

February 2016

M. Sc. IIIrd Semester Examination

PHYSICS

Fourth Paper : Atomic and Molecular Physics

Time 3 Hours]

[Max. Marks : Regular 85 / Private 100

Note : This question paper is meant for all Regular and Private students. Answer all five questions. All questions carry equal marks. The blind candidates will be given 60 minutes extra time.

1. (a) Explain the interaction between nuclear spin and magnetic field.
(b) Explain the spin spin interaction and spin spin coupling between two nuclei.
OR
Discuss relaxation processes. Explain Larmor Precession and Larmor Frequency. What is NMR imaging ?
2. What is Born-Oppenheimer Approximation ? Discuss its break down in reference to interactions of rotation and vibrations.
OR
State and explain Frank-Condon Principle. How does it account for the intensities of lines in vibrational electronic spectra ?
3. Explain vibration-rotation Raman Spectra of diatomic molecules. How does Raman scattering differ from Rayleigh scattering ?
OR
Explain Raman effect on the basis of quantum theory. Discuss molecular.
4. Explain recoilless emission and absorption of gamma rays.
OR
Explain Maussbauer spectrometer with a block diagram.
5. What do you mean by factor ? Derive expression of G ? discuss the role of G in ESR.
OR
What do you mean by electron spin resonance ? Briefly explain spllitting of electron energy levels by a magnetic field.

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