



**HCL-003-047501**

Seat No. \_\_\_\_\_

**B. Voc. (Pharma Ana. & QA) (Sem. V) (CBCS)**

**Examination**

**October – 2017**

**BVPAQA-501 : Spectroscopy**

**Faculty Code : 003**

**Subject Code : 047501**

Time : 3 Hours]

[Total Marks : 70

- 1 (a) Answer the following Questions : 10
- (1) Define emission spectroscopy.
  - (2) Define wavelength.
  - (3) Give expression of energy of electromagnetic radiation.
  - (4) Identify point group of  $\text{CHCl}_3$ .
  - (5) Define  $\sigma_v$  and  $\sigma_d$ .
  - (6) Which type of solvent is used in UV spectroscopy?
  - (7) Which oil is used in mull technique of sample preparation in IR spectroscopy?
  - (8) Which substance can be used if compound is insoluble in TMS for NMR spectroscopy?
  - (9) Define molecular ion peak.
  - (10) How many types of proton are present in acetone?
- (b) Answer the following Questions : 20
- (1) Explain different source of UV spectroscopy.
  - (2) Define homolytic and heterolytic bond cleavage.
  - (3) Define finger print region and its importance.
  - (4) Give equation of simple harmonic motion and values of K in it for IR spectroscopy.
  - (5) Explain types of monochromator used in UV spectroscopy.
  - (6) Discuss fast atom bombardment in mass spectrophotometer.
  - (7) Enlist the importance of NMR spectra.
  - (8) Give the equation of finding the splitting in NMR spectra.
  - (9) Find point group in  $\text{CCl}_4$ .
  - (10) Define centre of symmetry with an example.

**2** Answer the following Questions : (any **four**) **20**

- (1) Describe fundamental modes of vibration in IR spectroscopy.
- (2) Discuss instrumentation of Mass spectrophotometer.
- (3) Find out the structure of the molecule from the following data : Molecular formula  $C_8H_8O_2$   
IR: 3010, 2940, 2850, 2750, 1700, 1601, 1515, 1275, 834  $cm^{-1}$ 
  - (a) Singlet  $\delta=3.83$  (3H)
  - (b) Triplet  $\delta=8.0$  (1-H)
  - (c) Triplet  $\delta=7.2$  (4H)
- (4) Why tetra methyl silane is used as reference in NMR spectroscopy ?
- (5) Describe different transitions that take place in UV spectroscopy.
- (6) Describe multiplication table of  $NH_3$  and its point group.

**3** Answer the following Questions : (any **four**) **20**

- (1) Find out the structure of the molecule from the following data: Molecular formula  $C_6H_{12}O$   
IR: 2950, 2870, 1715, 1390, 1365  $cm^{-1}$ 
  - (a) Singlet  $\delta=2.2$  (3H)
  - (b) Singlet  $\delta=1.1$  (9H)
- (2) Explain auxochrome and chromophore.
- (3) Explain magnetic anisotropy observed in benzene and ethene in NMR spectroscopy.
- (4) Explain multiplication table of  $C_{2v}$  point group with an example.
- (5) Describe instrumentation of IR spectroscopy.
- (6) Discuss McLafferty rearrangement taking place in Mass spectra.