B.E Semester: VIII

Mechanical Engineering

Subject Name: Steam and Gas Turbines

A. Course Objective

- To develop a solution oriented approach by in depth knowledge of Thermal Engineering.
- To address the underlying concepts, methods and application of thermal power.

B. Teaching / Examination Scheme

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
ME802	Steam and Gas Turbines	4	0	0	4	4	3	70	30	20	-	120

C. Detailed Syllabus

1. 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, supersaturated flow.

2. Steam Turbine:
Principle of operation, types of steam turbines, compounding of steam turbines, impulse turbine- velocity diagram, calculation of work, power and efficiency, condition for maximum efficiency, 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, binary vapor cycle, Methods of attachment of blades to turbine rotor, Labyrinth packing. Losses in steam turbine, special types of steam turbine- back pressure, pass out and mixed pressure turbine.

3. Gas Turbine:
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 and specific output of simple cycle- open cycle turbine with regeneration, reheating and Intercooling, combined steam and gas turbine plant, requirements of combustion chamber, types of combustion chambers.

4. Jet Propulsion:
Turbojet Engine, thrust, thrust power, propulsive efficiency, thermal efficiency, turboprop, ramjet and pulsejet engines, rocket engines.

D. Lesson planning

SR. NO.	DATE/WEEK	UNIT NO.	%WEIGHTAGE	TOPIC NO.

1	1^{ST} , 2^{ND} , 3^{RD}	1	25	1
2	4^{TH} ,5^{TH} , 6^{TH}	2	25	2
3	7^{TH} ,8^{TH} , 9^{TH}	3	25	3
4	10^{TH} ,11^{TH} , 12^{TH}	4	25	4

E. Instructional Method & Pedagogy

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
2. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
3. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4. One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5. Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
7. The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
8. **Practical / Oral:** Term work shall be carried out to fulfill the practical credits related to course contents.

F. Students Learning Outcomes

- The student can identify different areas of Thermal Engineering.
- Can find the applications of all the areas in day to day life.

G. Recommended Study Materials

Text & Reference Books:

1. Steam Turbines – by Kearton, CBS Publication
2. Thermal Engineering - R.K. Rajput, Laxmi Publication, Delhi
3. Steam & Gas turbines- R. Yadav, Central publishing House, Allahabad.
4. Thermodynamics & Thermal Engineering – J. Selwin Rajadurai, New Age Publishers, Delhi.
5. Thermal Engineering – S. Domkundwar, Dhanpatrai & Co. Delhi.
6. Thermal Engineering- Mahesh Rathore, TataMcGraw Hill, Delhi.
7. Thermal Engineering – K. Suman, PrenticeHall, New Delhi.
8. Thermal Engineering – K.K. Ramalingam, Scitech Publication, Chennai.
9. Thermal Engineering – Khurmi & Gupta, S. Chand & Company, Delhi
10. Thermal Engineering – S. K. Kulshrestha, Vikas Publishing House Pvt. Ltd, New Delhi.
11. Thermal Engineering –P.L. Ballaney, Khanna Publishers, New Delhi
12. Thermal Engineering – B. K. Sarkar, Tata Mcgraw Hill, New Delhi
13. Gas Turbines & Propulsive Systems – by Dr. Khajuria & Dubey Dhanpatrai Publication