Printed Pages – 7

D-6332

M.Sc. (IIIrd Semester) Examination, 2020

CHEMISTRY

Paper - II

(Application of Spectroscopy : Organic Chemistry)

Time Allowed : Three Hours

Maximum Marks : 70

SECTION - A

Note : Attempt any ten questions. Each question carries one mark. **1×10=10**

Q. 1. Objective Type Questions :

(i) How is the wavelength controlled in a FTIR _____ spectrometer ?

(ii) The distance between the centers of the peaks of doublet is called as _____.

(iii) NMR spectroscopy is used for determining structure in which of the following materials _____ ?

(iv) Which state of matter mass spectroscopy is being performed _____ ?

(v) What type of techniques FTIR spectroscopy is _____ techniques ?

Multiple Choice Type Questions :

(vi) Which of the following is not a techniques for preparing solid samples in IR spectroscopy :

(a) Solids run in solution

(b) Mull techniques

(c) Solid film

(d) Thin film

(vii) Which of the compound show only one signal is present in the PMR spectra :

(a) C_3H_4, C_3H_6

(b) C_4H_6, C_5H_{12}

(c) C_6H_{18}, C_2H_6O

(d) All of the mentioned

(viii) The base peak in a mass spectrometer is :

(a) The lowest mass peak

(b) The peak corresponding to the parent ion

(c) The peak set to 100% relative intensity

(d) The higest mass peak

(ix) Which of the following is not a source used in mid IR ?

(a) Nernst glower

(b) High pressure mercury arc lamp

(c) Globar

(d) Nichrome wire

(x) The mass spectrum of Acetone CH_3COCH_3 shows major peaks at m/z = 58, 43 and 15. What can be deduced from these data ?

(a) The parent ion is observed and fragmentation involves loss of CO.

(b) The parent ion is observed and fragmentation involves cleavage of two C-C bonds

(c) The parent ion is not observed.

(d) The parent ion is observed and fragmentation involves cleavages of a C-C bond

(xi) Vicinal coupling is :

(a) Coupling between ^1H nuclei attached to the same C-atom

(b) Coupling between ^1H nuclei attached to the adjacent C-atom

(c) Coupling between ^1H nuclei in an alkane

(d) Coupling between ^1H nuclei in an alkene

(xii) Which of the following compounds contains one or more protons that could undergo exchange with proton in water ?

(a) CH_3OH

(b) $(CH_3)_2O$

(c) CH_3Br

(d) $(CH_3)_3N$

SECTION - B

Note : Attempt any five questions. Each question carries two marks. **2×5=10**

Q. 2. Write notes (very short answer in 25-30 words only) :

(i) Fieser-Woodward rules

(ii) Nitrogen rule

(iii) Molecular ion peak

(iv) FTIR

(v) Chemical exchange

(vi) Cosy and Noesy

(vii) Hindered rotation

SECTION - C

Note : Attempt any five questions. Each question carries 4 marks. **5×4=20**

Q. 3. Write short answer in 250 words :

(i) Describe ultraviolet bands for carbonyl compounds.

(ii) Discuss ion production – EI, CI, FD and FAB.

(iii) Give the Retro-Diels Alder reaction.

(iv) Discuss the instrumentation and sample handling of IR.

(v) Write notes on contact shift reagent and solvent effects.

(vi) Describe Fourier transform techniques in NMR.

(vii) Write the effect of deuteration.

SECTION - D

Note : Attempt any three questions. Each question carries 10 marks. **10×3=30**

Q. 4. Write essay type answer in 500 words :

(i) Explain ultraviolet spectra of Aromatic and Heterocyclic compounds.

(ii) What is the mass spectrometry and describe the instrumentation techniques of mass spectral of the organic compounds with applications.

(iii) Write the short notes on :

(a) Octant rule for ketones.

(b) Nuclear Overhauser Effect (NOE).

(iv) What is the NMR spectroscopy and discuss the Karplus curve variation of coupling constant with dihedral-angle.