex, ER	1.5	C02
14	t-SNAREs are present on the _____  a) budding vesicle b) transportation material c) target compartment d) tethering proteins	1.5	C03
15	Cilia and flagella of the eukaryotic cells are made up of  a) Tubulin b) Actin c) Lamin d) desmin	1.5	C04
16	State True or False: Rough endoplasmic reticulum imports its proteins post-translationally.	1.5	C04
17	For which of the following organelles, the proteins to be imported remain in their native folded state?  a) Peroxisomes b) Mitochondrion c) Chloroplast d) Endoplasmic reticulum	1.5	C03

18	Hsp 70 and Hsp 90 are _____ involved in the mitochondrial uptake of proteins.  a) chaperones b) receptors c) ligands d) glycolipids	1.5	CO4
19	Most proteins destined for uptake by the chloroplasts are synthesized with a _____  a) removable C-terminal sequence b) removable N-terminal sequence c) removable hydrophobic tail d) removable hydrophilic tail	1.5	CO4
20	Compare between Euchromatin and Heterochromatin.	1.5	CO4
	<b>Section B</b>	(4x5=20 Marks)	CO
Q	Statement of question (each question carries 5 marks)		
1.	a) With the help of a relevant example explain what do you understand by homologs? b) What is pH? A solution has $[H^+] = 10^{-5}$ . What would be the pOH of the solution?	2+3	CO1
2.	a) Briefly describe the fluid mosaic model of the lipid bilayer. Draw well labelled diagram for the same b) How active diffusion differs from facilitated diffusion?	3+2	CO2
3.	a) What is the significance of uptake targeting sequence (UTS)? Give two characteristic feature of UTS. b) What is SRP? Name its two subunits and their respective function	2+3	CO3
4.	a) Giving relevant examples, differentiate between a proto-oncogene and an oncogene b) Briefly describe how coated vesicles are formed/ bud off from parent membrane.	2+3	CO4
	<b>Section C</b>	(2x15=30 Marks)	
Q	Statement of question (Case studies: each question carries 15 marks)		CO
1.	Following figures present an overview of (1) Movement of molecules across lipid bilayer, and (2) junctions across cells.	15  (3+2+2+3+2+3)	CO1



- With reference to the figures answer the following questions:
- Give two molecules each, that are permeable (1,2), slightly permeable (3,4) and impermeable (5,6) to lipid layer.
  - Differentiate between active transport and secondary active transport.
  - What is the significance of the technique FRAP in the context of lipid bilayer?
  - Label A-F in Figure 2
  - Describe the various types of cytoskeleton prevalent in a cell.
  - Give a diagram showing the 9x2+2 arrangement of microtubules in a flagellum.

2. The following figure presents an overview of protein import from the cytosol into the Peroxisome:



- With reference to the figure answer the following questions:
- State the function of peroxisome. Name one protein that is delivered to peroxisome.
  - Label A-F.
  - Give a detailed account of steps 1-4.
  - How the signal sequence of peroxisome targeted protein differs from that of mitochondrial targeting sequence?

15

CO3

(2+6+4+2+1)

	e) State True or false: Folded proteins can be imported into peroxisomes and their targeting sequence is not removed in the matrix.		
	<b>Section D</b>	(2x10=20 Marks)	
Q	Statement of question (each question carries 10 marks)		CO
1.	<p>a) How do cyclins-CDK complexes regulate G1, S, G2 and M phases of mitosis. Explain with the help of a well labelled diagram</p> <p>b) What are Ras protein? How do they regulate controlled growth and proliferation in cells?</p>	6+4	CO4
2.	<p>a) With the help of a well labelled diagram, explain how Rab GTPases control docking of vesicles on target membranes?</p> <p>b) What are GPCRs. Discuss the role of GPCRs and second messengers in signal transduction?</p>	5+5	CO2