

Code No. 6969 / CBCS / Non-CBCS

FACULTY OF SCIENCE

M. Sc. IV – Semester (CBCS/Non-CBCS) Examination, May / June 2017

Subject : Physics

Paper – II : Spectroscopy

Time : 3 Hours

Max. Marks: 80

Note : Answer all questions from Part–A and Part–B. Each question carries 4 marks in Part–A and 12 marks in Part – B.

PART – A (8 x 4 = 32 Marks)
(Short Answer Type)

- 1 Explain LS and jj coupling schemes.
- 2 What is Lamb shift?
- 3 Explain the salient features of rotational spectra.
- 4 What are the selection rules in vibrational spectra?
- 5 Explain different modes of vibrations that can be observed in IR spectra of H₂O
- 6 What is Raman effect and explain the same?
- 7 What are spin-lattice and spin-spin relaxation times?
- 8 Obtain the resonance condition in ESR.

PART – B (4 x 12 = 48 Marks)
(Essay Answer Type)

- 9 (a) Derive the spectral terms arising in the case of P_1^2 and $P_1 P$ configurations.
OR
(b) Explain about hyper-time splitting of spectral lines and various selection rules.
- 10 (a) Obtain the energy expression for vibrating diatomic molecule as a harmonic oscillator.
OR
(b) Obtain an expression for energy of a vibrating rotator, hence define selection rules.
- 11 (a) What are the salient features of vibrational and rotational Roman spectra?
OR
(b) How do you interpret the data from Raman and IR spectroscopy? Give an example.
- 12 (a) Give the experimental details of NMR spectroscopy.
OR
(b) Give the quantum theory of electron spin resonance and hence obtain the condition for resonance.
