



HCN-003-045503

Seat No. _____

**B. Voc. (Chemical Technology) (Sem. V)
(CBCS) Examination**

October - 2017

BVCT - 503 : Modern Analytical Techniques

Faculty Code : 003

Subject Code : 045503

Time : 3 Hours]

[Total Marks : 70

1 (A) Answer the following Questions : 10

- (1) Define heterolytic bond cleavage.
- (2) Which atoms can undergo nuclear magnetic resonance?
- (3) Why ethanol is used as a solvent in UV spectroscopy?
- (4) Define emission spectroscopy.
- (5) Give equation of Hooke's law.
- (6) Find out principle rotational axis in benzene.
- (7) Give the types of proton present in propanaldehyde.
- (8) Identify point group of $PtCl_4$
- (9) Define wavelength.
- (10) Identify point group of CO_2 .

(B) Answer the following Questions : 20

- (1) Define coupling constant and Paramagnetic anisotropy.
- (2) Give the effect of H bond on IR spectra.
- (3) Enlist any four factors that affect on UV spectroscopy.
- (4) Give expression of Hooke's rule.
- (5) Define metastable ion peak and base peak.
- (6) Discuss which type of atoms can be studied in NMR spectroscopy on the basis of I value.
- (7) Define chemical shift and give its equation.
- (8) Give any two difference between σ_v and σ_h .
- (9) Define translational and electrical energy.
- (10) Find the point group of HCl and HCN.

2 Answer the following Questions : (Any **Four**) **20**

- (1) Why TMS is used as a reference material in NMR spectroscopy?
- (2) Explain Lambert-Beer's law.
- (3) Deduce the structure of the molecule from the following data: Molecular formula $C_{11}H_{16}$
IR : 3030, 2980, 1605, 1510, 1450, 1390, 1365, 835 cm^{-1}
NMR :
 - (a) Singlet $\delta=1.0$ (27.5 squares)
 - (b) Singlet $\delta=2.8$ (9.2 squares)
 - (c) Singlet $\delta=7.2$ (12.4 squares)
- (4) Explain fragmentation rules for Mass spectroscopy.
- (5) Describe instrumentation of IR spectroscopy.
- (6) Discuss C_3V point group and deduce its multiplication table.

3 Answer the following Questions : (Any **Four**) **20**

- (1) Discuss instrumentation of NMR spectroscopy.
- (2) Discuss various shifts that can be observed in UV spectroscopy.
- (3) Explain factor affecting IR spectroscopy.
- (4) Explain Mclafferty rearrangement with mechanism taking place in Mass spectra.
- (5) Explain different types of symmetry elements with an example of each.
- (6) Deduce the structure of the molecule from the following data :
Molecular formula $C_8H_{10}O_2$
IR : 3300-3200, 2845, 1605, 1510, 1460, 1310, 1250, 1175, 1032, 820 cm^{-1}
NMR :
 - (a) Singlet $\delta=3.5$ (1H)
 - (b) Singlet $\delta=4.5$ (3H)
 - (c) Singlet $\delta=2.69$ (2H)
 - (d) Multiplet $\delta=7.17$ (4H)