

THERMAL ENGINEERING

Course code	23ME3502	Year	III	Semester	I
Course category	Professional Core	Branch	ME	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Thermodynamics
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes		Blooms Level
Upon successful completion of the course, the student will be able to		L2
CO1	Understand the basic concepts of actual cycles and their analysis	L3
CO2	Analyze the IC Engines and Boilers.	L3
CO3	Discuss the concepts of Steam turbines.	L3
CO4	Analyze the working principles of compressors & Gas Turbines.	L3
CO5	Discuss the working of Jet propulsion, Rockets and solar engineering.	L2

Contribution of Course Out comes towards achievement of Program Outcomes & Strength of correlations (3:High, 2:Medium, 1:Low)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	1	3				1							1	1
CO-2	2	3				2							3	3
CO-3	2	3				2							3	3
CO-4	2	3				2							3	3
CO-5	2	3				2							3	3

SYLLABUS

UnitNo.	Contents	Mapped CO
I	Actual Cycles and their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blowdown-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines.	CO-1
II	I.C Engines: Classification - Working principles of SI and CI engines, Valve and Port Timing Diagrams, -Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication, principles of supercharging and turbo charging, Measurement, Testing and Performance. Boilers: Introduction, Classification of Boilers, Working Principles of Boilers, Differentiate Between Fire Tube & Water Tube Boilers.	CO-2

III	<p>Steam nozzles: Functions, applications, types, flow through nozzles, condition for aximum discharge, critical pressure ratio, criteria to decide nozzle shape, Wilson line.</p> <p>Steam turbines: Classification – impulse turbine; velocity diagram, effect of friction, diagram efficiency, De-leval turbine - methods to reduce rotor speed, combined velocity diagram. Reaction turbine: Principle of operation, velocity diagram, Parson's reaction turbine – condition for maximum efficiency.</p> <p>Steam condensers: Classification, working principles of different types – vacuum efficiency and condenser efficiency.</p>	CO-3
IV	<p>Compressors: Classification, Reciprocating type, Principle, multi-stage compression, Rotary type, Lysholm compressor, principle and efficiency considerations.</p> <p>Centrifugal Compressors: Principle, velocity and pressure variation, velocity diagrams.</p> <p>Axial flow Compressors: Principle, pressure rise and efficiency calculations.</p> <p>Gas Turbines: Simple gas turbine plant – ideal cycle, components –regeneration, inter cooling and reheating.</p>	CO-4
V	<p>Jet Propulsion: Principle, classification-s diagram – turbo jet engines – thermodynamic cycle, performance evaluation.</p> <p>Rockets: Principle, solid and liquid propellant rocket engines.</p> <p>Solar Engineering: Solar radiation, Solar collectors, applications</p>	CO-5