UKA TARSADIA UNIVERSITY

040030101/040040101/040050101/040060101/040120101 - Modern Analytical Techniques (THEORY) at the M.Pharm. (QA) / M.Pharm. (Pharmaceutics) / M.Pharm. (Pharmacology) / M.Pharm. (PA)/ M.Pharm. (PT) of Semester 1

Subject: Modern Analytical Techniques

Duration: 3 Hours **Max. 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 1

Q. 1 a. Explain the following statement (Any Four): (08)

i. Carbon-13-NMR spectrum are much more difficult to record than PMR.
ii. On hydrogen bonding stretching frequency in IR gets lowered.
iii. MALDI is used to determine the molecular weight of proteins.
iv. Anilinium cation exhibits UV spectrum almost identical to benzene.
v. Nonlinear calibration curve is obtained with ordinary spectrometer in AAS.
vi. FT-IR scans spectra faster than conventional IR

b. Explain the advantages of pulse NMR (03)

Q.2 a. Describe the limitations of conventional atomization techniques used in atomic emission spectroscopy. Discuss inductively coupled plasma emission spectroscopy with diagram. (07)

OR

a. Describe factors affecting the chemical shift. (07)

b. How will you differentiate following pair of compounds using IR spectroscopy? Give approximate wave number for prominent peaks. (05)

i. Ortho and Para hydroxy benzoic acid **ii.** Ethanol and acetone
iii. Phenyl acetate and methyl benzoate

Q.3. a. Identify the compound on the basis of spectral data presented below. Show your reasoning for the conclusion arrived at **(Any Two).** (08)

(i)
UV: 212nm, Є 60
IR: 2941, 2857, 1742, 1460, 1056 and 1260 cm^{-1}.
NMR: δ 2.5 s (5.3 squares)
1.29 t (16.5 squares) (*J*=7.2 Hz)
4.16 quartet (10.8 squares) (*J*=7.2 Hz)
MS: M^+ 160.

(ii).
UV: Below 220nm.
IR: 3500, 3400, 1680, 1400 cm^{-1}.
NMR: δ 1.2 t (3H)
2.25 quartet (2H)
6.5 Broad singlet (2H)
MS: M^+ 73, 57, 55, 44 (**base**), 29.

(iii).
IR: 2700, 1710, 1500, 1600, 1450, 750, 700 cm^{-1}
NMR: (δ) 2.8 multiplet (4H)
7.3 s (5H)
9.8 t (1H)
MS: 134, 105, 91, 78, 39, 29.

b. Describe the limitations of conventional IR spectroscopy. Explain time domain and frequency domain spectra. (04)

SECTION 2

Q. 4 a. Discuss the factors affecting the efficiency of chromatographic separation. (08)

OR

a. What is affinity chromatography? Describe techniques of affinity chromatography. (08)

b. Describe the factors affecting Ion exchange chromatography (04)

Q. 5 **a.** Classify the immunochemical methods of analysis. Discuss the separation techniques used in RIA. (07)

OR

a. What do you mean by exclusion limit in SEC? Describe principle and applications of Size exclusion chromatography. (07)

b. Explain the thermal method of analysis. Give suitable classification of thermal method of analysis. (04)

Q. 6 Write notes on the following (**Any Three)** (12)

a. Reference standard

b. ELISA

c. Isoelectric focusing

d. Optical rotary dispersion (ORD)

e. Differential thermal analysis (DTA)

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