QP Code: R253G056 | Reg. No | | | | | | | | | | | AY 24

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET UNIVERSITY)

M.Sc. (Third Semester – Regular) Examinations, December – 2025

24MBIPC23002– Emerging Technologies

(Biotechnology)

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions		CO #	Blooms Level
a.	What is the function of a dichroic mirror?	2	1
b.	Under what conditions will a researcher use evanescent microscopy.	3	5
c.	Explain point spread function?	3	2
d.	What do you understand by dimensionality reduction?	1	2
e.	What are the uses of phospho-proteomics?	4	2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions		Marks	CO #	Blooms Level
2. a.	Briefly explain the working of Atomic Force Microscopy using suitable diagram.	5	3	2
b.	Elaborate the mechanism of CRISPR with the help of suitable diagram.	5	4	2
	(OR)			
c.	Briefly discuss about cryo-electron microscopy and their advantages.	5	4	2
d.	Imagine yourself as a researcher who is working to decipher the structure of a crystallisable protein. Which method you will use to determine the 3D-structure. Justify your selection and explain the working mechanism?	5	4	5
3.a.	Compare and contrast between solid-state and solution-state NMR.	5	4	4
b.	Elaborate the process of combining nanobody with phage-display method for development of antibody against native proteins.	5	5	2
	(OR)			
c.	Briefly discuss how nanobodies act as a tool for protein structure-function studies and molecular imaging.	5	5	2
d.	Elaborate the uses of CRISPR in modern day genetic engineering. Add a note on the challenges faced by CRISPR.	5	4	2
4.a.	Illustrate the working of evanescent microscopy with the help of suitable diagram?	5	3	2
b.	Spinning disk confocal microscopy provides better imaging (resolution) compared to normal confocal microscopes. Justify.	5	3	5

	(OR)			
c.	Under what conditions will a researcher use Fluorescence Resonant Energy Transfer (FRET)? Illustrate the working using suitable diagram.	5	3	2
d.	Compare and contrast between STED and PALM microscopy.	5	3	4
5.a.	Classify the different ionization techniques used in mass spectroscopy?	5	4	2
b.	What is FLIM? Add a note on the advantages and limitations of FLIM.	5	4	1
	(OR)			
c.	Elaborate the working of orbitrap mass spectrometry using suitable diagram.	5	4	3
d.	Provide a brief note on fragmentation of peptides in MS.	5	4	2
6.a.	Elaborate high-throughput screening? Imagine yourself as a scientist/system biologist working on a specific disease, provide a flow chart of the steps involved for drug discovery.	5	3	6
b.	Write a brief note on the different omics method for experimental validation.	5	4	4
	(OR)			
c.	Provide a comparison of the different mathematical models used in biology.	5	4	4
d.	Evaluate the role of mass spectrometry in structural biology.	5	3	5

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