M.Sc.(PART - II) (Chemistry) Fourth Semester OLD MSC2431 / CH 401 - Spectroscopy Paper - XIII

P. Pages: 3

GUG/W/18/2444

Time : Three Hours		hree Hours * 1 9 1 2 *	Max. Marks : 80
	Not	tes : 1. All questions are compulsory. 2. All questions carry equal marks.	
1.	a)	 i) Write a note on photoelectron spectroscopy. ii) How will you differentiate the following structure on the basis of 	8 U.V. spectra.
	b)	 i) A certain compound dissolved in hexane, having λ max 305 nm. Compound was dissolved in ethanol, then the λ max is 307nm. Gi transition and effect of solvent. ii) If the % transmission of a solution is 90% at 254 nm. What is the wavelength. 	When the same 8 ve the type of absorbance at that
	c)	Calculate the λ max in hexane for the following two isomers. (i) (ii) (ii) (iii)	4
	d)	Explain the effect of conjugation on electronic transition.	4
	e)	Describe the basic principle of Auger spectroscopy.	4
	f)	Explain Frank Condon. Principle.	4
2.	a)	What is Chemical shift? Explain the various factors affecting the chem	ical shift. 8
	b)	i) Predict the structure of compound on the basis of 13_{C} NMR spect formula ; $C_{5}H_{12}O_{2}$. PMR: δ 19.0 (q) δ 39.4 (t) δ 55.8 (q) δ 59.3 (t) δ 75.1(d)	roscopy. Molecular 8
		ii) Write a note on shift reagent.	
	c)	On the basis of NMR spectroscopy, predict the structure of organic con Formula : $C_8H_{14}O_4$ δ 1.2 (t, J = 7Hz, 6H) δ 4.2 (a, J = 7Hz, 4H)	npound Mol. 4

δ 2.6 (s,4H)

	d)	A compound exhibit a 'H NMR signal at δ 2.5 ppm. What will be the chemical shift of these proton in Hz, If the spectrum is recorded at 60 MHz.	4
	e)	Explain the term complex spin-spin interaction 1 st order spectra.	4
	f)	How many ¹³ C NMR signals are obtained for the following compound. i) $C_1 - C_1 - C_2 - C_{H_2} - C_{H_3}$ ii) $C_1 - C_1 - C_1 - C_1 - C_{H_2} - C_{H_3}$	4
3.	a)	Explain the following NMR spectroscopic techniques. i) DEPT ii) COSY	8
	b)	An Organic compound $C_5H_{11}Cl$ gave the following spectral data. UV: Transparent above 210 nm IR : 2950 and 800 cm ⁻¹ PMR: $\delta 1.0 (3H, t, J=7Hz)$ $\delta 1.6 (6H,S)$ $\delta 1.8 (2H, q, J = 7Hz)$ Mass (m/e): 106, 108 (3:1 ratio) Product the correct structure.	8
		OR	
	c)	Explain nuclear overhouser effect.	4
	d)	Explain INEPT technique in brief.	4
	e)	Deduce the structure of compound having molecular formula $C_6H_{12}O_2$ PMR : $\delta 1.3(S,6H)$ $\delta 2.2(S,2H)$ $\delta 2.8(S,3H)$ $\delta 3.9(S, 1H$ exchangable with D ₂ O)	4
	f)	 Write a note on i) Quadrupole nuclei. ii) Quadrupole moment. 	4
4.	a)	Explain Bragg's condition. Discuss Debye Scherrer method for the X-rays analysis.	8
	b)	Derive the Wierl equation of electron diffraction technique. Explain the scattering of neutron by solids and liquids.	8

OR

c)	Explain Lave method for the X-rays analysis.	4

	d)	Explain how electron diffraction of gases is carried out.	4
	e)	Distinguish the electron and neutron diffraction in Brief.	4
	f)	Write a note on Ramachandran diagram.	4
5.	a)	Calculate Miller indices whose Weiss indices are (2,1,2)	2
	b)	Explain the various types of ultra-violet. Transitions in the following compound. i) $CH_3 - C - OH$ ii) ii)	2
	c)	How many ¹ H NMR signals arise for the following compounds. i) H ii) $CH_3 - CH_2 - CH - CH_2 - CH$	2
	d)	State Lambert-Beer's law.	2
	e)	Give the advantages of FT-NMR.	2
	f)	Write short note on photoelectric effect.	2
	g)	Write a short note on magnetic scattering.	2
	h)	Write a short note on APT technique.	2
