

Year & Sem: E2S1	Course Code: CH2101	Course Name: Chemical Engineering Thermodynamics-II	No. of Credits: 4	L 2	T&PS 2	P 0
UNIT I: Solution Thermodynamics: Theory, Fundamental property relation, chemical potential as a criterion for phase equilibrium, partial properties, ideal gas mixtures, fugacity and fugacity coefficient for pure species, fugacity and fugacity coefficient for species in solutions, generalized correlations for Fugacity coefficient, The ideal solutions, excess properties. UNIT II: Solution Thermodynamics: Applications: The liquid phase properties from VLE data, models for the excess Gibbs energy, property changes of mixing VLE at low to moderate pressures: The nature of equilibrium, the phase rule, Duhems theorem, VLE: Qualitative behavior, the gamma /Phi formulation of VLE, Dew point and bubble point calculations, flash calculations, solute (1)/solvent (2) systems UNIT III: Thermodynamic Properties and VLE from Equations of State: properties of fluids from the virial equations of state, properties of fluids from cubic equations of state, fluid properties from correlations of the Pitzer type, VLE from cubic equations of state Topics in Phase Equilibria: Equilibrium and stability, Liquid-Liquid Equilibrium (LLE), Vapor- Liquid–Liquid Equilibrium (VLLE), Solid-Liquid Equilibrium (SLE), Solid Vapor Equilibrium (SVE). UNIT IV: Chemical Reaction Equilibria: The reaction coordinate, application equilibrium criterion to chemical reactions, The standard Gibb’s energy change and the equilibrium constant, effect of temperature on equilibrium constants, relation of equilibrium constants to composition, equilibrium conversion for single reactions, Phase rule and Duhem’s theorem for reacting systems. UNIT V: Introduction to Molecular Thermodynamics : Molecular Theory of Fluids, Second Virial Coefficients from Potential Functions, Internal Energy of Ideal Gases: Microscopic view, Thermodynamic Properties and Statistical Mechanics , Hydrogen Bonding and Charge-Transfer Complexing , Behaviour of Excess Properties , Molecular Basis for Mixture Behaviour, VLE by Molecular Simulation. References/Text Books: 1. Introduction to Chemical Engineering Thermodynamics, 6th ed., J.M. Smith, H.C. Van Ness and M.M. Abbott, Tata McGraw-Hill, New Delhi, 2003. 2. Chemical Engineering Thermodynamics, Pradeep Ahuja, PHI Learning Pvt. Ltd., New Delhi, 2009 3. A Text Book of Chemical Engineering Thermodynamics, K.V. Narayanan, PHI Learning Pvt. Ltd., New Delhi, 2001. Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V & -VI syllabus for MID-III examinations.						