Subject: Chemical Engineering Thermodynamics-I

<table>
<tr><td>CHE- 223</td><td>Chemical engineering thermodynamics ics-1</td><td colspan="2">3CH
Theory+Lab (3+0)</td></tr>
<tr><td>Pre- req.</td><td>Nil</td><td>Category</td><td>Foundation Course</td></tr>
<tr><td colspan="4">Course Contents as per PEC Guidelines 2023-2024</td></tr>
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Fundamentals of Chemical engineering thermodynamics; Scope and definitions; Units and Dimensions, Isolated, closed and open systems; Intensive and extensive properties.
First law of Thermodynamics; Heat and work, thermodynamic equilibrium, internal energy, enthalpy, heat capacity Reversibility; Calorimetry; Enthalpies of formation and reaction and thermodynamic cycles.
Equations of state; The Phase Rule, PVT relationships for non-ideal gases. Viral equations of state, cubic equations of state, generalized correlations for gases, generalized correlations for liquids,
Second Law of Thermodynamics; Entropy.
Equilibrium and observable change; Changes in entropy with changes in P, V, and T change in entropy in ideal gas; Entropy balance in open system, Measurement of entropy.
Entropy and entropy balance for closed and open systems
Entropy changes, evaluating entropy data. The clausius inequality

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Weekly plan/ Reference Books	
1	Chemical engineering thermodynamics: Scope and definitions; Units and Dimensions
2-3	Temperature and zeroth law of thermodynamics, pressure and pressure measuring devices
4	Isolated, closed and open systems; Intensive and extensive properties, State and functions of state;
5	Thermodynamic Equilibrium; Phase equilibria: Phase rule; Enthalpies of formation and reaction, Equilibrium (reversible) and spontaneous (irreversible) change.
6	Internal energy U; Enthalpy H; Reversibility; Dependence of U and H on temperature. Reversible processes,
7-8	Energy balance in closed system, Mass and Energy Balances for Open Systems. First law as applied to ideal gases
9-10	Mid-term exam
11-12	The Phase Rule, P-V-T relationships for non-ideal gases.
13	Isothermal; Isometric; isobaric; polytropic and adiabatic processes involving an ideal gas;
14	Heat Effects; Sensible Heat Effects. Latent Heats of Pure Substances, Heat of Formation, Heat of Reaction & Combustion.
15-16	Second Law of Thermodynamics: Entropy; Equilibrium and observable change. Changes in entropy with changes in P, V, and T
17	Entropy changes, evaluating entropy data. The Clausius inequality
18	End Semester Exam

TEXT AND REFERENCE BOOKS:

- Smith J.M., Van Ness H.C., Abbott M.M. “Chemical Engineering Thermodynamics” 8th Ed. 2018. McGraw Hill International Edition.
- Yunus A. Çengel, Michael A. Boles - Thermodynamics _ an engineering approach- McGraw-Hill Education (2015)
- Eastop, McConkey “Applied Thermodynamics” National Book Foundation