Q.P. Code :10286

[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**

i. Give an account of monochromator used in IR spectrometer.
ii. Discuss the application of far IR and mid – IR absorption spectrometry.
iii. Give application of NMR spectroscopy with reference to quantitative analysis of the chemical compounds.
iv. Explain the behavior of a charged rotating particle in a magnetic field with suitable example.

b) What ^{13}C NMR? What are its advantages? **04**

OR

b) Explain the function of thermocouple and bolometer as infrared transducers. **04**

Q.2 a) Attempt any two of the following :- **08**

i. Explain qualitative and quantitative analysis of organic species on the basis of Raman spectra with suitable example.
ii. Explain the method of handling for liquid and solid samples in Raman spectrophotometry.
iii. Explain the function of fast atom bombardment sources in mass-spectroscopy.
iv. Discuss the application of mass spectroscopy with respect to determination of molecular formula from molecular weight.

b) Calculate the magnetic flux density that is required to focus a $C_4H_9^+$ ion on detector in mass spectrometer in which the accelerating potential is maintained at 160kV and rating of curvature of the focused ionic beam at the exit slit is 24.0cm. **04**

OR

b) Explain the mechanism of Raman and Rayleigh scattering. **04**

Q.3 a) Attempt any two if the following :- **08**

i. Explain the instrumentation used in DSC.
ii. What is meant by substoichiometry in IDA? What are the requirements for the tracers employed in this technique?
iii. Explain the principle and working of thermometric titration with suitable example.
iv. What are radiometric titrations? Explain the titration and nature of the curve obtained in the determination of chloride ions using this technique.

b) What are radio release methods? Explain the role radioactive kryptonates in radio release method. **04**

OR

b) Describe the working of instrument used in the differential thermal analysis. **04**

P.T.O

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

i. How the tandem mass spectroscopic technique used to identify compounds having same mass but different structures?
ii. What are hyphenated technique? Explain the need for hyphenation.
iii. Give the principle and working of MS-MS.
iv. Explain the interfaces used in GC-MS and give application of GC-MS.

b) Give application of GC-IR and account of interfaces GC-IR. **04**

OR

b) How can HPLC be coupled with MS? What are the interfaces available for this purpose? **04**

Q.5 Attempt any four of the following :- **12**

i. Explain the term with suitable example:- spin-spin coupling.
ii. Explain the principle of far – infrared spectroscopy.
iii. Give an account of surface enhanced Raman spectroscopy.
iv. Why do double – focusing mass spectrometers give narrower peaks and high resolutions?
v. What are the difficulties involved in the analysis of evolved gases during thermal decomposition by GC?
vi. What are the basic factors that affect the induced radioactivity during neutron activation analysis?
vii. Give the principle and working of ICP-OES.
viii. Explain principle of GC-IR.