

**SARDAR PATEL UNIVERSITY**  
**Programme & Subject: M.Sc (Defence Science)**  
**Semester: I**  
**Syllabus with Effect from: June - 2014**

<b>Paper Code: PT01EDSC01</b>	<b>Total Credit: 4</b>
<b>Title Of Paper: Thermodynamics, Phase Equilibria &amp; Properties of Matter</b>	

Unit	Description in Detail	Weightage (%)
I	Thermodynamics: Entropy, reversibility and irreversibility, thermodynamic temperature scale, entropy, time and cosmology, entropy and equilibrium, Gibb's and Helmholtz's energies, thermodynamic relations for a system an equilibrium, calculations, changes in state functions, chemical potentials and material equilibrium, reaction equilibrium, entropy and life, conventional entropies and third law (numerical and test examples)	25%
II	Thermodynamics: Thermodynamic description of mixtures, partial molar properties, thermodynamic properties of mixing, liquid mixtures, impact on biology, osmosis in physiology and biochemistry, chemical potentials in an ideal gas mixture, temperature dependence of equilibrium constants, ideal gas equilibrium calculations and deviations, simultaneous equilibria	25%
III	Phase equilibria: Henry's law and Rault's law, measurement of vapour pressure, Duhem-Margules equation, deviations from Rault's law, homogenous binary mixtures, boiling points and distillation, application of phase rule for incomplete systems and completely immiscible liquids, eutectic mixtures, solid solutions, salt water systems and solid liquid vapour equilibria, phase diagrams of binary systems- vapour pressure diagrams, liquid-liquid phase diagrams, liquid-solid phase diagrams, liquid- crystals and phase diagram	25%
IV	Properties of matter: Molecular properties- chemical bonds, hydrogen molecule ion, Mo methods for diatomic molecules and poly atomic molecules, calculation of molecular properties, SCF and Hartree –Fock wave functions, DFT calculations, semi empirical methods, chemical bonding and cohesive energies of solids, mechanical and electrical properties of solids, impact on nano science, optical and magnetic properties, superconductors	25%

**Basic Text & Reference Books:-**

- Glasstone S., Macmillan Textbook of Physical Chemistry, Macmillan India Ltd., 2<sup>nd</sup> edition
- Levine I. N., Physical Chemistry. Tata McGraw- Hill Edition, New Delhi, 5<sup>th</sup> edition
- Atkins P., Paula J. D., Atkin's Physical Chemistry. W. H. Freeman and Company, United States, 9<sup>th</sup> edition

