

Course Type	Course Code	Name of Course	L	T	P	Credit
DE 3	MED401	Energy Conversion Equipment	3	0	0	9

Course Objective

- The purpose of this course is to introduce the undergraduate students with the most important equipments in the thermal engineering related to production of output power in the thermal power plants, and provide proper understanding of its operations.

Learning Outcomes

Upon successful completion of this course, students will:

- Effective utilization of available renewable energy resources
- To acquire the knowledge of modern energy conversion technologies
- Capability to determine thermodynamic efficiency of various energy related processes.
- To understand the Gas turbine plant and performance of it.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Vapour Power Cycles: Simple and modified Rankine cycle, Binary vapour cycle.	6	Discuss the energy resources and energy conversion methods available for the production of electric power in India
2	Flow through Nozzle, Velocity and heat drop, mass discharge through a nozzle, critical pressure ratio and its significance, effect of friction and nozzle efficiency, supersaturated flow, design pressure ratio	7	Discuss the effects of area change, the effects of the back pressure on mass flow rate, and the occurrence of choking and normal shocks.
3	Steam Turbines: Classification, Flow through blades, velocity diagram, power output and efficiency, maximum blade efficiency of single stage impulse turbine, blade friction, compounding of impulse turbine. Reaction Turbine-Flow through impulse reaction blades, degree of reaction, velocity diagram, power output, efficiency and blade height, comparison of impulse and impulse reaction turbines. Losses in steam turbines, stage efficiency, overall efficiency and reheat factor. Governing of steam turbines.	12	Discuss the working principle and basic concepts of the steam turbines, its layout, safety principles and compare it with plants of other types.
4	Steam Condensers: jet and surface condensers., Condenser vacuum, sources of air leakage & its disadvantages, vacuum efficiency and condenser efficiency	7	Select the heat transfer tubes needed for condensers and effects of air leakage in a condenser
5	Gas Turbines: Brayton cycle; Components of a gas turbine plant; open and closed types of gas turbine plants; Optimum pressure ratio; Improvements of the basic gas turbine cycle; multi stage compression with inter-cooling; multi stage expansion with reheating between stages; exhaust gas heat exchanger, Applications of gas turbines; selection of blade materials; gas turbine fuels.	10	Calculate the performance of gas turbines with reheat and regeneration, and discuss the performance of combined cycle power plants.

Text Book:

1. Power plant engineering- PK nag, McGraw Hill, 4th edition, 2014

Other References:

1. Steam turbine theory and practices – W. J kearton, CBS Publication, 7th edition, 2004
2. Gas turbine theory-H. Cohen, H. I. H. Saravanamuttoo, G.F.C Rogers, Paul Straznicky, Andrew nix, Pearson Publication, 7th edition, 2017
3. Gas turbine- V Ganesan, McGraw hill, 3rd edition, 2010
4. Thermodynamics and Heat Engines vol.2- R Yadav, central Publishing house, 6th edition, 2000.