C. U. SHAH UNIVERSITY
Wadhwan City

FACULTY OF: - Technology and Engineering
DEPARTMENT OF: - Mechanical Engineering
SEMESTER: -VII
CODE: - 4TE07TMA1
NAME: – Turbomachines

Teaching and Evaluation Scheme:-

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
							Theory				Practical (Marks)			
							Sessional Exam		University Exam		Internal		University	Total
		Th	Tu	Pr	Total		Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE07TMA1	Turbomachines	3	0	0	3	3	30	1.5	70	3	___	___	___	**100**

Objectives:

- To integrate the concepts, laws and methodologies from the first course in thermodynamics into the analysis of cyclic process.
- To apply the thermodynamic concepts into various thermal application like Steam nozzle, Steam turbines, Gas turbines, and Jet Propulsion Systems
- To understand design procedure of Steam nozzle, Steam turbines, Gas turbines, and Jet Propulsion Systems, also to know procedure of getting maximize the efficiency and output at the end.

Prerequisite:

Basic knowledge of Thermodynamics, Fluid mechanics and Heat and mass transfer.

Sr. No.	Course Content	Hours
1	**Steam Nozzles:** Flow through the nozzle**,** different shape 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.	**07**
2	**Steam turbine** : functional principle of operation, types of steam turbines, impulse and reaction principle, 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 vapour cycle.	**11**

3	**Gas turbine:** Classification, comparison of gas turbine and reciprocating gas engine, open and closed cycle, gas turbine fuels and there properties , 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, application of gas turbine.	**10**
4	**Combustion system:** Requirements of combustion chamber, Types of combustion chambers, Combustion theory applied to gas turbine combustor, Factor affecting combustion chamber design and performance, Combustion chamber geometry, Fuel injection and ignition.	**05**
5	**Jet Propulsion:** Turbojet Engine, thrust, thrust power, propulsive efficiency, thermal efficiency, turbo prop engine, ram jet engine, pulse jet engines, turbo jet engine, turbo fan engine, and rocket engines, calculation of specific thrust and efficiency.	**07**
6	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.	**05**

Learning Outcomes:

- Study of this subject imparts knowledge to design Steam nozzle, Steam turbines, Gas turbines, and Jet Propulsion Systems, to calculate load and dimension of different parts, and getting maximize the efficiency and output at the end.

Books Recommended:

1. Thermal Engineering, by **R. K. Rajput**, Laxmi Publication, Delhi
2. Steam & Gas turbines, by **R. Yadav**, Central publishing House, Allahabad.
3. Thermodynamics & Thermal Engineering, by **J. Selwin Rajadurai**, New Age Publishers, Delhi.
4. Thermal Engineering, by **Domkundwar**, Dhanpatrai & Co. Delhid Edn., New York, 1974.
5. Thermal Engineering, by **Rudramoorthy R**, Tata McGraw-Hill, New Delhi, 2003.
6. Turbomachines, **B. U. Pai**, Wiley India.

Reference Books:-

1. T.K. Garrett, Motor Vehicle by **K. Newton and W. Seeds** 13th Edition, Elsevier publications
2. Automotive Mechanic, by **William H.** Crouse - Tata McGraw Hill Publishing House
3. Thermal Engineering, by **Mahesh Rathore**, TataMcGraw Hill, Delhi.
4. Thermal Engineering, by **K. Suman, PrenticeHall**, New Delhi.
5. Thermal Engineering, by **K.K. Ramalingam**, Scitech Publication, Chennai.
6. Thermal Engineering, by **Khurmi & Gupta**, S. Chand & Company, Delhi
7. Thermal Engineering, by **S. K. Kulshrestha**, Vikas Publishing House Pvt. Ltd, New Delhi.
8. Thermal Engineering, by **P.L. Ballaney**, Khanna Publishers, New Delhi
9. Thermal Engineering, by **B. K. Sarkar**, Tata Mcgraw Hill, New Delhi
10. Gas Turbines & Propulsive Systems, by **Dr. Khajuria & Dubey** Dhanpatrai Publication.
11. Turbines Compressors and Fans: **S. M. Yahya,** Tata-Mc-Graw Hill Publishing Copany Ltd. New Delhi.