Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
M. Pharmacy Sem-I   Examination January 2010
Subject code: 910001
Subject Name: Modern Analytical Techniques

Date: 19 / 01/ 2010   Time: 12.00 – 3.00 pm

Instructions: Total Marks: 80
1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 (a) Explain the term resolution, column selectivity and capacity factor. Describe the options for changing the selectivity α.   **08**

(b) Explain the principle of size exclusion chromatography. Describe stationary phases used in SEC.   **08**

Q.2 (a) Enlist the factors affecting the efficiency of chromatographic separation. Discuss longitudinal diffusion.   **06**

(b) Describe chemical ionization technique with its advantages and disadvantages.   **05**

(c) Give chemical shift values and spin-spin splitting for the following compounds: **05**
   i. Benzyl acetate   ii. Ethanol   iii. Ethyl methyl ether

Q.3 (a) What is plasma? Discuss inductively coupled plasma emission spectroscopy.   **06**

(b) What is enzyme immune-assay? Describe double sandwich ELISA technique for antigen measurement.   **05**

(c) How will you differentiate o, m and p xylene on the basis of their proton decoupled CMR spectrum.   **05**

Q.4 (a) Describe the factors affecting the chemical shift.   **06**
(b) Describe methods used for simplification of complex spectra.   **05**
(c) Describe theory and application of derivative spectroscopy.   **05**

Q.5 (a) Explain the following statements: **06**
   i. Maldi is used to determine the molecular weight of proteins.
   ii. Anilinium cation exhibits UV spectrum almost similar to benzene.
   iii. C 13 NMR spectra are more difficult to record than PMR
   iv. The value of capacity factor k' should be between 1 to 10.
(b) Describe storage, handling and documentation of reference standard.   **05**
(c) Describe with diagram, principle and working of Michelson interferometer.   **05**

Q. 6 Write short notes on the following: **16**
   a. HPTLC
   b. Isoelectric focusing
   c. Mc-lafferty rearrangement

Q.7 (a) Describe technique of Affinity chromatography.   **06**

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(b) Identify the following compounds on the basis of the spectral data **10** presented here. Show your reasoning for the conclusion arrived at.

i. UV: 265 nm ($\epsilon = 450$)

   IR: 3330, 2970, 2880, 1515, 1465, 813 cm^{-1}

   NMR: (δ) 1.12 d (6H) J=7.0 Hz

           2.28 s (3H)

           2.82 heptate (1H) J=7.0 Hz

           7.02 s (4H)

   CMR: 21.3, 24.2, 38.9, 126.6, 134.8, 145.7

   MS: M$^+$ 134, 119, 77.

ii. UV: Not more than 210

   IR: 2980, 2800, 2170, 1745, 1200 cm^{-1}

   NMR: (δ) 1.3 t (3H)

           3.5 s (2H)

           4.3 q (2H)

   MS: 113(M$^{+)}$, 86, 68, 67.

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