

FPYC-102 HEAT AND THERMODYNAMICS

Unit-I

Thermodynamical system , Principles of thermodynamics , concept of thermodynamic state , Zeroth law of thermodynamics , work done in isothermal and isobaric processes, Heat and work ,Free energy and their application, internal energy function and the first law of thermodynamics , application to various processes , $C_p - C_v$, Equation of state for adiabatic process, work done in adiabatic process , Equations of state.

Ideal gases and their PVT relations, Gas mixtures.

Unit-II

Maxwell- Boltzmann formula for distribution of molecular speed (statement of formula and discussion), Average RMS and most probable speed, Mean free path, Degrees of freedom, The principle of equipartition of energy, The Vanderwaals equation of state, Evaluation of critical constants,

Unit-III

Zeroth law of thermodynamics, Heat capacity, Second law of thermodynamics, Carnot's engine, Carnot theorem, The thermodynamic scale of temperature, Entropy, entropy change in reversible and irreversible processes, mathematical formulation of second law, Maxwell's relations, first TdS equation, second TdS equation, Phase change, Clausius-Clapeyron equation

Unit-IV

Thermal conductivity, Conduction along a uniform bar, rectilinear flow of heat, Experimental determination of Thermal conductivity (Ingen-Hausz's method).

Blackbody radiation, Emissive and absorptive power, Kirchoff's law, Stefan-Boltzmann's law, Energy distribution in the blackbody spectrum, Wein's law and Rayleigh-Jean's law (Statement of formula and discussion). Planck's radiation formula, derivation of Rayleigh-Jean's formula, Wein's formula and Stefan-Boltzmann law using Planck's formula.

Books:

1. Heat and thermodynamics- Zemansky And Dittman (Mc Graw Hill)
2. Heat and thermodynamics- A. B Gupta , H. Ray (New Age)
3. Advance textbook of heat- P.K Chakraborty (Hindustan Publication)
4. A treatise on heat – Saha And Srivastava (The Indian Press)
5. Heat and thermodynamics- D. S Mathur.