Register Number: ……

B.TECH. DEGREE EXAMINATIONS: NOV/DEC 2010

Seventh Semester

BIO TECHNOLOGY

U07BTE10: Techniques for Analysis of Biomolecules Biophysics

Time: Three Hours **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. ORD is change of

   a) absorbance with time b) absorbance with wavelength

   c) optical rotation with wave length d) transmittance with frequency

2. Cotton effect is

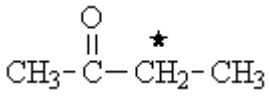
   a) magnetic field dependence of ORD curve

   b) characteristic wavelength dependence of ORD/CD near the absorption band

   c) frequency dependence of absorbance

   d) electric field dependence of ORD

3. What is the multiplicity expected in the proton NMR spectrum for the hydrogen atoms marked by a "star" in the following compound?



   a) singlet b) triplet c) quartet and d) heptet

4. The number of nuclear spin energy levels fo a nuclei of nuclear spin quantum number I = 5/2 is

   a) 5 b)6 c) 4 and d) 3

5. Mass spectra is a plot between

   a) Relative abundance & m/z, b) intensity & wavelength,

   c) absorbance & wavelength and d) intensity & electric field

6. Which of the following statement is incorrect

   a) Parent ions are not always observed in the mass spectra of compounds.

   b) Mass spectrometry provides direct structural data.

   c) Mass spectrometry gives information about fragmentation patterns.

   d) Isotopic distribution patterns are observed in mass spectra

7. The crystallinity of a material can be calculated using its

a) mass spectra, b) X-ray diffractogram, c) NMR spectra and d) scanning electron microscopy

8. Which of the following compounds give x-ray diffractogram?

a) amorphous silica b) sodium chloride

c) amorphous poly(vinyl chloride) d) liquid water

9. Maximum Resolution of electron microscopy is

a) <0.1 nm b) 200 nm c) 100 nm d) 1000nm

10. Transmission electron microscopy is best for high magnification viewing of

a) internal structure of fixed cells. b) internal structure of live, motile cells.

c) surface structure of fixed cells. d) surface membranes of live, motile cells.

PART B (10 x 2 =20 Marks)

11. What is Faraday effect?
12. Define molar ellipticity.
13. Distinguish phenyl alanine and alanine using proton NMR.
14. What is screening constant in NMR spectroscopy?
15. Define the resolution of mass spectrophotometer.
16. How do mass spectra for electron impact and chemical ionization sources differ from each other?
17. What material could be used to filter the 40kV radiation for an XRD measurement?
18. What are small angle (SAXS)and wide angle x-ray scattering(waxs)? What structural information they furnish?
19. How an electron beam exchange energy with materials in SEM?
20. What are spatial and temporal resolution in scanning tunneling microscopy?

PART C (5 x 14 = 70 Marks)

21.a) (i) What is circular dichroism spectrophotometer? Explain how it is useful in analysis of different types of protein secondary structures and protein folding kinetics. (9)

(ii) Explain how CD spectra is useful in analyzing base-base orientation in nucleic acids. (5)

(OR)

b) (i) Discuss the working principle of ORD spectroscopy and its application in analysis of structures of nucleic acid and protein. (11)

(ii) Give the different types of ORD curves (3)

22 a) (i) Explain how the proton NMR is useful in elucidating the structure of macromolecules such as protein (10)

(ii) Define spin-spin splitting and coupling constant in NMR spectroscopy (4)

(OR)

b) Write briefly on

(i) Nuclear overhauser effect (7)

(ii) Magnetic resonance imaging (7)

23 a) (i) Explain with examples how the structural information of molecules can be derived from the fragmentation pattern in mass spectra. Discuss the quantitative applications of mass spectrometer. (10)

(ii) What is time- of-flight mass analyzer? (4)

(OR)

b) (i) Discuss the different ionization sources in mass spectrometer (10)

(ii) How do gaseous and desorption sources in mass spectrometer differ? What are the advantages of each? (4)

24. a) (i) Explain how the crystal structure of a molecule is determined using X-ray Diffraction. (10)

(ii)What is anomalous diffraction? (4)

(OR)

b) (i) What is electron diffraction? How it differs from X-ray diffraction? Discuss its application. What are the advantages and disadvantages of electron diffraction? (10)

(ii) What is neutron diffraction? Mention its applications. (4)

25. a) (i) What is tranmission electron microscope? What are its limitations? Discuss its biological and non-biological applications (10)

(ii) How SEM micrographs of tissues and living cells are recorded? (4)

(OR)

b) (i) Discuss the working principle of atomic force microscopy ? Explain its applications in biotechnology with examples? (10)

(ii) Explain the principle of combinatorial chemistry? How it is useful in discovery of new drugs (4)

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