



S.K.R. & S.K.R. Govt. College for Women (Autonomous), Kadapa.

Reaccredited with 'B' Grade by NAAC

Y.S.R.Kadapa District – 516001, Andhra Pradesh

DEPARTMENT OF PHYSICS

B.Sc. 2nd year 3rd Semester Physics Syllabus

PAPER-III: HEAT AND THERMODYNAMICS

Work load: 60 hrs per semester

4 hrs/week

UNIT-I: Kinetic Theory of gases:

(12 hrs)

Kinetic Theory of gases-Introduction, Maxwell's law of distribution of molecular velocities

(qualitative treatment only) and its experimental verification, Mean free path, Degrees of freedom, Principle of equipartition of energy (Qualitative ideas only), Transport phenomenon in ideal gases: viscosity, Thermal conductivity and diffusion of gases.

UNIT-II: Thermodynamics:

(12hrs)

Introduction- Isothermal and Adiabatic processes, Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, Second law of thermodynamics: Kelvin's and Clausius statements, Entropy, Physical significance, Change in entropy in reversible and irreversible processes; Entropy and disorder-Entropy of Universe; Temperature-Entropy (T-S) diagram and its uses.

UNIT-III: Thermodynamic Potentials and Maxwell's equations:

(12hrs)

Thermodynamic potentials-Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free

Energy and their significance, Derivation of Maxwell's thermodynamic relations from thermodynamic potentials, Applications to (i) Clausius-Clayperon's equation (ii) Value of CPCV (iii) Value of CP/CV (iv) Joule-Kelvin coefficient for ideal gas.

UNIT-IV:

Low

temperature

Physics:

(12hrs)

Methods for producing very low temperatures, Joule Kelvin effect, Porous plug experiment, Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Liquefaction of air by Linde's method, Production of low temperatures by adiabatic demagnetization (qualitative), Practical applications of Substances at low temperatures.

UNIT-V: Quantum theory of radiation:

(12 hrs)

Blackbody and its spectral energy distribution of black body radiation, Kirchoff's law, Wein's

displacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law (No derivations), Planck's law of black body radiation-Derivation, Solar constant and its determination using Angstrom pyroheliometer, Estimation of surface temperature of Sun.

Reference Books:

1. B. Sc. Physics, Vol.2, Telugu Academy, Hyderabad
2. Fundamentals of Physics Vol. I - Resnick, Halliday, Krane, Wiley India 2007
3. Thermodynamics, R.C.Srivastava, S.K.Saha&AbhayK.Jain, Eastern Economy Edition.

4. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
5. University Physics-FW Sears, MW Zemansky & HD Young, Narosa Publications, Delhi
6. Heat and Thermodynamics -N BrijLal, P Subrahmanyam, S.Chand & Co., 2012
7. Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000
8. Unified Physics Vol.2, Optics & Thermodynamics, Jai Prakash Nath & Co. Ltd., Meerut

B.Sc III Sem. - Physics

Practical paper 3: Heat and Thermodynamics

Work load: 30 hrs per semester

2 hrs/week

Minimum of 6 experiments to be done and recorded:

1. Specific heat of a liquid –Joule’s calorimeter –Barton’s radiation correction
2. Thermal conductivity of bad conductor-Lee’s method
3. Thermal conductivity of rubber.
4. Measurement of Stefan’s constant.
5. Specific heat of a liquid by applying Newton’s law of cooling correction.
6. Heating efficiency of electrical kettle with varying voltages.
7. Thermoemf- thermo couple - Potentiometer
8. Thermal behavior of an electric bulb (filament/torch light bulb)
9. Measurement of Stefan’s constant- emissive method
10. Study of variation of resistance with temperature - Thermistor.

NOTE: *Minimum 6 Experiments need to be done and recorded from the above list*