

CBCS SCHEME

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BBT405D

Fourth Semester B.E./B.Tech. Degree Supplementary Examination,
June/July 2024

Structural Biology and Biophysical Techniques

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

Module – 1			M	L	C
Q.1	a.	List the different types of secondary structures found in proteins and describe their basic features.	10	L1	CO1
	b.	Explain how hydrogen bonding, disulfide bonds, hydrophobic interactions and Vander Waals forces contribute to the stability of protein structures.	10	L2	CO1
OR					
Q.2	a.	Analyze the role of phi(ϕ), psi(ψ) and omega(ω) angles in determining the conformational flexibility of proteins using Ramachandran Plot.	10	L3	CO2
	b.	Evaluate the impact of primary structure on the folding and functionality of proteins considering examples of immunoglobuline and fibrous proteins.	10	L4	CO2
Module – 2					
Q.3	a.	Differentiate between the three different forms of DNA (i.e. A, B and Z).	10	L1	CO1
	b.	Highlight the structure and conformational properties of cell membrane with respect to Singer and Nicholson model.	10	L2	CO1
OR					
Q.4	a.	Elaborate on the general characteristics of nucleic acid structures (A, T, G, C and U)	10	L2	CO2
	b.	Outline the key features of supercoiled DNA and hyperchromicity.	10	L2	CO2
Module – 3					
Q.5	a.	Differentiate between the working principles of SEM and TEM technique with appropriate case studies.	10	L1	CO2
	b.	Analyze the key features and applications of Rayleigh Scattering.	10	L3	CO3
OR					
Q.6	a.	What is MALDI-TOF? Evaluate the importance of this technique and the measurements made. Add a note on the nature of matrices used in the analysis of different compounds.	10	L4	CO4
	b.	Summarize the principle and applications of flow cytometry.	10	L2	CO3

Module – 4

Q.7	a.	Distinguish between fibre diffraction and neutron diffraction techniques towards investigation of biomolecules.	10	L1	CO3
	b.	Outline the working principle, process and applications of Laser Raman.	10	L2	CO2

OR

Q.8	a.	Enumerate the steps involved in the 3D structure determination of biomolecules in a single crystal diffraction technique.	10	L2	CO3
	b.	Differentiate between ESR and EPR.	10	L1	CO3

Module – 5

Q.9	a.	Distinguish between normal phase and reverse phase chromatography with specific applications and merits.	10	L2	CO2
	b.	Interpret the importance of immunoelectrophoresis with special reference to its principle and applications.	10	L3	CO3

OR

Q.10	a.	Discuss the principle of TLC and its experimentation protocol. Comment on the significance of R_f value in a chromatogram.	10	L2	CO4
	b.	Differentiate between horizontal and vertical gel electrophoresis. Add a note on iso-electric focusing.	10	L2	CO4
