

FACULTY OF SCIENCE

M.Sc. IV – Semester Examination, May / June 2015

Subject: Physics / Applied Electronics

Paper – II

C.B. 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 (8x4 = 32 Marks)

[Short Answer Type]

- 1 What are equivalent and non-equivalent electrons?
- 2 Explain about lamb shift
- 3 What are different types of molecular spectra?
- 4 What is the effect of isotopes on rotational spectra?
- 5 Explain Raman effect.
- 6 What is IR absorption?
- 7 Write briefly about the principle of NMR
- 8 Explain about the hyperfine structure of ESR.

PART – B (4x12 = 48 Marks)

[Essay Answer Type]

- 9 a) Derive the expression for g-factor for an atom in a magnetic field.
OR
b) Obtain the energy expression in the case of spin-orbit interaction.
- 10 a) Obtain the energy levels of rotational spectra of rigid rotator diatomic molecules.
OR
b) Write the salient features of vibrational spectra and explain the selection rules.
- 11 a) Explain quantum theories of Raman effect. Describe an experimental set-up for observing Raman effect.
OR
b) Explain the principle and instrumentation of IR spectrophotometer.
- 12 a) What are Bloch equations of NMR? Derive them.
OR
b) Give the experimental details of ESR spectrometer.
