Chapter 1

Chapter 1 : Basic Concepts 1-1 to 1-30

Syllabus : Thermodynamic system and control volume, Microscopic and macroscopic point of view, thermodynamic properties, state of a substance, process and cycle, Thermodynamic equilibrium, Concept of Continuum, Quasi-static process, The Zeroth Law of Thermodynamics, Temperature scales.

Chapter 2

Chapter 2 : First Law of Thermodynamics 2-1 to 2-60

Syllabus : First law for a closed system undergoing a cycle and change of state, energy, PMM1, first law of thermodynamics for steady flow process, steady flow energy equation applied to nozzle, diffuser, boiler, turbine, compressor, pump, heat exchanger and throttling process, filling and emptying process.

Chapter 3

Chapter 3 : Second Law of Thermodynamics 3-1 to 3-38

Syllabus : Limitations of First Law of thermodynamics, Kelvin-Planck and Clausius statements and their equivalence, PMM2, causes of irreversibility, Carnot theorem, corollary of Carnot theorem, thermodynamic temperature scale.

Chapter 4

Chapter 4 : Entropy 4-1 to 4-34

Syllabus : Clausius theorem, property of entropy, inequality of Clausius, entropy change in an irreversible process, principle of increase of entropy, entropy change for non-flow and flow processes.

Chapter 5

Chapter 5 : Exergy 5-1 to 5-26

Syllabus : Exergy of a heat input in a cycle, exergy destruction in heat transfer process, exergy of finite heat capacity body, exergy of closed and steady flow system, irreversibility and Gouy-Stodola theorem and its applications, second law efficiency.

Chapter 6

Chapter 6 : Vapour Power Cycles 6-1 to 6-42

Syllabus : Carnot vapour cycle, Rankine cycle, comparison of Carnot and Rankine cycle, calculation of cycle efficiencies, variables affecting efficiency of Rankine cycle, reheat cycle, regenerative cycle, reheat-regenerative cycle, feed water heaters.

Chapter 7

Syllabus : Recapitulation of Carnot, Otto and Diesel cycle, Dual cycle, Comparison of Otto, Diesel and Dual cycles, air standard efficiency, mean effective pressure, brake thermal efficiency, relative efficiency, Simple Brayton cycle.

Chapter 8

Syllabus : Simple Vapour Compression Refrigeration (VCR) cycle on P-h and T-s diagrams, analysis of the simple cycle, factors affecting the performance of the cycle, actual cycle, Reversed Carnot cycle and its limitation, Bell-Coleman cycle.

Chapter 9

Chapter 9 : Combustion 9-1 to 9-28

Syllabus : Combustion equations, stoichiometric air fuel ratio, enthalpy of formation, adiabatic flame temperature, determination of calorific values of fuels - calorimeter - Bomb and Junkers gas calorimeter.

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