Department Of Mechanical Engineering

Steam Power & Jet Propulsion

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III Year B.Tech I Sem			
Sub Code: 23ME505	3	1	4

UNIT- I

Steam Power Plant: Rankine cycle - Schematic layout, Thermodynamic Analysis, Concept of Mean Temperature of Heat addition, Methods to improve cycle performance - Regeneration & reheating. Boilers - Classification - Working principles with sketches including HP Boilers - Mountings and Accessories - Working principles- Boiler horse power, Equivalent Evaporation, Efficiency and Heat balance - Draught- Classification - Height of chimney for given draught and discharge- Condition for maximum discharge- Efficiency of chimney

UNIT- II

Steam Nozzles: Stagnation Properties- Function of nozzle - Applications and Types- Flow through nozzles- Thermodynamic analysis - Assumptions -Velocity of nozzle at exit-Ideal and actual expansion in nozzle- Velocity coefficient- Condition for maximum discharge- Critical pressure ratio- Criteria to decide nozzle shape- Super saturated flow, its effects, Degree of super saturation and Degree of under cooling - Wilson line.

UNIT- III

Steam Turbines: Classification - Impulse turbine; Mechanical details - Velocity diagram - Effect of friction - Power developed, Axial thrust, Blade or diagram efficiency - Condition for maximum efficiency. De-Laval Turbine - its features- Methods to reduce rotor speed- Velocity compounding and Pressure compounding- Velocity and Pressure variation along the flow - Combined velocity diagram for a velocity compounded impulse turbine.

Reaction Turbine: Mechanical details - Principle of operation, Thermodynamic analysis of a stage, Degree of reaction -Velocity diagram - Parson's reaction turbine - Condition for maximum efficiency.

UNIT- IV

Steam Condensers: Requirements of steam condensing plant - Classification of condensers - Working principle of different types - Vacuum efficiency and Condenser efficiency - Air leakage, sources and its affects, Air pump- Cooling water requirement.

Gas Turbines: Simple gas turbine plant - Ideal cycle, essential components - Parameters of performance - Actual cycle - Regeneration, Inter cooling and Reheating -Closed and Semi-closed cycles - Merits and Demerits- Combustion chambers and turbines of Gas Turbine Plant- Brief Concepts

UNIT- V

Jet Propulsion: Principle of Operation -Classification of jet propulsive engines - Working Principles with schematic diagrams and representation on T-S diagram - Thrust, Thrust Power and Propulsion Efficiency - Turbo jet engines - Needs and Demands met by Turbo jet - Schematic Diagram, Thermodynamic Cycle, Performance Evaluation Thrust Augmentation - Methods.

Rockets: Application - Working Principle - Classification - Propellant Type - Thrust, Propulsive Efficiency - Specific Impulse - Solid and Liquid propellant Rocket Engines.

TEXT BOOKS:

1. Thermal Engineering / Mahesh M Rathore/ Mc Graw Hill
2. Gas Turbines - V. Ganesan /Mc Graw Hill

REFERENCE BOOKS:

1. Gas Turbine Theory/ Saravanamuttoo, Cohen, Rogers/ Pearson
2. Fundamentals of Engineering Thermodynamics / Rathakrishnan/ PHI
3. Thermal Engineering/ Rajput/ Lakshmi Publications