

FPYC504 FUNDAMENTALS OF ATOMIC AND MOLECULAR PHYSICS

UNIT-I

Alfa particle scattering and Rutherford scattering formula, Rutherford model of atom, Atomic spectra, Series spectra of H-atom Ritz-Rydberg combination principle. Bohr theory of H-atom and explanation of series spectra. Correction of finite mass of the nucleus, Bohrs corresponding principle. Sommer feld's modification of Bohr theory, fine structure H line. General characteristics of Sommer field's orbits ,descret energy exchange by atoms and Frank-Hertz experiment. Continuous X ray spectrum , characteristics of emission and absorption spectra, comparision of optical and X ray spectra, Moseley's law

Unit-2

Qualitattive idea about wave mechanical solution of Hydrogen Atom and discussion of quantum numbers , space quantization, Larmor's theorem , Magnetic moment and the Bohr magneton , Series spectra of alkali metals and elementary idea regarding double fine structure , spinning electron and the vector atom model, Electron spin orbit interaction energy and fine structure separations (P, D,F levels) due to spin-orbit interaction . Normal Zeeman effect ,anomalous Zeeman effect and Paschen – Black effect in one electron system

Unit -3

The atom model for two valence electrons ,l-l coupling and s-s coupling , L-S coupling ,jj coupling and terms arising from the interaction of two electrons in these coupling schenes.

Unit-IV

Pauli exclusion principle and quantization of vibrational and rotational energy in molecules. Pure rotational and rotation- vibration spectra. Raman effect, stokes and anti stokes lines . Character of Raman Spectra . Experimental arrangement of Raman Spectroscopy .

Reference Books

1. Introduction to Atomic spectra: Havery Elliott White (Mc-Graw Hill Book Company)
2. Concepts of Physics : Arthur Beiser (TMH)
3. Fundamentals of Spectroscopy- Raj kumar (Pragati Prakasan)