

Q.P. Code : 39084

[2½ Hours]

[Marks: 60]

Please check whether you have got the right question paper.

- N.B:**
- 1. All questions are compulsory.**
 - 2. Use of log table of nonprogrammable calculator is permitted.**

Q1. (A) Attempt any two of the following :

08

- Discuss the sample handling in IR Spectroscopy.
- Explain the different types of proton decoupling experiments that are used in ^{13}C NMR
- Discuss the applications of near IR absorption spectrometry. Mention the various IR regions with respect to their suitability to the chemical analysis.
- Explain the applications of ^{31}P NMR Spectroscopy.

(B) Why Deviations from Beer's Law With IR radiation are more common than with ultraviolet and visible wavelengths?

04

OR

(B) Mention environmental effects in NMR Spectroscopy. Explain anyone in detail.

04

Q2. (A) Attempt any two of the following :

08

- Discuss Quantitative Analysis of Compounds and Mixtures by Mass Spectroscopy
- Discuss the Mechanisms of Raman and Rayleigh Scattering.
- Enlist the different classes of Mass analysers. Explain anyone in brief,
- Explain Depolarization Ratio. Discuss its analytical utility.

(B) Discuss Electron impact ionization sources, mention its advantages and disadvantages.

04

OR

(B) At what wavelengths in nanometers would the Stokes and anti-Stokes Raman lines for carbon tetrachloride $\bar{\nu}$ ($\bar{\nu} = 218,314, 459, 672$ and 790 cm^{-1}) appear if the source was a helium-neon laser (632.8 nm).

04

Q3. (A) Attempt any two of the following

08

- Discuss the principle and types of radiometric titration.
- Explain the principle and instrumentation of thermometric titration.
- Explain advantages and limitations of isotope dilution analysis.
- Discuss the analytical applications of DTA for characterization of polymers.

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(B) What is the difference between heat flux DSC and Power compensated DSC? Discuss anyone in brief. **04**

OR

(B) Explain the applications of evolved gas analysis. **04**

Q4. (A) Attempt any **two** of the following **08**

- i. What is hyphenation of analytical instrument? Enlist possible hyphenations
- ii. Discuss Light Pipe Interfaces in GG-IR
- iii. What is Tandem mass spectrometry? Discuss its advantages.
- iv. Enlist the interfaces in LC-MS. Discuss Thermospray LC-MS interface in detail.

(B) Discuss the Instrumentation of ICP-OES. **04**

OR

(B) Explain the applications of GC-MS tandem Systems. **04**

Q5. Attempt any **four** of the following : **12**

- i) Why are quantitative analytical methods based on Near-IR radiation often more precise and accurate than methods based on mid-IR radiation?
- ii) Explain the origin of the Chemical Shift in NMR spectroscopy.
- iii) Explain fast atom bombardment sources in mass spectroscopy.
- iv) How fluorescence problems in Raman spectroscopy can be minimized?
- v) Explain the substoichiometric Isotope Dilution Analysis.
- vi) What are the applications of DSC?
- vii) Explain the spectral interferences observed in ICP-MS.
- viii) Discuss major problems encountered in GC-MS interfacing.
