Course Type	Course Code	Name of Course	L	T	P	Credits
DE	NMED539	Turbomachinery	3	0	0	3

Course Objectives

- To make the students accustomed with various turbomachines and related complex processes.
- The provide knowledge of performance evaluation, operation and maintenance of rotodynamic machines.

Learning Outcomes

- Knowledge of transport processes through the turbomachine passage.
- Knowledge about the analytical, numerical and experimental tools for design, operation, performance evaluation.
- Enabling the students to perform innovative researches in the area of turbomachines.

Unit No.	Topics to be Covered Lecture	Lecture Hours	Learning Outcomes
1	Introduction, Classification of turbomachinery	1	To introduce the subject, various turbomachines, classifications and processes
2	Thermodynamics: Adiabatic flow through Nozzles and Diffusers. Work and efficiencies in Turbine and Compressor stages	8	Fundamentals about the thermodynamic analysis of the flow through nozzles and diffusers, and the corresponding analysis
3	Dimensional Analysis: Principle of Similarity, Incompressible and Compressible flow machines, Performance of Turbines, Compressors	6	To introduce the dimensional analysis of various flow machines
4	Axial flow Turbine and compressors: stage velocity diagram, enthalpy entropy diagram, stage losses and efficiency, Performance characteristics	7	An ability to identify, formulate and utilize maximum amount of energy
5	Centrifugal Pumps and Compressors: stage velocity diagram, enthalpy entropy diagram, optimum design at inlet, slip factor, stage losses and efficiency, Performance characteristics	6	The understanding of pumps and compressors, corresponding analysis, and performance evaluation
6	Radial Turbines: stage velocity diagram, enthalpy entropy diagram, stage losses and efficiency, Performance characteristics	5	The understanding of radial turbines, corresponding analysis, and performance evaluation
7	Hydraulic Turbines: Pelton turbine, Kaplan turbine, Francis turbine, effect of size on turbomachine efficiency, cavitation	6	The understanding of hydraulic turbines, corresponding analysis, and performance evaluation
8	Wind turbines: Axial flow, crossflow machines, Betz limit, the efficiency of the wind turbine, application as hydrokinetic turbine	3	The understanding of the principle of wind and hydrokinetic turbines and their performance evaluation.
	Total	42	

Text Books:

1. S. M. Yahya, Turbines, Compressions & Fans, Tata McGraw-Hill, 2011.
2. S. L. Dixon and C. A. Hall, Fluid Mechanics and Thermodynamics of Turbo machinery, Elsevier, 2014.

References:

1. V. Ganesan, Gas Turbine, Tata McGraw-Hill, 3rd Edition, 2010.
2. M. Dubey, B. V. S. S. S. Prasad and Archana Nema, Turbomachinery, Tata McGraw-Hill, 2018.
3. B.U. Pai, Turbomachines, Wiley, 2013.