III Year I Semester	**L**	**T**	**P**	**C**
Code:20ME5010	**3**	**0**	**0**	**3**

STEAM AND GAS TURBINES

Course Objectives:

The Students will acquire the knowledge:

1. To interpret the principles of nozzles and analyze the performance of nozzles
2. Todiscusstheperformanceandapplicationsofimpulsesteamturbinesinpowerplants.
3. Tooutlinetheconceptsofperformanceandapplicationsofreactionsteamturbinesin power plants.
4. To discuss the working of Gas Turbine and methods to improve efficiency.
5. To illustrate the performance of jet propulsion system, know the principle of operation of Rocket Propulsion Systems.

UNIT I STEAM NOZZLES

Types of nozzles, velocity of steam, discharge through nozzle, critical pressure ratio and condition for maximum discharge, physical significance of critical pressure ratio, effect of friction and nozzle efficiency, general relationship between area, velocity and pressure in nozzle flow.

UNIT II IMPULSE STEAM TURBINE

Principle of operation, types of impulse steam turbines, compounding of steam turbines, impulse turbine- velocity diagram, calculation of work, power and efficiency, condition for maximum efficiency.

UNIT III REACTION TURBINES

Velocity diagram, degree of reaction, Parson turbine, work, power, efficiencies, blade height, condition for maximum blade efficiency for Parson turbine, reheat factor, governing of steam turbine- throttle, nozzle and bypass governing, regenerative feed heating, reheating of steam, Losses in steam turbine.

UNIT IV GAS TURBINES

Classification, open and closed cycle, gas turbine fuels, actual Brayton cycle, optimum pressure ratio for maximum thermal efficiency, work ratio, air rate, effect of operating variables on the thermal efficiency and work ratio and air rate means of improving efficiency, Open cycle turbine with regeneration, reheating and Intercooling, combined steam and gas turbine plant, requirements of combustion chamber, types of combustion chambers.

UNIT V JET PROPULSION

Turbojet Engine, thrust, thrust power, propulsive efficiency, thermal efficiency, turboprop, and ramjet and pulsejet engines.
Rocket Propulsion: Principle, classification-chemical, rocket-solid propellant, liquid propellant, advantages.

Reference Books:

1. Power Plant Engineering, P.K.Nag, Mc Graw Hill Education
2. Gas Turbines, V. Ganeshan, Mc Graw Hill Education
3. Thermal Engineering, R.K. Rajput, Laxmi Publication
4. Steam Turbine Theory and Practice, William J.Kearton,CBSPublication
5. Power Plant Engineering, R. K. Hegde, Pearson India Education

Course Outcomes:

Upon successful completion of this course, the students will be able to:
1. Illustrate the principles of nozzles and analyze the performance of nozzles
2. Explain the performance and applications of impulse steam turbine sin power plants.
3. Summarize the performance and applications of reaction steam turbine sin power plants.
4. Describe the working of Gas Turbine and methods to improve efficiency.
5. Outline the performance of jet propulsion system, know the principle of operation of Rocket Propulsion Systems.