

M.Sc. (Part-II) (Chemistry) (CBCS Pattern) Semester-IV
PSCHT13 - Paper-XIII : Spectroscopy

P. Pages : 3

Time : Three Hours



GUG/S/25/11448

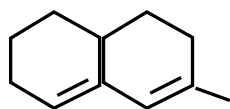
Max. Marks : 80

- Notes : 1. All questions are compulsory and carry equal marks.
2. Draw the diagrams where necessary.

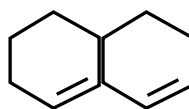
1. a) i) Discuss the effect of conjugation on λ_{\max} . 8

ii) Calculate the λ_{\max} value of the following compounds.

A)



B)



b) i) Write note on basic principle of photoelectron spectroscopy. 8

ii) Explain the applications of Auger electron spectroscopy.

OR

c) Explain Koopman theorem. 4

d) Discuss Frank-Condon principle. 4

e) Derive Beer-Lamberts Law and give its Limitations. 4

f) Explain the basic principle of Electron spectroscopy For chemical Analysis (ESCA). 4

2. a) What is coupling constant? Explain its relation with Karplus equation & dihedral angle. 8

b) i) Discuss spin-spin interactions. 8

ii) Define with suitable examples i.e homotopic enantiotopic & diastereotopic protons.

OR

c) Discuss ^{19}F NMR spectroscopy. 4

d) Explain the shielding and deshielding effect with suitable example. 4

e) Deduce the structure of compound having molecular formula $\text{C}_4\text{H}_8\text{O}$ from NMR Data. 4

M. F $\text{C}_4\text{H}_8\text{O}$, NMR Data : -

$\delta = 1.3$, 3H triplet (t)

$\delta = 2.2$ 2H quartet (q)

$\delta = 2.8$ 3H singlet (s)

- f) Write a note on shift reagent with examples. 4
3. a) Explain the following in details 8
- i) COSY
- ii) DEPT
- b) Assign the structure of compound A and B on the basis of NMR Data. 8

Compound → A	M.F. → C ₁₁ H ₁₄ O ₂	Compound. B → MF. C ₁₁ H ₁₄
δ = 1.22 (S, 6H)		δ = 1.21 (S, 6H)
δ = 2.0 (S, 2H)		δ = 1.85 (t, J = 6H _z , 2H)
δ = 7.0 (S, 5H)		δ = 2.83 (t, J = 6H _z , 2H)
δ = 10.10 (S, 1H)		δ = 7.02 (m, 4H)

OR

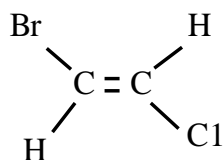
- c) Discuss the structure of FT – NMR 4
- d) Explain Nuclear Overhauser effect. 4
- e) Determine the most probable structure of compound. From NMR Data. 4
- M.F = C₃H₆O, δ = 2.2 PPM 6HS
- f) Discuss application of NMR in medical diagnosis. 4
4. a) Give a brief account of Bragg's method used in the elucidation of crystal structure. Also state the limitations of this method. 8
- b) Discuss the applications of electron diffraction technique. 8

OR

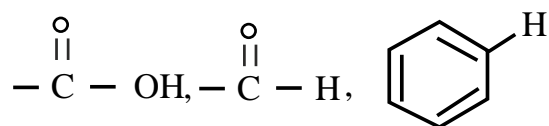
- c) Distinguish in between electron and neutron diffraction. 4
- d) Write Wierl equation and explain the terms involved in it. 4
- e) Write a note on intensity associated in X-ray diffraction. 4
- f) What is miller indices? Calculate the miller indices of crystal Plane's cuts through the crystal axes at i) (2a, 3b, c) ii) (3a, ∞, ∞) 4
5. a) Define 2
- i) Quadropole nuclei
- ii) Quadrupole moment.

b) Explain in short about chemical shift in NMR. 2

c) How many signals obtained in NMR spectroscopy in the given molecule 2



d) State the chemical shift value for following functional group hydrogen 2



e) Write a note on Ramachandran Plot. 2

f) Calculate interplanar distance for (1,2,3) Plane. 2

g) What are chromophore and Auxochromic. 2

h) What is photoelectric effect. 2
