

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: MSc
BRANCH: Biotechnology**

**SEMESTER : 1st
SESSION : MO/2024**

SUBJECT: BT401 MOLECULAR CELL BIOLOGY

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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		CO	BL
Q.1(a)	Explain the concept of relative permeability of molecules across the cell membrane. How does the size and polarity of a molecule affect its permeability?	[5] 1	2
Q.1(b)	With reference to the fluid mosaic model, describe the role of lipids and proteins in maintaining membrane fluidity and function.	[5] 2	3
Q.2(a)	Compare the structure and functions of microtubules, actin filaments, and intermediate filaments in the cytoskeleton.	[5] 2	4
Q.2(b)	Outline a method to measure the rate of diffusion of molecules across the animal cell plasma membrane, highlighting the experimental setup and expected results	[5] 4	5
Q.3(a)	Describe the structural and functional roles of desmosomes, tight junctions and gap junctions.	[5] 2	1
Q.3(b)	Explain how the endoplasmic reticulum (ER) and Golgi apparatus contribute to intracellular trafficking and protein sorting.	[5] 1	4
Q.4(a)	Provide a detailed overview of regulated proteolysis through polyubiquitination. Include the steps of ubiquitination, its role in protein degradation.	[5] 3	3
Q.4(b)	With the help of a schematic diagram, compare the structure of flagella in prokaryotes and eukaryotes.	[5] 1	2
Q.5(a)	Describe the process of mitosis, focusing on the key events of each phase. Discuss the Anaphase-Promoting Complex (APC), its regulation, and its significance in ensuring accurate chromosome segregation.	[5] 3	2
Q.5(b)	Explain the role of G-protein coupled receptors (GPCRs) in activating calmodulin. Discuss the downstream signaling pathway involving calmodulin, emphasizing its biological implications.	[5] 3	3

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