UKA TARSADIA UNIVERSITY

M.Pharm. (QA) / M.Pharm. (Pharmaceutics) / M.Pharm. (Pharmacology) / M.Pharm. (PA)/ M.Pharm. (PT) Semester 1

040030101/040040101/040050101/040060101/040120101 - 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 statements (**Any Four**) (08)

i. Caboxylic acid proton appears at high delta value.
ii. Mono substituted alkyl benzene shows prominent peak
iii. Cyclobutanol gives six signals in PMR Spectrum.
iv. OH stretching frequency is higher than that of NH stretching frequency.
v. Anilinium cation exhibits UV spectrum almost identical to benzene.
vi. On conjugation carbonyl group shows bathochromic shift in UV while in IR it shifts to lower wave number.

b. Give chemical shift values and spin coupling for the following compounds. (03)
i. Benzyl acetate **ii.** 2-Methyl-1-propanol **iii.** Propylamine.

Q.2 **a.** Describe the principle and working of Michelson interferometer with diagram. (06)

OR

a. What is mass spectrometry? Enlist ionization techniques used in MS. Describe MALDI ionization technique.
b. Describe Bragg's law of X-ray diffraction. (03)
c. Calculate the frequency range of modulated signal from Michelson interferometer with a mirror velocity of 0.25cm/s for 600nm and 3300 cm^{-1} . (03)

Q.3 **a.** Describe inductively coupled plasma emission spectroscopy. (04)

OR

a. What is spin-spin coupling? How anisotropy affect the chemical shift? Describe it.

b. Identify the following compounds on the basis of the spectral data presented here. Show your reasoning for the conclusion arrived at. (**Any Two**) (08)

i. UV: 270 nm (€ = 1450)
IR: 3500, 3000, 1612, 1595, 1507, 1223, 813 cm^{-1}
NMR: (δ) 2.3 s (3H), 5.1 s (1H), 7.1 s (2H), 8.2 s (2H)
MS: 108, 107, 79, 77, 51.

ii. UV: 321nm (ϵ= 10,000) in ethanol, on addition of one drop of 1N NaOH solution show peak at 400nm (ϵ =20,000) and 305 nm (ϵ = 8500).
IR: 3330, 3090, 1620, 1590, 1330, 855, 760 and 695 cm^{-1}
NMR(δ): 6.5 s (1H), 7.1 d(2H), 8.2 d (2H)
MS: m/e, 139, 109, 93, 81, 65 (base) 53, 39.

iii. 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.

SECTION –2

Q. 4 **a.** Describe principle and techniques of affinity chromatography. (07)

OR

a. Discuss principle of enzyme immunoassay. Describe various techniques used in ELISA with its applications. (07)
b. Describe the options available for changing selectivity 'α'. (04)

Q.5 **a.** Discuss principle, instrumentation and applications of DSC. (08)

OR

a. What is ion-exchange and ion-pair chromatography? Discuss the factors affecting the separation in ion-exchange chromatography. (08)

b. The data in the table were extracted from the chromatogram of a two component mixture of X and Y. (a) Calculate the capacity factor k'of X and Y. (b) Calculate the resolution. (04)

	Unretained	X	Y
Retention time(sec)	5	25	30
Peak Width, baseline(sec)	--	5	4

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

a. Size exclusion chromatography

b. Circular dichroism

c. Super fluid chromatography (SFC),

d. Reference standards

e. Isoelectric focusing (IEF)

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