M.Sc. (Chemistry) (CBCS Pattern) Sem-III PSCHT09 / CH-301 : Spectroscopy Paper-IX

Time : Three Hours			3		Max. Marks : 80		
	Note	es: 1. 2. 3. 4.	All questions are com All questions carry ec Use of calculator is po Draw labelled diagram	ual marks. ermitted.	cessary.		
1.	a)	Define	ostulates and types of groups.	8			
	b)	Derive	character table for H ₂ C	D molecule usi O	ng great orthogonality theorem. R	8	
	c)	Discuss the point groups and Schoentiles symbols.					
	d)	What are the classes of symmetry operations?					
	e)	Explain the group multiplication table for C_{3V} point group.					
	f)	Explain reducing and irreducible representation with suitable example.					
2.	a)		s the principle of Mass pectrometer.	sspectrometry?	Discuss different types of ions produced in	8	
	b)		the application of Mos rface studies	ssbauer spectro ii)	scopy in- Molecular structure.	8	
				0	R		
	c)	-	the following terms in etastable ion	relation to mas ii)	ss spectrometry. Factor affecting fragmentation	4	
	d)	-	in brief: oppler shift	ii)	Quadrupole splitting	4	
	e)	Discuss the applications of Mossbauer spectroscopy.					
	f)	Explain McLafferty rearrangement with suitable example.					
3.	a)	Explain	Explain the principle and instrumentation in ESR spectroscopy.				
	b)	What are rigid rotors? Derive the equation of moment of inertia, rotational energy for rigid rotors, and how does microwave spectra differ from the infrared spectra.					
				0	R		

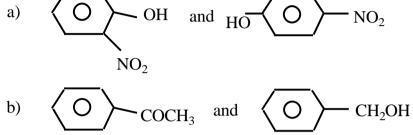
Discuss the hyperfine splitting of methyl radical in ESR. c)

P. Pages: 2

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	d)	Explain Stark effect in brief.	4		
	e)	Explain the applications of ESR in i) Study of free radicals ii) Structure determination	4		
	f)	Give the classification of compound on the basis of moment of inertia.			
4.	a)	Explain the moment of Inertia of diatomic molecules with stoke's and antistoke's line in Raman Spectroscopy.			
	b) i) Discuss following compounds on the basis of IR spectra.				



ii) Explain how Raman and IR are complementary to eachother.

OR

c)	 Distinguish between following pair of compounds using IR spectroscopy. i) CH₃-CH₂-OH and CH₃-O-CH₃ ii) m-xylene and p-xylene 	4
d)	Discuss the pure rotational Raman spectra of diatomic molecule.	4
e)	Explain the P, Q, R branches.	4
f)	Explain Rayleigh and Raman scattering.	4
a)	Differentiate between C_{2V} and C_{3V} point group with suitable example.	2
b)	Write a note on dihedral plane.	2
c)	What is nitrogen rule.	2
d)	What is isomer shift.	2
e)	What are rigid and non-rigid molecule.	2
f)	Predict the no of lines in the esr spectrum of methyl free radical.	2
g)	Define symmetric and asymmetric speaching.	2
h)	What are factors affecting on Raman peak intensities.	2

5.