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**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.

1. **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.

1. **Text Book (TB):**

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

1. **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.

1. **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 |

1. **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 |

1. **Chamber Consultation Hour:**

To be announced in the class.

1. **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.

1. **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.

1. **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)**