Part A: Introduction				
Program: **Diploma**		Class: **B.Sc.**	Semester: **Third**	Session:**2023-2024**
1	Course Code	**PSC – 03T**		
2	Course Title	**THERMAL PHYSICS AND BASIC STATISTICAL MECHANICS**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	As per norms		
5	Course Learning Outcomes (CLO)	**After completion of the course students will be able to:** • Understand the relations between heat energy, work, temperature, and energy. • Understand how the thermal energy in a system change and perform useful work on its surroundings. • Understand the interrelationship between thermodynamic functions and ability to use such relationships to solve practical problems. • Get the understanding about black body radiation. • Get the introductory knowledge of statistical mechanics • Solve numerical problems based on entire syllabus		
6	**Credit Value**	**Theory : 3**		
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks : 40**	

Part B: Content of the Course		
Total Hours: 45		
Unit	**Topic**	**Number of Hours**
I	**Laws of Thermodynamics:** Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, various Thermodynamical Processes. Second law of thermodynamics & Entropy, Carnot's cycle,Carnot's theorem, Entropy changes in reversible & irreversible processes,Entropy-temperaturediagrams,Thirdlawofthermodynamics. **Thermodynamic, Potentials:** Internal Energy, Enthalpy, Helmholtz Free Energy and Gibbs function. Maxwell's relations & applications, Clausius-Clapeyron Equation, Expression for (C_P–C_V), C_P/C_V, Joule-Thompson effect, Cooling by adiabatic demagnetization	**12**
II	**KineticTheoryofGases:**Maxwellian distribution of speeds in an ideal gas: distribution of speeds and velocities, experimental verification, distinction between mean, rms and most probable speed values, Molecular Collision and Mean Free Path, Transport Phenomena in gases: Viscosity, Conduction and Diffusion, Law of equipartition of energy.	**11**
III	**Theory of Radiation:** Blackbody radiation, Spectral distribution, Concept of Energy Density, Stefan-Boltzmann Law, Wien's displacement law and Rayleigh-Jeans Law (Only qualitative). Planck's radiation Law, Deduction of Wien's distribution law and Rayleigh-Jeans Law from Planck's law. Experimental verification of Planck's radiation law.	**11**
IV	**Statistical Mechanics:** Introductory Idea, Phase-space, Macro-state and Microstate, Entropy and Thermodynamic probability, fundamental postulates of statistical mechanics. Boltzmann's Canonical Distribution Law. Maxwell-Boltzmann distribution law, Quantum statistics-Fermi-Dirac distribution law and its application for Fermi Levels and Fermi Energy, Bose-Einstein distribution law and its application for Liquid Helium, comparison of three statistics.	**11**