

explain this observation? How many fundamental modes of vibration are expected in the IR spectra of H_2O and CO_2 ? (9,9)

5. (a) (i) The density of DNA in 7M CsCl containing 0.1 M MgCl_2 is less than in 7M CsCl alone. Explain. Differentiate between isopycnic and isozonal density gradient centrifugation.

(ii) The sedimentation velocity properties of a supercoiled DNA are being studied as a function of the concentration of added ethidium bromide. It is found that 's' decreases, reaches a minimum and then increases. Explain

(b) Discuss the basic principle of flow cytometry with a suitable diagram and its applications in cell sorting. (9,9)

6. (a) Explain Fick's laws of diffusion and how they apply to the transport of solutes across biological membrane. Briefly discuss the factors affecting membrane transport.

(b) Discuss the concept of the marginal stability of protein. Explain the thermodynamics of protein folding. (9,9)

(200)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5504

J

Unique Paper Code : 3182013601

Name of the Paper : Biophysics

Name of the Course : B.Sc (H) Biomedical Science (NEP)

Semester : IV

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt five questions in all.
3. Question No. 1 is compulsory
4. Subparts of the questions should be attempted together.

1. (a) Define the following terms: (Any five): (5x2=10)

(i) EMR

(ii) Larmor frequency

P.T.O.

- (iii) Spectroscopy
- (iv) Bathochromic shift
- (v) Valinomycin
- (vi) Bragg's law

(b) Differentiate between the following: (Any four)
(4x2 = 8)

- (i) Relative and Specific Viscosity
- (ii) Static and Dynamic quenching
- (iii) Differential and Density gradient centrifugation
- (iv) Twist and Writhe
- (v) Absorption and Emission Spectroscopy

2. (a) Non-quadrupolar nuclei are NMR active. Explain it with suitable examples. Alkynes are more upfield than alkenes in NMR spectroscopy. How can you best explain this observation?
- (b) Using the Jablonski diagram, explain the theory of fluorescence spectroscopy. Discuss the intrinsic and extrinsic fluorescent probes used in the study of proteins. (9,9)

3. (a) The glycine molecule is CD inactive. How can you best explain this observation? State the major differences between CD and ORD. Explain how CD can be used to study protein structure.
- (b) pi bonds are required to produce an absorption spectrum. Explain it with suitable examples. An auxochrome is known as a compound that modifies the lambda max of a chromophore. Explain this observation with suitable examples. (9,9)
4. (a) (i) What are the different factors which affect viscosity? How is Couette viscometer better than Ostwald viscometer?
- (ii) For a single subunit protein, how the viscosity would be affected when given the following treatments
- Guanidium chloride alone
 - Guanidium chloride and Beta mercaptoethanol
- (b) Not all covalent bonds display bands in the IR spectrum. Only polar bonds do so. Justify the statement with suitable examples. Amines show a broad band but not as wide as the O-H bond of alcohols in the IR spectrum. How can you best