

Q.P. Code :10285**[Time: 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 or non-programmable calculator is **permitted**.

Q.1 a) Attempt any two of the following:-**08**

- Explain the basic principle of IR spectroscopy.
- What is the significance of group frequency region and fingerprint region in qualitative analysis of organic compounds by IR spectroscopy?
- Explain the term “precession of particles in a field” involved in NMR spectroscopy.
- Discuss the effect of Magnetic Anisotropy.

b) Explain the role of pyroelectric transducer in infrared spectroscopy.**04****OR****b) What is ^{31}P NMR? What are its advantages over normal NMR?****04****Q.2 a) Attempt any two of the following:-****08**

- Under what circumstances would helium / neon lesser be preferable to an argon ion in laser as a Raman source?
- Explain the use of Raman spectra for qualitative and quantitative analysis of inorganic species with suitable example.
- Explain the function of fast atom bombardment sources in mass-spectroscopy.
- Explain origin of metastable peaks in mass spectroscopy.

b) Write note on surface – Enhanced Raman spectroscopy.**04****OR****b) Explain the use of mass spectrum for structural information from fragmentation pattern.****04****Q.3 a) Attempt any two of the following:-****08**

- Discuss the advantages and disadvantages of thermal neutron activation analysis.
- Give the expression used in quantitative isotope dilution analysis and explain the term involved in it.
- Describe the working of instrument used in differential scanning calorimetry (DSC).
- What are radiometric titrations? Explain the nature of the titration curve obtained in the determination of chloride ions using this technique.

b) Describe the working of instrument used in DTA with suitable diagram.**04****OR****b) Discuss the different types of thermometric titrations with suitable examples.****04****P.T.O**

Q.P. Code :10285**Q.4 a) Attempt any two of the following :-****08**

- Give the principle and working of ICP-OES.
- How can HPLC be coupled with MS? What are the interfaces available for this purpose?
- Explain the interfacing devices used in GC-MS. How is it ensured that the carrier gas is removed from the components?
- How can IR be coupled to GC? What are the difficulties in coupling an IR to GC?

b) Explain: The interfaces used in ICP-MS and advantages of using mass spectrometer as detector.**04****OR****b) How the tandem mass spectroscopic technique used to identify compounds having same mass but different structures?****04****Q.5 Attempt any four of the following:-****12**

- Discuss advantages of Fourier transform infrared spectrometer compared with a dispersive instrument.
- What are the advantages of FTNMR measurement over a continuous – wave measurements?
- Explain the method of sampling using optical fibers used in Raman spectroscopy, with suitable diagram.
- Explain the function of time of flight mass analyzer in mass spectrometer.
- What is autoradiography? How is it different from gamma radiography?
- Give applications of evolved gas analysis.
- What is hyphenation? Why is it required? What are its advantages?
- Give the principle and working of MS-MS.