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| 4th Semester | RPR4D001 | Applied Thermodynamics | L-T-P 3-0-0 | 3 CREDITS |
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Module-I (06 hrs)

Review of First and Second laws: First law analysis of unsteady flow control volumes, Entropy generation, Entropy balance for closed systems and steady flow systems, Available energy, Quality of energy, Availability for non flow and flow process, Irreversibility, Energy balance, Second law efficiency.

Module – II (10 hrs)

Air Standard Cycle & Introduction to I.C. Engine: Otto, diesel and dual cycles, description and operation of four and two stroke cycle engine, comparison of SI and CI engines, valve timing diagram, power output and efficiency calculation.

Reciprocating Air Compressors: Introduction (Uses of compressed air), The reciprocating cycle neglecting and considering clearance volume, Volumetric efficiency and its effect on compressor performance, Limitations of single stage compression, Multistage compression and intercooling, Optimum intercooler pressure, Performance and design calculations of reciprocating compressors, Air motors

Module – III (10 hrs)

Steam And Steam Generator :- Properties of steam, measurement of dryness fraction, use of steam table. T-S and H-S diagrams for representing thermodynamic processes. Boiler, Classification of boiler, comparison between water tube boiler and fire tube boiler. Boiler mountings and accessories. Description of Cochran & Babcock -Wilcox boiler.

Steam Nozzles :- Types of nozzles, isentropic flow through nozzles, effect of friction on nozzle efficiency. Critical pressure ratio and maximum discharge, throat and exit area.

Module – IV (09 hrs)

Steam Turbines & Condensers:- Turbine type and applications. Impulse turbine, pressure and velocity compounding, velocity diagram, work output, losses and efficiency. Impulse reaction turbine, velocity diagram, degree of reaction, work output, losses and efficiency. Jet and surface condensers. Condenser vacuum and vacuum efficiency.

Module – V (10 hrs)

Heat Transfer : Basic modes of heat transfer, one dimensional steady state, conduction through slab, cylinder and sphere ; basic theory of radiant heat transfer, black body & mono chromatic radiation, total emissive power.

Refrigeration system: Reversed Carnot cycle, Reversed Brayton cycle (Gas refrigeration system), The vapor compression cycle, The vapor absorption cycle.

Books:

- Engineering Thermodynamics by P. K. Nag, Publisher:TMH
- Engineering Thermodynamics by P. Chattopadhyay, OXFORD
- Fundamentals of Thermodynamics by Sonntag, Borgnakke, Van Wylen, John Wiley & Sons
- Fundamentals of Engineering Thermodynamics by E. Rathakrishnan, PHI
- Engineering Thermodynamics by M.Achyuthan, PHI
- Engineering Thermodynamics by Y.V.C. Rao, University Press
- Thermodynamics and Thermal Engineering by Kothandaraman & Domkundwar, Dhanpat Rai
- Applied Thermodynamics by P.L.Ballaney, Khanna Publishers
- Steam Tables in SI Units by Ramalingam, Scitech
- Steam Tables by C.P.Kothandaraman, New Age International