

[Time: 2½Hrs]

[Marks:60]

Please check whether you have got the right question paper.

- N.B:
1. All question are compulsory.
 2. Figures to the right indicate full marks.
 3. Use of logarithmic table/ non programmable calculator is allowed.

- Q. 1 A) Attempt any TWO of the following: (08)**
- i) Explain the theory of FTNMR
 - ii) What is a HETCOR technique? How is it related to COSY?
 - iii) Discuss the principle and applications MRI
 - iv) Discuss the FID signal generation mechanism in NMR spectroscopy
- Q. 1 B) Attempt any ONE of the following: (04)**
- i) Draw the schematic diagram of two dimensional NMR spectrum and explain the significance of diagonal and off diagonal peaks
 - ii) Describe briefly ¹³C NMR spectroscopy
- Q. 2 A) Attempt any TWO of the following: (08)**
- i) What do you understand by metastable ion peak? How these are recognized in the mass spectrum?
 - ii) Describe the basic components in Mass spectrometer and its function?
 - iii) Explain the principle and theory of SERS
 - iv) Discuss four applications of Raman spectroscopy
- Q. 2 B) Attempt any ONE of the following: (04)**
- i) Discuss the correlation of mass spectra with molecular structure with suitable examples
 - ii) Explain the theory of Resonance Raman spectroscopy
- Q. 3 A) Attempt any TWO of the following: (08)**
- i) Discuss the different radio release methods in analysis.
 - ii) What are radiometric method of analysis? Illustrate with suitable example?
 - iii) Explain evolved gas analysis with respect to TG-FTIR.
 - iv) Describe the working of TG-DSC.
- Q. 3 B) Attempt any ONE of the following: (04)**
- i) Give a brief account of neutron activation.
 - ii) What is TG-DTA? Draw neat labelled diagram of the instrument and explain the components of it.

- Q. 4 A) Attempt any TWO of following (08)**
- i) Explain the interfaces used in GC-MS
 - ii) How is GC coupled with IR?
 - iii) Describe in brief the principle and working of Tandem mass spectrometry.
 - iv) Discuss the applications of HPLC-MS

- Q. 4 B) Attempt any ONE of following (04)**
- i) Give the applications of GC-IR
 - ii) Write the note on CE-MS.

- Q. 5 Attempt any FOUR of the following (12)**
- i) Explain chemical shift in NMR spectra. How is it able to elucidate the structure of molecules?
 - ii) Describe the different types of relaxation processes
 - iii) Describe with examples the fragmentation pattern in mass spectrum
 - iv) Explain the instrumentation of Resonance Raman spectroscopy
 - v) Outline the types of radiometric titrations.
 - vi) Explain the principle of TG-DSC
 - vii) Identify the advantages of MS-MS over MS?
 - viii) Draw neat labelled diagram of GC-MS.
