

**UKA TARSADIA UNIVERSITY**  
**M. Pharm. (Pharmaceutical Analysis) (1<sup>st</sup> Semester)**  
**040060103: Advanced Spectroscopic Techniques**

Time : 10:00 am to 1:00 pm

Date : 26/12/2013

**Duration: 3 hours**

**Maximum marks: 70**

**Instructions:**

1. Attempt all questions
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks allocated to that question.
5. Draw diagrams/figures wherever necessary.

**SECTION-1**

**Q.1] (a) Answer the following in brief: [5 x 2 = 10]**

- 1) What is depolarization ratio?
- 2) Explain the principle of Photoacoustic spectroscopy.
- 3) What do you mean by three and four level laser systems?
- 4) What do you mean by chemical equivalence and magnetic equivalence?
- 5) What are the benefits of 2D NMR?

**(b) Define eximers. [1]**

**Q.2] Answer the following (any three): [3 x 4 = 12]**

- 1) Write full form of DEPT. What kind of information can be obtained from DEPT spectrum? Explain with suitable example.
- 2) Explain the mechanism of Raman and Rayleigh scattering.
- 3) Write a note on Surface enhanced Raman spectroscopy.
- 4) Describe COSY spectra of 1-chloro 2-propanol.

**Q.3] Attempt any two [2 x 6 = 12]**

- 1) Describe the instrumentation for measurement of chemiluminescence. Explain with suitable example how chemiluminescence aid in analysis of gases.
- 2) What are the components of a typical laser source? Explain the mechanism of laser action.
- 3) Discuss diastereotopic groups with their effects in NMR spectra.

## SECTION-2

**Q.4] (a) Answer the following in brief: [5 x 2 = 10]**

- 1) Describe any one detector for radioactivity measurement.
- 2) Explain the principle of isotopic dilution method.
- 3) Enlist the components of an instrument used to measure ESR.
- 4) Write full forms of HETCOR and HMQC.
- 5)  $^{13}\text{C}$ -NMR is less sensitive than  $^1\text{H}$ -NMR. Explain.

**(b) Give full forms of ENDOR and ELDOR. [1]**

**Q.5] Answer the following (any three): [3 x 4 = 12]**

- 1) Discuss the factors affecting chemical shift in CMR spectroscopy.
- 2) Explain the principle of ESR and state its applications.
- 3) Differentiate between alpha, beta and gamma rays.
- 4) What is INADEQUATE? Explain the significance of INADEQUATE in  $^{13}\text{C}$ -NMR spectroscopy.

**Q.6] Attempt any two [2 x 6 = 12]**

- 1) Enlist the types of proton decoupling methods used in  $^{13}\text{C}$ -NMR. Describe any two with suitable examples.
- 2) Predict  $^{13}\text{C}$ -NMR spectra of cyano methane, ethyl methyl ketone and chloro benzene. Justify your predictions.
- 3) Describe destructive and non-destructive activation methods with suitable diagram.