M.Sc.(Physics) Fourth Semester Old MSc241012-Paper-XII: Spectroscopy (Elective-II)

P. Pag Time	ges : : Thi	2 ree Hours $\begin{array}{c} & & \\ & & \\ & & \\ & & 1 \\ & & 9 \\ & & 0 \\ & & \\$	GUG/W/18/243 Max. Marks : 8	D 30
1.		Either:		
	a)	Explain in detail the electronic spectra of linear diatomic molecules.		8
	b)	Give an account of Rotational structure of electronic bands explaining P, Q	, R branches.	8
		OR		
	e)	Discuss vibrational structure of electronic transitions.		8
	f)	Explain in detail progressions and sequences in vibrational spectra.		8
2.		Either:		
	a)	Explain the formation of Band head. The band-head of the Q branch is always	ays at $J = \frac{-1}{2}$,	8
		while that of the P or R branch may be anywhere. Explain.		
	b)	State Franck- Codon principle and give its wave mechanical interpretation help in understanding the intensity distribution in the vibrational structure of transitions of a diatomic molecule?	n. How does it of the electronic	8
		OR		
	e)	Give an account of general treatment of molecular orbitals.		8
	f)	Derive the formulae for rotational constants and intensities in electronic ba	nds.	8
3.		Either:		
	a)	Discuss the symmetry operations in polyatomic molecules.		8
	b)	Give an outline of group theory in symmetry operations of polyatomic mol	ecules.	8
		OR		
	e)	Explain in detail the method of determination of symmetry Point groups.		8
	f)	Explain the mathematical methods of studying vibrations.		8

4.		Either:			
	a)	Give an account of Bond stretching Interactions.			
	b)	What are the differences between stretching vibrations and bending vibrations. What is G. Matrix for a linear triatomic molecules.			
		OR			
	e)	Discuss and derive the expression for kinetic energy for linear triatomic molecules.	8		
	f)	Give an outline of symmetry of Benzene molecules and its vibrational modes.	8		
5.		All questions are compulsory.			
		a) Write a note on Deslander's table.	4		
		b) Explain Hund's coupling cases.	4		
		c) What are point groups symmetry potential and kinetic energy.	4		
		d) What are the selection rules for molecules is vibrational modes.	4		
