Subject Code: 01ME0831
Subject Name: Steam and Gas Turbine
B. Tech. Year - IIII (Semester - 8)

Type of course : Program Core

Prerequisite : Engineering Thermodynamics, Fluid Mechanics, Heat Transfer

Rationale : The course is prepared to provide the detail knowledge of construction and working of steam turbine, gas turbine, nozzles etc.

Course Outcome :
Students will be able to

1. Analyze thermodynamic cycles of steam power plant and understand construction, working and significance of its various components
2. Analyze thermodynamic cycles of gas turbine power plant and jet propulsion systems

Teaching and Examination Scheme :

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks			Practical Marks		
Theory	Tutorial	Practical	C	ESE(E)	IA	CSE	Viva (V)	Term Work (TW)	
4	0	2	5	50	30	20	25	25	150

Content :

Sr. No.	Content	Total Hrs
1	**Steam Nozzles:** Definitions and applications, classification of nozzles, steady flow energy equation in nozzles, velocity of steam, mass of discharge through nozzle, critical pressure ratio and condition for maximum discharge, physical explanation of critical pressure ratio, nozzle efficiency	**8**
2	**Steam Turbine:** Principle of operation of steam turbine, classification of steam turbines, velocity diagram and work done, parson's reaction turbine, difference between impulse and reaction turbine, simple impulse turbine, compounding of impulse turbine, pressure compounded impulse turbine, velocity compound impulse turbine, pressure-velocity compounded impulse turbine, impulse reaction turbine, combination turbines, governing of steam turbine, Methods of attachment of blades to turbine rotor, Losses in steam turbine. Reheating, regenerative and inter-cooling in steam turbine, stage efficiency of impulse turbines, state point locus of an impulse turbine, state point locus for multistage steam turbine, reheat factor	**14**

3	**Gas Turbine:** Types and application, air standard Brayton cycle, actual Brayton cycle, optimum pressure ratio for maximum cycle thermal efficiency, work ratio, cycle air rate, effect of operating variables on the thermal efficiency and work ratio, and air rate, simple open cycle turbine with regeneration, reheating and Inter cooling, closed cycle gas turbine, fuel for gas turbine. Combined steam and gas turbine plant, requirements of combustion chamber, classification of combustion chambers	**14**
4	**Jet Propulsion:** Fundamental of propulsion technology, classification of jet propulsion engines, turbojet Engine, thrust power, propulsive and thermal efficiency, Turbo propulsion, Ramjet and Pulsejet engines	**6**

Distribution of Theory Marks

R Level	**U** Level	**A** Level	**N** Level	**E`** Level	**C** Level
10	**20**	**25**	**25**	**10**	**10**

Legends: R: Remember**; U:** Understand**; A:** Apply**; N:** Analyze**; E:** Evaluate**; C**: Create

List of Assignment :

1. Theory and Example on steam nozzle.
2. Theory and Example on steam turbine.
3. Theory and Example on gas turbine.
4. Theory and Example on jet propulsion.

Reference Books :

1. Steam & gas turbine and Power Plant Engineering, R. Yadav, Central Publishing House, Allahabad.
2. Gas Turbines, V. Ganeshan, McGraw Hill Education
3. Power Plant Engineering, P.K. Nag, McGraw-Hill Education
4. Power Plant Engineering, R. K. Hegde, Pearson India Education
5. Thermal Engineering, R. K. Rajput, Laxmi Publication
6. Steam Turbine Theory and Practice, William J. Kearton, CBS Publication

List of Open Base Software/learning website :

1. http://nptel.ac.in/courses/112104117/18
2. http://nptel.ac.in/courses/112104117/4
3. http://nptel.ac.in/courses/112104117/17