2.12 40187 CHEMICAL ENGG. THERMODYNAMICS

UNIT-1 BASIC CONCEPTS AND FIRST LAW:

System, surroundings, processes, heterogeneous and homogeneous systems, closed and open systems, , intensive and extensive properties, state and path functions, force, pressure and energy, equilibrium state and phase rule, reversible and irreversible process, zeroth law of thermodynamics, general statement of first law of thermodynamics, first law of cyclic process and non flow process, heat capacity, Enthalpy . Derivation for closed system and steady state flow process-flow calorimeter and heat calorimeter, simple problems.

UNIT-2 P-V-T BEHAVIOR AND HEAT EFFECTS:

P-V-T Behavior of pure fluids, equations of state and ideal gas law, processes involving ideal gas law :constant pressure, constant temperature, Constant Volume, adiabatic and polytrophic processes , equation of state for real gases :Vander waals equation, redlich-kwong state, generalized compressibility chart, heat effects accompanying chemical reactions, the standard heat of reactions, the standard heat of combustion, the standard heat of formation, hess's law of constant heat summation, simple problems.

UNIT-3 SECOND LAW OF THERMODYNAMICS AND THERMODYNAMIC PROPERTIES OF PURE FLUIDS:

Second law of Thermodynamics: general statement of the second law of thermodynamics, concept of entropy, carnot's principles, the equivalence of the Kelvin and clausius statement, thermodynamic temperature scale, Ideal gas as the carnot engine working substance, process involving ideal gases, adiabatic mixing process, clausius inequality, entropy and irreversibility, Indian Institution of Engineers Diploma in Chemical Engineering mathematical statement of the second law of thermodynamics. Third law of thermodynamics, work functions, Classification of thermodynamic properties, Gibbs free energy , fundamental property relation, fugacity, fugacity coefficient, effect of temperature and pressure on fugacity, determination of fugacity of pure fluids, fugacities of solids and liquids, Thermodynamic diagrams, simple problems.

Reference Books:

1. Chemical Engineering Thermodynamics" by J M Smith and M M Abbott
2. Chemical Engineering Thermodynamics" by Gopinath Halder