	PVKN Govt. College (Autonomous) Chittoor	**Program** II B.Sc. Physics Hons.
Course Code **24-PHY-3C6**	**TITLE OF THE COURSE** **HEAT AND THERMODYNAMICS**	**Semester-III**

Syllabus

UNIT-I: KINETIC THEORY OF GASES:

Kinetic Theory of gases- Introduction, Maxwell's law of distribution of molecular velocities, Mean free path, ~~Principle of equipartition of energy~~, Transport phenomenon in ideal gases: Diffusion, viscosity and Thermal conductivity.

UNIT-II: THERMODYNAMICS:

Introduction- **Isothermal and adiabatic process**, Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, Thermodynamic scale of temperature, second law of thermodynamics Entropy: Physical significance, change in entropy in reversible and irreversible processes; Temperature Entropy (T-S) diagram and its uses; change of entropy when ice changes into steam, **Change in entropy during free expansion**.

UNIT-III: THERMODYNAMIC POTENTIALS AND MAXWELL'S EQUATIONS:

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-Clapeyron's equation (ii) Joule-Kelvin coefficient for ideal and Vander Waals' gases.

UNIT-IV: LOW TEMPERATURE PHYSICS:

Methods for producing very low temperatures, **Liquefaction of helium by Kapitsa's method**, Joule Kelvin effect, porous plug experiment, Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Expression for Joule Thomson cooling, Production of low temperatures by adiabatic demagnetization.

UNIT-V: QUANTUM THEORY OF RADIATION:

Black body- Ferry Black body Spectral energy distribution of black body radiation, Wein's displacement law and Rayleigh Jean's law (No derivations), Planck's law of black body radiation-Derivation, Deduction of Wein's law and Rayleigh- Jean's law from Planck's law, Solar constant and its determination using Angstrom pyro heliometer, ~~Estimation of surface temperature of Sun~~.