[2½Hours] **[Total Marks : 60]**

Please check whether you have got the right question paper.

N.B: 1. **All questions are compulsory**
2. **Figures to the right indicate full marks**

Q.1 (A) Attempt **Any Two** of the following: **(08)**

1) Explain the instrumentation of NMR with a schematic diagram.
2) What is Chemical shift? Discuss factors affecting Chemical shift.
3) Explain the principle and Instrumentation of MRI.
4) Describe briefly C^{13} NMR spectroscopy.

(B) What is Proton Decoupling? Explain it with suitable examples. **(04)**

OR

(B) Give a brief account of 2D FTNMR. **(04)**

Q.2 (A) Attempt **Any Two** of the following: **(08)**

1) Draw a schematic diagram of Mass Spectrometer and explain the major components of the instrument.
2) Discuss factors affecting Fragmentation.
3) Describe fragmentation in case of alkyl halides.
4) Explain the principle of Raman Spectroscopy.

(B) What is Surface Enhanced Raman Spectroscopy? **(04)**

OR

(B) Discuss Raman Depolarisation Ratios. **(04)**

Q.3 (A) Attempt **Any Two** of the following: **(08)**

1) What are the factors affecting induced radioactivity during neutron activation analysis?
2) Give brief account of radiometric methods of analysis.
3) Write a note on TG-MS.
4) Discuss the application of radiometric technique in complexometric titrations.

(B) Explain TG-FTIR with respect to Evolved Gas Analysis. **(04)**

OR

(B) Describe the working of the instrument used for TG-DTA. **(04)**

Q.4 (A) Attempt **Any Two** of the following: **(08)**

1) What is hyphenation? Give the principle of Hyphenated Techniques.
2) With a neat Labelled diagram explain the instrumentation of GC-MS.
3) Describe Tandem Mass Spectrometry.
4) Discuss inductively coupled plasma- mass spectrometry.

(B) Write a note on LC-MS. **(04)**

OR

(B) What are the difficulties in connecting IR to GC and how are they overcome? **(04)**

Q.5 Attempt **Any Four** of the following: **(12)**

1) Explain Nuclear Over Hauser effect (NOE) with respect to 2D FT-NMR.
2) Distinguish between COSY and TOCSY.
3) What are the ion sources used in mass spectroscopy?
4) What kind of analytical information can be derived from Mass Spectra?
5) List the applications of Neutron Activation Analysis.
6) Write the principle of TG-DSC.
7) Describe the working of Jet Separator.
8) Discuss the light pipe used in GC-IR.

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