Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2019-2020

Course Handout Part II

Date: 01/08/2019

In addition to Part-I (a general handout for all the courses appended in the time table) this portion gives further specific details regarding the course.

Course No. : ME G514
Course Title : TURBOMACHINERY
Instructor-in-Charge : JEEVAN JAIDI
Lab Instructors : Jeevan Jaidi

1. Course Description:

Introduction, thermodynamics, gas turbine plants, steam turbine plants, fluid dynamics, dimensional analysis and performance parameters, flow through cascades, axial turbine stages, high temperature turbine stages, axial compressor stages, centrifugal compressor stages, radial turbine stages, axial fans and propellers, centrifugal fans and blowers, and wind turbines.

2. Scope and Objective:

The broad objective of this course is to introduce and familiarize students with various elements of turbomachinery. The course mainly aims at giving analytical treatment to various turbomachines, which will help to understand practical situations at the design stage and during the operations.

3. Text Book (TB):

TB1: B. K. Venkanna, *Fundamentals of Turbomachinery*, PHI Learning Pvt Ltd. 2012.

4. Reference Book (RB):

RB1: S. L. Dixon, and C. A. Hall, *Fluid Mechanics and Thermodynamics of Turbomachinery*, Elsevier, 6th edition, 2010.
RB2: Rama S.R. Gorla, Aijaz A. Khan, *Turbomachinery: Design and Theory*, CRC Press, 2003.
RB3: Budugur Lakshminarayana, *Fluid Dynamics and Heat Transfer of Turbomachinery*, John Wiley & Sons, 1995.

5. Course Plan:

Lecture No.	*Learning objectives*	*Topics to be covered*	*Chapter/ Section*
1-7	Introduction to basic principles, types of turbomachines, gas turbine plants, steam turbine plants	Introduction, comparison between PDM and TM, types of TM, basic laws and equations, dimensional analysis, energy scenario in India	TB: Ch. 1
8-12	Energy transfer in turbomachines	Components of energy transfer, degree of reaction, analysis of all turbomachines	TB: Ch. 2

13-20	Operation principle and key parameters of centrifugal compressors & Pumps	Working principle, work done and pressure rise, influence of key parameters and surging, work done analysis	TB: Ch. 4
21-25	Operation principle and key parameters of axial flow compressors	Principle of operation T-E diagram, influence of key parameters, combined velocity analysis, work done analysis	TB: Ch.5
26-32	Operation principle and key parameters of steam & gas turbines	Principle of operation, method of compounding velocity triangle analysis, multi stage analysis	TB: Ch. 6
33-38	Operation principle and key parameters of hydraulic turbines	Classification unit quantities, velocity triangles comparison of HT	TB: Ch. 7
39-42	Operation principle and key parameters of wind turbines	Principle of operation, classification blade design, siting constraints, maintenance issues	Class Notes

6. Evaluation Scheme:

Component	*Duration (min.)*	*Weightage (%)*	*Date & Time*	*Nature of Component*
Midsem Test	90	25	03/10 , 11:00 – 12:30 PM	Closed Book
Lab Experiments & Reports	-	25	Continuous throughout the semester	Open Book
Project Seminars (Mid- & End-sem.)	-	15	To be announced in the class	Open Book
Comprehensive Exam.	180	35	09/12 AN	Closed Book

7. **Chamber Consultation Hour:**
To be announced in the class.

8. Notices:
All notices concerning this course will be displayed in *CMS (institute's web-based Course Management System)*. Students are advised to visit *CMS* regularly for all notices and updates.

9. Make-up Policy:
Make-up request for tests shall be granted only for the *genuine* case with sufficient evidence. Request letter duly signed by the student must reach the undersigned at least one day before the scheduled test.

10. Academic Integrity Policy:
It is expected that in compliance with institute rules and regulations, academic integrity should be adhered to in all the evaluation components. No type of academic dishonesty is acceptable and malpractice in any form will have serious implications.

INSTRUCTOR-IN-CHARGE (ME G514)