M.Pharm. DEGREE EXAMINATION.

(New Regulations)

First Year

Paper I — MODERN PHARMACEUTICAL
ANALYTICAL TECHNIQUES

(Common to all branches)

Time : Three hours   Maximum : 100 marks

Use calculator as required.

Answer any FOUR questions.

All questions carry equal marks.

1. (a) Explain with illustrations the working of double beam spectrophotometer. (15)

(b) Define molar absorptivity, Beer–Lambert's law. (5)

(c) A solution containing 3.80 mg/100 ml of A (MW = 220) has a transmittance of 39.8% in a 1.50 cm cell at 500 nm. Calculate the molar absorptivity of A. (5)

2. (a) Explain the theory of nuclear magnetic resonance (NMR) spectroscopy and significance of Boltzman distribution. (10)

(b) Discuss with examples chemical shift and spin-spin coupling. (5 + 5)

(c) For the compound ethyl benzyl ether

CH_2-O-CH_2-CH_3

discuss the following : number of NMR signals, their approximate positions and splitting of signals. (NMR refers only to proton magnetic resonance). (5)

3. (a) Elaborately explain the instrumentation of mass spectrometer. (10)

(b) Define and explain : (9)
Isotope abundance; Nitrogen rule and metastable ions.

(c) An analgesic and anti-inflammatory drug has a molecular formula $C_{11}H_{14}O_2$. It produces the following mass spectra. Apply fragmentation pattern rules, identify the compound after building the structure (6)

M/Z	Intensity	Fragment
206	63%	$C_{13}H_{18}O_2$ (M^+)
163	100%	$C_{10}H_{11}O_2$
119	73%	C_9H_{11}
91	82%	C_7H_7

4. Explain the following techniques with examples :

(a) Radio immuno assay. ($12\frac{1}{2}$)

(b) Differential thermal analysis. ($12\frac{1}{2}$)

5. (a) Explain the principle involved in the production of X-ray diffraction patterns by deriving Bragg's equation. (12)

(b) Discuss the factors influencing the fluorescence intensity. (8)

(c) Explain how you will differentiate the I.R. spectra produced by ethers and alcohols. (5)

6. (a) Explain with neat illustration the instrumentation of HPLC. (12)

(b) Define the following : (6)
Gradient and isocratic elution, reverse and normal phase chromatography, capacity and selectivity factors.

(c) Explain how and why the following calibration techniques are adopted in GC/HPLC : (7)
Internal standard
Standard addition.

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3 [KH 268]

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Time : Three hours   Maximum : 100 marks

Answer ALL questions.

1.   (a) Explain the principle behind IR spectroscopy. What are the factors necessary in a molecule to absorb IR radiation?   (10)

(b) What is the principle behind the working of FT–IR spectrophotometer? Explain.   (10)

(c) Write a note on sample handling in IR spectroscopy.   (5)

2.   (a) Explain the principle of Electron impact mass spectrometry.

(b) Describe the various other techniques of ionisation of samples for mass spectrometry. Bring out their applications.   (13 + 12)

3.   Write notes on :

(a) Capillary electrophoresis

(b) X–ray crystallography

(c) Quantitative TLC.   (9 + 8 + 8)

4.   (a) Discuss in detail the principle and instrumentation of HPLC.

(b) How are the following determined in HPLC?

(i)   Column efficiency

(ii)   Detector sensitivity.

(c) Discuss the working and applications of detectors used in U.V. Spectroscopy.   (11 + 6 + 8)

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