Detailed Course Content	Number of Lectures
Definitions & Concepts: System & CV, Macroscopic and microscopic view points; Property, Thermodynamic State & Equilibrium, Energy, Work interaction & various modes of work, Heat; Zeroth Law of Thermodynamics, Temperature Scale	4
Properties of Pure Substances: Pure substance, Phase, Simple compressible substance, Ideal gas Equation of State, van der Walls Equation of State; Law of corresponding states, Compressibility chart, Pressure-volume; Temperature-volume and Phase diagrams; Mollier diagram and Steam tables.	4
First Law of Thermodynamics & its consequences: First law for a control mass; Internal energy; I Law analysis of Non-flow processes; Use of steam tables & Mollier diagram, Application of I Law of Thermodynamics for Flow Process CV) –Steady-state processes, Throttling process; Transient Flow Processes - Charging & discharging of tanks.	9
I Law Application to Chemically Reacting Systems: Fuels & Combustion, Theoretical Air/Fuel ratio, Standard heat of Reaction and effect of temperature on standard heat of reaction, Adiabatic flame temperature.	4
II Law of Thermodynamics & its Applications: Limitations of the I Law of Thermodynamics, Heat Engine, Heat Pump/Refrigerator. II Law of Thermodynamics – Kelvin Planck and Clausius statements & their equivalence. Reversible & irreversible processes, Criterion of reversibility, Carnot cycle & Carnot principles, Thermodynamic Temperature scale, Clausius inequality, Entropy, Calculations of entropy change, Principle of entropy increase, T-S diagram, II Law analysis of Control Volume. Available energy, Availability; Second law efficiency	10
Thermodynamic Potentials: Maxwell relations, Thermodynamic relations, Jacobian methods, Clapeyron and Kirchoff equations, Phase rule.	4
Power Cycles: Rankine cycle – Ideal and Reheat. Gas Power Cycles; Otto cycle, Diesel cycle and Brayton cycle.	3
Regrigeration Cycles: Vapor compression cycle, Air-standard refrigeration cycle.	2