

B.Sc. Physical Science SEMESTER –III

SPH 203 : Thermal Physics and Statistical Mechanics

No. of hrs/week: 4

Credits: 4

UNIT I (11 hrs)

Kinetic theory of gases

Introduction –Deduction of Maxwell's law of distribution of molecular speeds, experimental verification. Toothed wheel experiment. Transport phenomena-Viscosity of gases-thermal conductivity-diffusion of gases.

UNIT II(14 hrs)

Thermodynamics

Introduction- Isothermal and adiabatic process- Reversible and irreversible processes-Carnot's engine and its efficiency-Carnot's theorem-Second law of thermodynamics. Kelvin's and Clausius statements-Thermodynamic scale of temperature-Entropy, physical significance – Change in entropy in reversible and irreversible processes-Entropy and disorder-Entropy of Universe-Temperature-Entropy (T-S) diagram-Change of entropy of a perfect gas- change of entropy when ice changes into steam.

UNIT III(11 hrs)

Thermodynamic potentials and Maxwell's equations

Thermodynamic potentials-Derivation of Maxwell's thermodynamic relations-Clausius-Clayperon's equation-Derivation for ratio of specific heats-Derivation for difference of two specific heats for perfect gas.Joule Kelvin effect-expression for Joule Kelvin coefficient for perfect and Van der waal's gas.

UNIT IV(14 hrs)

Black body radiation

Blackbody-Ferry's black body-distribution of energy in the spectrum of black body-Wein's displacement law,Wein's law and stefans law Rayleigh-Jean's law-Quantum theory of radiation-Planck's law-Measurement of radiation.

UNIT V(10 hrs)Statistical Mechanics

Phase space, Macrostate and Microstate Statistical basis, Probability, Principle of equal apriori probability, some basic rules of probability theory, permutations and combinations, Entropy and Thermodynamic probability.

TEXT BOOKS:

- 1.BSc Physics, Vol.2, Telugu Akademy, Hyderabad
- 2.Thermodynamics, R.C. Srivastava, Subit K. Saha &Abhay K. Jain Eastern Economy Edition.
- 3.Unified Physics Vol.2, Optics & Thermodynamics, Jai Prakash Nath&Co.Ltd., Meerut
- 4 Heat ,Thermodynamics and Statistical Physics, Brij lal, Dr.N Subrahmanyam, P.S. Hemne, S Chand & Co
5. A text Book of Heat J.B.Rajam

REFERENCE BOOKS:

1. Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007
2. Heat, Thermodynamics and Statistical Physics-N Brij Lal, N Subrahmanyam, PS Hemne, S.Chand& Co.,2012
3. Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000
4. University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, New Delhi
5. Text Book of +3 Physics – Samal, Mishra &Mohanty, National Library, Min.of Culture, Govt of India.
6. Modern Engineering Physics, A.S. Vasudeva, S.Chand& Co.,