Subject Code : RCCSPH6

CORE COURSE VIII - ATOMIC AND NUCLEAR PHYSICS

Unit I Cathode Rays and Tue Rays.

Cathode rays – properties – e/m of cathode rays – Milliken's oil drop method – Positive rays – Properties – e/m of Positive rays: Thomson's parabola method – Aston's Bain's bridge - Determination of critical Potential – Franck and Hertz's experiment - Davi'srs and Goucher method.

Unit II Vector Atom model

Various quantum numbers, L-S and j-j Couplings – Pauli's exclusion principle – electronic configuration of elements and periodic classification – magnetic dipole moment of electron due to orbital and spin motion – Bohr magnet ion stern and Gerlach experiment.

Unit III Fine structure of special lines

Special terms and notations – selection rules- intensity rule and internal rule – Fine structure of sodium D lines – Alkali spectra – Fine structure in Alkali spectra – spectrum of Helium – Zeeman effect - Larmor's theorem – Debye's quantum mechanical explanation of the normal Zeeman effect – Anamolous Zeeman effect – theoretical explanation, Lande's 'g' factor and explanation of splitting of D1 and D2 lines of sodium.

Unit IV Nucleus I

Review of basic properties of nuclei – mass, radius, binding energy, nuclear moments – isotopes – isobars – radioactivity cyclotron – Betatron – Geiger Muller counter – cloud chamber – Q value of nuclear reaction – discovery of neutron, positron.

Unit V Nucleus II

Liquid Drop Model – application to fission, fission fragments, neutrons in fission process – nuclear energy – thermo nuclear reactions – atom bomb. Shell Model – magic numbers – spin orbit coupling – Basic ideas of a nuclear reactor. Bethe's Theory of fusion – Solar energy – hydrogen bomb.
Basic classification of subatomic particles – photons, leptons – meson – baryons.

Books for study

1. Murughesan, R., Modern Physics S.Chand & Co. (2006).

Books for Reference

1. Arthus Beiser, Concept of Modern Physics: Mc Graw Hill Ed. V (1999).