UNIT I

Chapter 1 : Fundamentals of Thermodynamics

1-1 to 1-28

Syllabus :

1.1 Basic concepts - Concepts of pure substance, types of systems, properties of systems, Extensive and Intensive properties, flow and non flow process, specific volume, temperature, density, pressure, processes and cycles.

1.2 Energy - Work, Heat Transfer and Energy Thermodynamic definition of work and heat, Difference between heat and work, Potential Energy, Kinetic Energy, Internal Energy, Flow Work, concepts of enthalpy and physical concept of entropy.

1.3 Laws of Thermodynamics - Zeroth Law, First law of Thermodynamics, Second Law of Thermodynamics - Kelvin Planks, Clausius statements and their equivalence, Reversible and irreversible processes, Factors making the process irreversible, reversible carnot cycle for heat engine and refrigerator.

1.4 Application of Laws of Thermodynamic Steady Flow Energy equation and its application to boilers, engine, nozzle, turbine, compressor & condenser. Application of Second law of Thermodynamics to Heat Engine, Heat Pump and Refrigerator.

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1.8.6 Difference between Heat Engine and Refrigerator 1-20
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UNIT II

Chapter 2 : Ideal Gases and Ideal gas processes

2-1 to 2-29

Syllabus :

2.1 Avogadro's law, Calculate Molar Volume, Derivation of characteristic gas equation using boyle's and Charle's law, characteristics gas constant and universal gas constant.

2.2 Ideal gas processes : Isobaric, Isochoric, Isothermal, Isentropic, Polytropic, Throttling and their representation on P-V and T-S diagrams. Determination of work, heat, internal energy, enthalpy change and entropy change.

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UNIT III

Chapter 3 : Steam and Steam Boiler 3-1 to 3-40

Syllabus : Steam fundamentals - Applications of steam, Generation of steam at constant pressure with representation on various charts such as p-V, T-S, H-S. Properties of steam and use of steam table, Dryness fraction, Degree of superheat, sensible and latent heat, boiler efficiency, Mollier chart
Vapour processes : Constant pressure, constant volume, constant enthalpy, constant entropy process (numerical using steam table to determine dryness fraction and enthalpy), Rankine Cycle.
Steam Boilers : Classification, Construction and working of - Cochran, Babcock and Wilcox, La-mont and Loeffler boiler. Packaged boiler, Boiler draught. Indian Boiler Regulation (IBR).
Boiler mountings and accessories. Boiler instrumentation. Methods of energy conservation in boilers.

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UNIT IV

Chapter 4 : Steam Nozzles and Turbines 4-1 to 4-15

4.1. Steam nozzle : Continuity equation, types of nozzles, concept of Mach number, critical pressure and chock flow condition, application of steam nozzles.
4.2. Steam turbine : Classification of turbines, Construction and working of Impulse and Reaction turbine.
4.3. Compounding of turbines and its types, Regenerative feed heating, bleeding of steam, governing and its types, losses in steam turbines

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UNIT V

Chapter 5 : Steam Condensers and Cooling Towers 5-1 to 5-18

Steam Condensers - Dalton's law of partial pressure, function and classification of condensers, construction and working of surface condensers and jet condensers .

Condensers performance - Sources of air leakage and its effect, concept of condenser efficiency, vacuum efficiency (Simple numerical).

Cooling Towers - Construction and working of forced, natural and induced draught cooling tower.

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UNIT VI

Chapter 6 : Heat Transfer 6-1 to 6-25

6.1 Modes of heat transfer - Conduction, convection and radiation.

6.2 Conduction - Fourier's law, thermal conductivity, conduction through cylinder, thermal resistance, composite walls, list of conducting and insulating material

6.3 Convection – Newton's law of cooling, natural and force convection

6.4 Radiation - Thermal Radiation, Absorptivity, Transmissivity, Reflectivity, Emissivity, black and gray bodies, Stefan-Boltzman law.

6.5 Heat Exchangers - Classification, Construction and working of Shell and tube, shell and coil, pipe in pipe type and plate type heat exchanger, automotive heat exchanger and its applications.

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