Course Code	PEAOT751	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	Engineering Thermodynamics and Fluid mechanics	Course Type	Theory

Course Objectives:

1. Understand the working and application of rotary compressors and turbines.
2. Apply the engineering concepts for basic design of turbo machines
3. Understand the working and application of rotary compressors and turbines.
4. Apply the engineering concepts for basic design of turbo machines.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Turbo Machineries:** Introduction to turbomachines. Classification of Turbo machines. Energy transfer between fluid and rotor - Euler equation and its interpretation. Velocity triangles. Efficiencies in Compressor and Turbine stages. Degree of reaction. Dimensionless parameters for Turbomachines.	9
2	**CENTRIFUGAL FANS AND BLOWERS:** Types – components – working. Flow analysis in impeller blades-volute and diffusers. Velocity triangles - H-S Diagram. Stage parameters in fans and blowers. Performance characteristic curves – various losses. Fan – bearings, drives and noise.	9
3	**CENTRIFUGAL AND AXIAL FLOW COMPRESSOR** Components - blade types. Velocity triangles - h-s diagram, stage work. Slip factor. Performance characteristics and various losses. Geometry and performance calculation. Construction details of axial compressor. Work done factor. Velocity triangles - h-s diagram, stage work. Work done factor. Performance characteristics, efficiency, and stage losses – Stalling and Surging.	11
4	**AXIAL AND RADIAL FLOW TURBINES**: Axial flow turbines - Types – Elements - Stage velocity diagrams - h-s diagram, stage work - impulse and	7

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	reaction stages. Compounding of turbines. Performance coefficients and losses. Radial flow turbines: Types– Elements - Stage velocity diagrams - h-s diagram, stage work Performance coefficients and losses.	

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

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Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Understand the general design relationships for Turbo machines.	**K2**
CO2	Apply the fundamental principles of turbomachinery to optimize the performance characteristics of centrifugal fans and blowers.	**K3**
CO3	Apply the basic laws to find the relations for the design of axial flow compressor and centrifugal compressor.	**K3**
CO4	Illustrate the working, design procedures of axial and radial turbines	**K2**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	-	-	-	-	-	2
CO2	2	3	2	-	-	-	-	-	-	-	-	2
CO3	3	3	2	-	-	-	-	-	-	-	-	2
CO4	2	1	-	-		-	-	-	-	-	-	2

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Gas Turbines	Ganesan, V.	Tata McGraw Hill	3rd Edition, 2011.
2	Turbines, Compressor and Fans	Yahya, S.M.	Tata McGraw Hill	4th Edition,2011.

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Gas Turbine Theory	Saravanamutto, Rogers, Cohen, Straznicky	Pearson Education Ltd	6th Edition, 2009.
2	Fundamentals of Turbomachinery	Venkanna, B.K	PHI Learning Pvt. Ltd	6th Edition,2009

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://archive.nptel.ac.in/courses/112/104/112104305/
2	https://archive.nptel.ac.in/courses/112/104/112104305/
3	https://archive.nptel.ac.in/courses/112/104/112104305/
4	https://archive.nptel.ac.in/courses/112/104/112104305/

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