

### AE-313: Thermal Engineering

L	T	P	Credit	Area		CWS	PRS	MTE	ETE	PRE
3	0/1	2/0	4	DEC		15/25	25/-	20/25	40/50	-

**Objectives:** This course introduces students with types of boilers, steam nozzles, types of steam turbines, steam condensers and centrifugal compressors

### AE-313: Thermal Engineering

AE-313: Thermal Engineering		Contact Hours
Unit-1	<b>Introduction to Boilers:</b> Classification of boilers, boiler mountings and accessories; draft systems, circulation system; combustion and its calculations, and boiler performance.	8
Unit-2	<b>Steam Nozzles:</b> Types of nozzles, flow of steam through nozzles; condition for maximum discharge through nozzle; nozzle efficiency, effect of friction and supersaturated flow through nozzle.	6
Unit-3	<b>Steam Turbines:</b> Working principle and types of steam turbines; velocity diagrams for impulse and reaction turbines, compounding of impulse turbines; optimum velocity ratio and maximum efficiency, blade twisting, comparison of impulse and reaction turbines, condition line and reheat-factor, losses in steam turbines; governing of steam turbines.	6
Unit-4	<b>Steam Condensers:</b> Types and working of condensers, types and performance of cooling towers.	8
Unit-5	<b>Reciprocating Air Compressor:</b> Steady flow analysis, isothermal, adiabatic and polytropic compression; single and multi-stage compression, ideal intermediate pressure; compressor clearance, volumetric and isothermal efficiency; minimum work requirement of a compressor.	8
Unit-6	<b>Centrifugal compressor:</b> Velocity diagrams, efficiency of compressor stage, choice of reaction, stage pressure rise, surging, multi-stage compressor, compressor performance, vacuum pump.	6
<b>Total</b>		<b>42</b>

Reference Books:	
1	P.K. Nag,"Engineering Thermodynamics",Publisher-Tata Mcgraw Hill Publishing Company Limited(ISBN-1259062562)
2	Gordon Rogers,"Engineering Thermodynamics",Publisher-Pearson Education( ISBN8131702065
3	Kenneth Wark,"Thermodynamics",Publisher-Mcgraw-hill Book Company(ISBN00706828
4	Gordon Rogers and Yon Mayhew, "Engineering Thermodynamics", PublisherPearsonpublisher(ISBN-978813
5	Van Wylen and Sonntag, "Fundamentals of Classical Thermodynamics", PublisherJohn Wiley & Sons Inc.(ISBN-0471041882
6	Moran and Shaprio, "Fundamentals of Engineering Thermodynamics", "PublisherJohn Wiley &
7	Cengel and Boles,"Thermodynamics: An Engineering Approach, "Publisher-The McGraw-Hill Companies(ISBN-9789814595292)
8	T.D. Eastop,"Applied Thermodynamics for Engineering Technologists",PublisherLongman publisher(ISBN-9788177582383)
9	S. Domkundwar,"Thermal Engineering",Publisher-Dhanpat Rai& Co (p) Ltd 9(ISBN8177000217)
10	Onkar singh,"Applied Thermodynamics",Publisher- New Age International (p) Limited (ISBN-8122425836)

### Course Outcomes

CO1	To understand about boilers: its types , its components ,its calculations, and performance
CO2	To understand about steam nozzles , its types and analysis
CO3	To understand aboutsteam turbines ,its Working principle ,types and analysis.
CO4	To understand aboutTypes and working of condensers& cooling towers with performance.
CO5	To understand aboutreciprocating air compressor and analysis.
CO6	To understand aboutcentrifugal compressor and analysis.

### CO-PO/PSOMatrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	0	0	0	0	0	0	2	2	1	1
CO2	3	3	2	3	1	0	0	0	0	0	0	1	2	1	1
CO3	3	3	3	3	1	0	0	0	0	0	0	2	3	3	2
CO4	3	3	3	3	1	0	0	0	0	0	0	1	3	3	2
CO5	2	2	2	2	2	0	0	0	0	0	0	1	2	2	2