Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. Pharm. – SEMESTER – I • EXAMINATION – WINTER 2013

Subject Code: 910207 Date: 26-12-2013

Subject Name: Advanced Spectroscopic Techniques

Time: 10.30 am - 01.30 pm Total Marks: 80

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Explain the following (Any five) **10**

I) Monochromator is not required for light measurement in Chemiluminescence method.

II) DEPT experiment can be discriminated methyl, methylene and methyne protons.

III) The methyl group of the acetate moiety of ethyl acetate does not show off-diagonal peak.

IV) In ^{13}C NMR protonless carbon exhibits low intensity.

V) $CDCl_3$ exhibits a triplet at δ 76, 77and 78 in its ^{13}C NMR spectrum.

VI) NIR laser sources are used in Raman spectroscopy.

VII) Population inversion for normal distribution of energy state is required for laser.

(b) What is Chemiluminescence? Describe theory of Chemiluminescence. **06**

Q.2 **(a)** Explain principle of Photoacoustic spectrometry. Describe the detectors used in Photoacoustic spectrometry. **08**

(b) What is shifts reagent? Discuss its utility in study complex spectra with example. **08**

Q.3 **(a)** What is LASER? Explain. Describe principle of LASER formation in detail. **08**

(b) Classify and describe any two lasers with diagram. **08**

Q.4 **(a)** Describe theory, instrumentation and applications of Electron Spin resonance spectrometry. **10**

(b) Describe COSY spectrum of 2-propanol. **06**

Q.5 **(a)** Describe proton decoupled and off resonance techniques used in ^{13}C NMR. **06**

(b) Describe the effects of substitution on chemical shifts in ^{13}C NMR. **05**

(c) Predict proton coupled and decoupled ^{13}C NMR spectrum of parcetamol. **05**

Q. 6 **(a)** What is stoke's and antistoke's shift? Describe principle and instrumentation of Raman spectroscopy. **10**

(b) Give difference between COSY and NOESY. Describe INADEQUATE technique. **06**

Q.7 Write notes on the followings: **16**

a. HETCOR technique

b. Neutron activation analysis

c. Positron emission tomography(PET)

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