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Total No. of Pages : 02

Total No. of Questions : 08

**M.Tech.(Bio. Tech.) (Sem.-2)**  
**BIO-ANALYTICAL TECHNIQUES**  
Subject Code : MTBT-108  
Paper ID : [E0915]

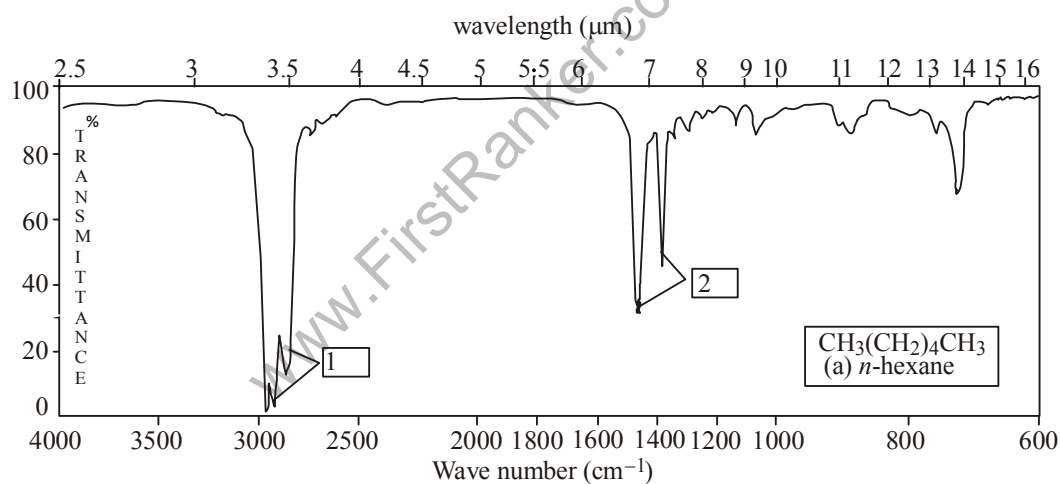
Time : 3 Hrs.

Max. Marks : 100

**INSTRUCTION TO CANDIDATES :**

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

- Q1 a) Identify the type of peaks i.e. stretches represented in boxes 1 and 2 in the Infra-red Chromatogram given above. What is the fingerprinting region?
- b) Give the principle and applications of Infra-Red Spectroscopy?
- c) What are the different types of IR detectors used in Infra-Red Spectroscopy?
- d) Discuss the methods of sample preparation for IR spectroscopy.

**Figure - 1**

- Q2 Discuss the role and applications of radioisotopes in Biotechnology.

- Q3 a) What is Quenching? What are the methods of counting Scintillations during a radioactivity based experiment?
- b) Explain how UV spectrophotometer is different from Fluorescent Spectrophotometer.
- Q4 What is the principle of NMR Spectroscopy? Give an account on the application of NMR in Biomedical and Diagnostics.
- Q5 Explain the differences between Mass Spectroscopy and IR Spectroscopy, based on principle, instrument design and applications.
- Q6 a) A protein having single tryptophan residue shows fluorescence emission spectrum with  $\lambda_{\text{max}} \approx 325 \text{ nm}$  in water.
- i. Name the major chromophore for this wavelength region.
- ii. What are the different electronic transitions that take place in this wavelength region?
- b) What is the name of the standard used in proton NMR? Give four advantages of the standard used in NMR.
- Q7 a) Explain the appearance of Rayleigh, Stokes and Anti-Stokes lines in Raman spectra with suitable schematic diagram using quantum theory.
- b) Why are Stokes lines more intense than anti-Stokes lines in Raman effect?
- Q8 a) Differentiate between rate zonal centrifugation and density gradient centrifugation giving suitable examples.
- b) How is bench top centrifuge different from ultracentrifuge?