Course code	Course Name	L-T-P-Credits	Year of Introduction
ME364	**Turbomachinery**	**3-0-0-3**	**2016**

Prerequisite : ME205 Thermodynamics

Course Objectives: :
1. To know the principle of operation of turbomachines
2. To provide students thorough understanding of velocity triangles, turbomachinery
3. To introduce students to fans, turbines, pumps etc..

Syllabus:

Definition of turbomachine, Application of first and second laws of thermodynamics to turbomachines, Efficiencies, Centrifugal fans and blowers, Centrifugal Compressors, Axial flow compressors, Axial and radial flow turbines

Expected Outcomes:

The students will be able to

1. Understand the operation of turbomachines
2. Gain ideas on performance characteristics, governing and selection of turbomachinery.

Text books
1. Bruneck, Fans, Pergamom Press, 1973.
2. Dixon, S.I, Fluid Mechanics and Thermodynamics of Turbomachinery , Pergamom, Press, 1990.
3. Ganesan .V, Gas Turbines , Tata McGraw Hill Pub. Co., New Delhi, 1999.
4. Stepanff, A.J, Blowers and Pumps , John Wiley and Sons Inc., 1965.
5. Yahya, S.H, Turbines, Compressor and Fans , Tata Mc Graw Hill, 1996.

Reference books
1. Earl Logan, Jr, Hand book of Turbomachinery, Marcel Dekker Inc, 1992.
2. Shepherd, D.G, Principles of Turbomachinery , Macmillan, 1969.

Course Plan			
Module	**Contents**	**Hours**	**End Sem. Exam. Marks**
I	Definition of turbomachine, parts of turbomachines, Comparison with positive displacement machines, Classification, Dimensionless parameters and their significance, Effect of Reynolds number, Unit and specific quantities, model studies.	**7**	**15%**
II	Application of first and second laws of thermodynamics to turbomachines, Efficiencies of turbomachines. Stage velocity triangles, work and efficiency for compressors and turbines	**7**	**15%**
FIRST INTERNAL EXAMINATION			

III	Centrifugal fans and blowers : Types, stage and design parameters, flow analysis in impeller blades, volute and diffusers, losses, characteristics curves and selection, fan drives and fan noise.	7	15%
IV	Centrifugal Compressors: Construction details, types, impeller flow losses, slip factor, diffuser analysis, losses and performance curves.	7	15%
SECOND INTERNAL EXAMINATION			
V	Axial flow compressors : Stage velocity triangles, enthalpy-entropy diagrams, stage losses and efficiency, work done factor, simple stage design problems and performance characteristics.	7	20%
V1	Axial and radial flow turbines : Stage velocity diagrams, reaction stages, losses and coefficients blade design principles, testing and performance characteristics.	7	20%
END SEMESTER EXAMINATION			

Question Paper Pattern

Maximum marks: 100   **Time: 3 hrs**

The question paper should consist of three parts

Part A
There should be 2 questions each from module I and II
Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B
There should be 2 questions each from module III and IV
Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C
There should be 3 questions each from module V and VI
Each question carries 10 marks
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: Each question can have a maximum of four sub questions, if needed.