Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Pharm /SEM-1/MPT-101/2010-11

2010-11

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

Time Allotted : 3 Hours | Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) In NMR spectroscopy the Boltzmann factor for distribution of nuclei in the lower spin state is

   a) 0·001% b) 0·01%

   c) 0·1% d) 1·0%.

   ii) Which of the following fundamental molecular vibration does alter a bond angle ?

   a) Antisymmetrical stretching

   b) Scissoring

   c) Rocking

   d) Wagging.

iii) Paper chromatography is

a) adsorption chromatography

b) partition chromatography

c) size exclusion chromatography

d) none of these.

iv) Which of the following compounds will give a molecular ion having m/z = an odd number ?

a) CH_3CH_2OH

b) CH_2BrCl

c) CH_3CO_2H

d) $CH_3CH_2NH_2$

e) $(CH_3)_2NCH_2C \equiv N$.

v) What is the characteristic of gradient chromatography ?

a) The detector scans over a wide range of wavelengths

b) The mobile phase is unbuffered

c) A gradient of flow velocity is created

d) A gradient of mobile phase composition is created.

vi) In paper chromatography the separation takes place according to the phenomenon of

a) adsorption only b) partition only

c) all of these d) none of these.

vii) Which one is not considered as mobile phase in HPLC ?

a) CO_2 b) H_2

c) O_2 d) He.

viii) In a typical infrared (IR) spectrum the region 600 – 1400 cm^{-1} is known as

a) Complex splitting region

b) Fingerprint region

c) Unsymmetrical region

d) Stretching region.

ix) Flame ionization detector used in

a) Gas chromatography

b) Thin layer chromatography

c) Liquid chromatography

d) None of these.

x) Nephelometry based on measuring

a) Turbidity b) Polarity

c) Fluorescence d) R_f value.

xi) HPLC pumps are generally

a) double acting plunger type

b) single acting plunger type

c) gear type

d) air lift type.

xii) Transition requires maximum energy from

a) $n - \pi^*$ b) $\pi - \pi^*$

c) $\delta - \delta^*$ d) $n - \delta^*$.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. What is a chromophore and auxochrome group, bathochrome and hypsochromic shift ? Explain in brief.

3. Give the principle and application of electrophoresis.

4. Explain the procedure of evaluation of leaf by determining stomatal number and stomatal index.

5. Write about the application and limitation of disc diffusion and turbidimetric method of antibiotic assay.

6. What is

   i) Ring Rule

   ii) Nitrogen Rule

   iii) Metastable ion peaks ?

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. Write notes on any *two* of the following : $7\frac{1}{2}+7\frac{1}{2}$

   a) Differential thermal analysis (DTA)

   b) Applications of various chromatographic techniques.

   c) Column packing in HPLC.

8. Define and derive Beer's Law. Write notes on electronic spectroscopy. Explain why bathchromic shifts occur in $\pi - \pi^*$ transition in polar solvent. Explain Woodward Fieser Rules for calculation of λ_{max} in conjugated dienes and trienes. Write different qualitative and quantitative applications of UV – Vis spectroscopy. 5 + 10

9. What do you mean by Biological Standardization ? Describe in detail about different method of insulin assay.

10. a) An organic compound, C_6H_8O shows the following spectral data :

UV : λ_{max} 225 nm (ε = 10,000), 318 nm (ε = 40)

MS : Molecular ion at m/z = 96, base peak at m/z = 68

IR : A strong band at 1690 cm^{-1}

^1H NMR : A ^1H doublet at δ 5·9 and a ^1H multiple at δ 7·0.

Propose a structure for this compound.

b) How can you distinguish among the three isomeric amines of the formula C_3H_9N from their

i) IR spectra and

ii) Mass spectra ? 8 + (3 + 4)

11. What is the principle of gas-liquid chromatography ? Write down the essential criteria of carrier gas used in GLC. Briefly describe the detection used in GLC with their advantages and disadvantages. Write down the criteria of components analysed in GLC. 3 + 3 + 6 + 3

12. What is the principle of NMR spectroscopy ? Discuss chemical shift in proton NMR spectroscopy. What is the importance of reference in NMR spectroscopy ? What are the merits of TMS as a reference compound ? Explain why alkyne hydrogens show characteristic shielding while alkenyl and aldehydic protons are deshielded and explain diamagnetic anisotropy. 2 + 2 + 3 + 3 + 5