Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. Pharm. – SEMESTER – I • EXAMINATION – WINTER • 2015

Subject Code: 910001 **Date: 29-12-2015**

Subject Name: Modern Analytical 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)** Define chemical shift. Discuss the factors affecting the chemical shift. **06**

(b) Explain the following statements **10**

(i) M is not obtained for sugars using EI source but it can be obtained in FAB.

(ii) CD curves are obtained in those optical isomers only which have chromophoric groups.

(iii) C-13 NMR spectra are more difficult to record than PMR spectra

(iv) On hydrogen bonding, stretching frequency in IR gets lowered.

(v) R band shows a blue shift on increasing the polarity of the solvent.

Q.2 **(a)** Discuss principal of UV – Visible spectroscopy. **06**

(b) Write in brief about **10**

(i) Spin-spin decoupling (ii) Mc- Lafferty rearrangement

(iii) Base Peak (iv) HETP

Q.3 **(a)** How will you differentiate between following pairs of compounds using IR spectroscopy. Give appropriate wave number for prominent peaks. **06**

(i) CH_3COCH_3 and $CH_2{=}CHCH_2OH$

(ii) CH_3OH and CH_3CHO

(iii) CH_3COOH and C_6H_5CHO

(b) Explain Bragg's equation for diffraction of X – rays by crystals. How it can be used? **05**

(c) Explain: (i) zone electrophoresis (ii) principle of RIA and IRMA **05**

Q.4 **(a)** Give fragmentation patterns of the following compounds **06**

(i) Ethyl secondary butyl ether (ii) Cyclohexanone

(ii) Ethyl benzoate (iv) Benzyl alcohol

(b) What is thermal method of analysis? Discuss principle and applications of differential thermal analysis. **05**

(c) Explain: (i) MALDI-MS (ii) Documentation of reference standard. **05**

Q.5 **(a)** Give chemical shift values and spin-spin splitting for the following compounds **06**

(i) Ethyl methyl ketone (ii) 2-Propanol (iii) Ethyl ethyl ether

(b) Write note on 2D NMR spectroscopy. **05**

(c) Describe in brief: **05**

(i) Principle of atomic spectroscopy (ii) ORD and Cotton effect

Q. 6 **(a)** Discuss the principle and advantages of HPLC **06**

(b) Explain the principle of Size exclusion chromatography. **05**
Describe stationary phases used in SEC.

(c) Enlist the factors affecting the efficiency of chromatographic separation. **05**
Discuss longitudinal diffusion.

Q.7 **(a)** Discuss principle and stationary phases used in ion exchange chromatography. **06**

(b) Identify the following compounds on the bases of the spectral data presented here. Show the reasons for the conclusions to be taken by you. **05**

Molecular formula: C_7H_8O
UV: λmax = 222 nm and 272 nm
IR: 3065-3000, 2950-2840, 1604, 1498, 1250, 1040, 750, 688 cm^{-1}
NMR: (δ) 3.70 s (3H),
6.85 m (3H),
7.15 m (2H)

(c) Identify the following compounds on the bases of the spectral data presented here. Show the reasons for the conclusions to be taken by you. **05**

UV: λmax = 280 nm
IR: 3400, 3050, 2980, 1601, 1499, 1420, 1300, 745, 692 cm^{-1}
NMR: (δ) 1.20 t (3H)
3.10 q (2H)
3.30 s (1H)
6.5-7.5 s (5H)
Mass: M^+ 121

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