



Name :
Roll No. :
Invigilator's Signature :

CS/M.PHARM/ SEM-1/MPT-101/2012-13

2012

**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 × 1 = 10
- i) A compound will be sensitive towards IR radiation only when undergoes transition on irradiation.
 - a) polarizability b) dielectric constant
 - c) dipole moment d) refractivity
 - ii) On increasing the external magnetic field in NMR experiment coupling constant, J
 - a) increases
 - b) decreases
 - c) remains unaltered.
 - iii) Aliphatic C-H stretching occurs at
 - a) nearly above 3000 cm⁻¹
 - b) nearly below 3000 cm⁻¹
 - c) at 3600 cm⁻¹
 - d) at 1745 cm⁻¹.



- iv) In gel permeation chromatography the separation takes place according to the phenomenon of
- adsorption
 - partition
 - ion exchange
 - shape and size of the molecule.
- v) Which amongst the following auxochromes produces a shift towards higher energy wavelength ?
- $-\text{CH}_3$
 - $-\text{NHCH}_3$
 - $-\text{Cl}$
 - $-\text{C}=\text{O}$.
- vi) What is the wavenumber equivalent of 400 nm wavelength ?
- 0.0025 cm^{-1}
 - 0.25 cm^{-1}
 - 2500 cm^{-1}
 - 25000 cm^{-1} .
- vii) All of the given compounds shown $n \rightarrow \sigma^*$ transition. Identify which will have the highest λ_{max} ?
- Methanol
 - Methylamine
 - Methyl iodide
 - Methyl bromide.
- viii) In 3-point Bio-assay the doses are selected as
- one standard & two test doses
 - two standard & one test doses
 - three test doses
 - none of these.
- ix) Which of the following functional group (s) produce (s) deshielding effect ?
- Fluorine
 - Silicon
 - Both (a) and (b)
 - None of these.
- x) The spin quantum number of a nucleus is zero when
- mass number is odd and atomic number is odd
 - mass number is odd and atomic number is even
 - mass number is even and atomic number is even
 - mass number is even and atomic number is odd



- xi) Telsa is a unit of
- a) Chemical shift b) Precissional frequency
 c) Resonance d) Magnetic flux density.
- xii) FTIR instrument records a signal in the
- a) time domain
 b) frequency domain
 c) both time and frequency domain
 d) none of these.
- xiii) In reverse phase chromatography, the stationary phase is
- a) polar
 b) non-polar
 c) combination of (a) & (b)
 d) none of these.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Write a short note on paper chromatography. 5
3. What do you mean by ¹³C NMR spectroscopy ? How is it different from ¹H NMR ? Write its applications. 1 + 2 + 2
4. Write down the principles of Radio-Immuno Assay (RIA).
 What are the applications of RIA ? 3 + 2
5. Describe the Woodward-Fischer rule for λ_{\max} prediction of conjugated dienes and triens. 5
6. Write the definitions and applications of palisade ratio and stomatal index. 5
7. Describe the four-point bioassay for the determination of acetylcholine by using frog-rectus abdominis muscle. 5



GROUP – C

(Long Answer Type Questions)

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

8. Explain the phenomenon of spin-spin coupling by giving example. Give example of coupling constants in application of NMR spectroscopy. Why is magnetic field required in NMR spectroscopy ? Describe the solvents of NMR spectroscopy. Describe the factors effecting chemical shift in NMR spectroscopy. $3 + 3 + 2 + 3 + 4$
9. a) What is the need of derivatization in GC ? Write the merits, demerits and application of GC.
b) Describe about the detectors used in HPLC ? What do you mean by a C-18 column in HPLC ? $8 + 7$
10. Explain Hooke's Law for the calculation of vibrational frequency of a bond. Diagrammatically explain the construction and operation of FTIR spectrophotometer. How will you differentiate (i) different isomeric amines and (ii) aldehydes and ketones by looking at their respective IR spectra ? $4 + 7 + 4$
11. Define mother ion peak and base peak in a mass spectrum. What are metastable ion peak and what are their significance ? What is McLafferty rearrangement ? Derive the equation upon which the separation of ions takes place in a mass spectrometer. How can you distinguish among the three isomeric amines of the formula C_3H_9N from their (i) IR spectra and (ii) Mass spectra ? $2 + 2 + 3 + 5 + 3$
12. Write short notes any two of the following : $2 \times 7 \frac{1}{2}$
- a) Differential Thermal Analysis (DTA).
b) Thermogravimetric Analysis (TGA).
c) Differential Scanning Calorimetry (DSC).