



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/M.Pharm/SEM-1/MPT-101/2009-10  
2009**

**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) In NMR spectroscopy the Boltzmann factor for distribution of nuclei in the lower spin state is
- a) 0.1%                                      b) 0.001%
- c) 1.0%                                      d) 0.01%.
- ii) Hydrogen bond in alcohol and phenol is responsible for
- a) lowering of stretching frequency
- b) increasing of stretching frequency
- c) lowering of bending frequency
- d) increasing of bending frequency.



in ion exchange

- 
- in ion exchange

for which type

- for which type

for which type

- for which type

for which type

- for which type



- x) FT-IR records a signal in the
- a) time domain
  - b) frequency domain
  - c) both time and frequency domains
  - d) none of these.
- xi) Chemical shift for the protons of halomethane is ..... to the electronegativity of halogen atom.
- a) directly related
  - b) inversely related
  - c) unrelated.
- xii) In the I-R spectroscopy, the absorbed energy brings about predominant changes in the vibrational energy which depend upon
- a) mass of the atom present in the molecule
  - b) strength of the bond
  - c) the arrangement of atoms within the molecule
  - d) all of these.



**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.

3 × 5 = 15

2. Write notes on various types of bioassay.
3. Discuss in brief about spin-spin splitting and Pascal triangle.  
 $2\frac{1}{2} + 2\frac{1}{2}$
4. Describe the following terms :  $5 \propto 1$   
  
Stomatal number, stomatal index, palisade ratio, vein islet number and vein termination number.
5. How will you detect the presence of aromatic ring in an IR spectrum ? How will you differentiate 1°, 2°, 3° alcohols by looking at their IR spectrum ?
6. Bring out the similarities and differences of the principle of the microbiological assay of antibiotics and vitamins.

**GROUP – C**

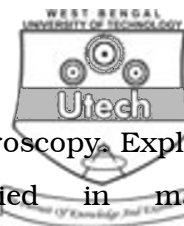
**( Long Answer Type Questions )**

Answer any *three* of the following.

3 × 15 = 45

7. Explain the term “Finger Print Region”. Why is it called so ?  
  
Discuss in brief about the mechanism of measurement in FTIR. What are the factors affecting the position of absorption of carbonyl group in FTIR.

2 + 2 + 5 + 6



8. Write down the basic principle of mass spectroscopy. Explain the main ionization techniques applied in mass spectrometry. Discuss in detail about metastable ion.

3 + 7 + 5

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

UV :  $\lambda_{max}$  225 nm ( $\epsilon = 10,000$ ) , 318 nm ( $\epsilon = 40$ )

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

IR : a strong band at  $1690\text{ cm}^{-1}$

$^1\text{H NMR}$  : A  $^1\text{H}$  doublet at  $\delta 5.9$  and a  $^1\text{H}$  multiplet at  $\delta 7.0$

Propose a structure for this compound.

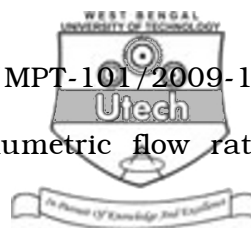
- b) How can you distinguish among the three isomeric amines of the formula  $C_3H_9N$  from their (a) IR spectra and (b) Mass spectra ?

8 + 3 + 4

10. a) Define and derive Beer's Law. Write notes on electronic spectroscopy. Explain why bathochromic shifts occur in  $\pi - \pi^*$  transition in polar solvent.

- b) Explain Woodward-Fieser rules for calculation of  $\lambda_{max}$  in conjugated dienes and trienes. Write different qualitative and quantitative applications of UV-Vis spectroscopy.

5 + 10



11. a) On which parameters does the volumetric flow rate ( $F_c$ ) depend on ?

b) Write short notes on the following :

i) Partition coefficient and partition ratio

ii) Band asymmetry

iii) Resolution

iv) Eddy diffusion.

3 + ( 4 × 3 )

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