

**UKA TARSADIA UNIVERSITY**  
**M. PHARM.(Pharma Analysis) SEMESTER – I January 2012**  
**040060103 ADVANCED SPECTROSCOPIC TECHNIQUES**

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.
5. Draw diagrams/figures whenever necessary.

**Section I**

- Q-1 (A) Answer the following** **[07]**
- i. Give the full form of followings:  
a. LASER                      b. DEPT                      c. INADEQUQTE                      d. NOESY
  - ii. Enlist the types of LASER
  - iii. Name the detectors used in Photoacoustic spectrometry.
  - iv. Enlist useful Chemiluminescence reagents for solution phase assay.
- Q-1 (B) Answer the following in brief: (Any 4)** **[08]**
- I) What is the meaning of population inversion in LASER?
  - II) NIR laser sources used in Raman spectroscopy. Explain
  - III) What is stoke's and antistoke's shift?
  - IV) Monochromator is not required for light measurement in Chemiluminescence method.
  - V) DEPT experiment can be discriminated methyl, methylene, and methyne protons.
  - VI) The methyl group of the acetate moiety of ethyl acetate does not show off-diagonal peak.
- Q-2** **[10]**
- A) Describe mechanism of LASER formation.
- OR**
- A) What is Chemiluminescence? Describe theory of Chemiluminescence.
- B) Discuss principle of Photoacoustic spectrometry.
- OR**
- B) Describe COSY spectrum of 1-propanol.
- Q-3** **[10]**
- Write note on the followings: (Any 2)**
- A) Principle and instrumentation of Raman spectroscopy
  - B) HETCOR technique
  - C) Shifts reagents

**Section-2**

- Q-4 (A) Answer the following:** **[07]**
- I) Enlist the factors that affecting the CMR chemical shifts.
  - II) Enlist accelerators used as neutron source.
  - III) What do you mean by barns?
  - IV) What is the value of natural abundance of  $^{13}\text{C}$ ?
  - V) What is the chemical shift value for carbon of acetylene in  $^{13}\text{C}$ NMR
  - VI) Give the full form of PGNA and INNA.

**Q-4 (B) Answer the following in brief: (Any 4) [08]**

- I) Why in CMR protonless carbon is exhibit low intensity?
- II) Why benzene carbon is absorb at about  $\delta$  120 ppm in  $^{13}\text{C}$  NMR?
- III) What is the role of quenching gas in GAS Ionization detector?
- IV) Differentiate between  $\alpha$ ,  $\beta$  and  $\gamma$  rays.
- V) Explain hyperfine splitting.
- VI) Give principle of INNA.

**Q-5 Answer the following: [10]**

A) Describe proton decoupled and off resonance techniques used in  $^{13}\text{C}$  NMR.

**OR**

A) Predict proton coupled and decoupled  $^{13}\text{C}$  NMR spectrum of Aspirin.

B) Describe principle and instrumentation of Electron Spin resonance spectrometry.

**OR**

B) Describe any two detectors used for radio activity measurement.

**Q-6 Write note on the followings (Any 2) [10]**

- A) Neutron activation analysis
- B) Positron emission tomography.
- C) Chemical shifts in  $^{13}\text{C}$  NMR.

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