

FPYE306	Physics –III	3-0-0	3
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Module-I

Thermodynamic system and thermodynamic equilibrium, Reversible and irreversible process, internal energy, first law of thermodynamics, difference between molar specific heat of an ideal gas, Derivation of relation $PV^\gamma = \text{constant}$ for adiabatic process, work done in isothermal and adiabatic process. Entropy change in various processes. T-S diagram, Carnot cycle, Carnot engine and its efficiency, Carnot theorem, second law of thermodynamics-Kelvin plank and Clausius formulation, their equivalence, thermodynamic scale of temperature. (7)

Module-II

Thermodynamic co-ordinates P.V.T and 1st Tds equation, 2nd Tds equation. Clausius- Clapeyron equation, effect of pressure on melting point and boiling point, thermal conductivity, differential equation of heat flow in one dimension, experimental determination of thermal conductivity by Ingen-Haus and Searl's method. Vandewall's equation of state for real gases, critical constants, reduced equation of state. (7)

Module-III

Black body radiation, Stefan's law, energy distribution in the blackbody spectrum. Wien's displacement law, Wein's formula and Rayleigh-jeans formula (only statement and discussion). Planck's radiation formula, derivative of Rayleigh-jeans formula. Wein's formula and Stefan Boltzmann law using Planck's formula. Rutherford's atomic model and its short coming, Bohr's theory of hydrogen atom. Energy levels, explanation of spectra, correction for nuclear motion, Bohr's correspondence principle. Frank-Hertz experiment, critical potential. Photoelectric effect, Photon, Einstein's photoelectric effect, photon, Einstein's photoelectric equation, Compton effect. Particle nature of radiation. (8)

Module-IV

The atomic nucleus: its size, mass, charge, spin, magnetic moment, Mass defect, binding energy, stability of nuclear force-its characteristics, Radioactive decay law, activity decay law, activity, half-life, average life, elementary idea of nuclear fission and fusion. Linear accelerator, cyclotron. (8)

Essential readings:

1. Heat and Thermodynamics-A.B.Gupta & H.B. Ray (New Central)
2. Sound-M.Ghosh (S.Chand)
3. Physics for degree students-vol-I, II, M.Das
4. Modern Physics-R.Murugesan
5. Introduction to Modern physics-H.S. Mani, G.K. Mehta (Affiliated East West)
6. Atomic physics-G.P.Harnwerll & W.E. Stephens. Mc Graw-HILL book company, Inc.
7. Atomic and nuclear physics-Satyapraksh
8. Atomic and nuclear physics-Shatendra Sharma (pearson publication)
9. Atomic and nuclear physics-Gupta Ghosha