

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE PILANI- HYDERABAD CAMPUS

FIRST SEMESTER 2022-2023

(COURSE HANDOUT PART II)

29/08/2022

In addition to part-I (general handout for all courses in the time-table), this handout provides the specific details regarding the course.

Course No.: ME F420

Course Title: Power Plant Engineering

Instructor-in-charge: MRINAL KETAN JAGIRDAR

- 1. Course Description:** Classification of power plants. Components and layout of thermal, nuclear, hydro electric power plants. Site selection for various power plants. Combined cycle power plants. Magneto Hydro Dynamics (MHD) systems. Economics of power generation, economic loading of power stations. Load curve analysis, load factor, diversity factor. Power plant instrumentation and controls.
- 2. Scope and Objective:** This course has been designed to make the students familiar with the power plant engineering and technology. It deals with the thermal, hydro, and nuclear power plants. The course also discusses non-conventional power generation. The economic analysis, economic loading, load curve analysis will also be discussed.

3. Text Book:

P. K. Nag, Power Plant Engineering, Tata McGraw-Hill Publishing Company Ltd, Fourth Edition, 2014.

Reference Books:

- 1. Bernhardt G.A. Strotzki and William A. Vopat**, "Power Station Engineering and Economy", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 1960.
- 2. M.M. EI-Wakil**, "Powerplant Technology", McGraw-Hill International Edition, 1984.
- 3. Domkundwar**, "Power Plant Engineering", Dhantpat Rai and Co. (P) Ltd., New Delhi, 2001.
- 4. S.P. Sukhatme**, "Solar Energy", McGraw-Hill, Fourth Edition, 2017

4. Course Plan:

Lecture Nos.	Learning Objectives	Topics to be covered	Chapter in the Text Book
1-3	Introduction and power scenario of India, Load curve, Availability of power, Power plant economics, Electricity pricing	Introduction, Economics of power generation	1.1-1.5
4-7	Steam power cycles, Efficiency improvement of stem power cycles	Analysis of Steam Cycles	2.1 – 2.17
8-10	Working of fluid power cycles, binary vapor cycles, GT-ST power plant	Combined Cycle Power Generation	3.1 – 3.6
11-14	Important fuels, Stoichiometry, Control of excess air, Draught	Fuels, Combustion and Draught systems	4.1 – 4.3, 4.12, 4.15, 5

Lecture Nos.	Learning Objectives	Topics to be covered	Chapter in the Text Book
	systems, essentials of combustion equipment		
15-18	Types of boilers, Efficiency improvement of boilers, Pollution control of boilers, Feed water treatment	Steam Generators	6.1 – 6.7, 6.9-6.10, 6.12 – 6.20
19-24	Nozzles	Energy conversion aspects of Steam nozzles	7.1 – 7.2
25-28	Condensers, Cooling towers	Condenser, Feed Water, Circulating Water System	8.1 – 8.7
29-32	Basics, Nuclear reactors	Nuclear Power Plant	9.16 – 9.23
33-35	Optimization of hydro-thermal mix, Hydro turbines, Cavitation, Performance of turbines	Hydroelectric Power Plant	10.1 – 10.3, 10.10 – 10.20, 10.24 – 10.25
36-38	Types of plants, Efficiency evaluation	Diesel engine, Gas Turbine Power Plants	11.1 – 11.5, 11.7 – 11.10
39-40	Renewable energy sources, Solar and Wind based power generation, Biomass, Geothermal & other sources for power generation	Non-Conventional Power Generation	14.1 – 14.11

5. Evaluation Scheme:

Evaluation Component	Duration	Weightage (%)	Date & Time	Nature of Component
Class-test	50 min	10%	TBA	Open book
Mid Semester Exam	90 min	35%	04/11 3.30 - 5.00PM	Closed book
Assignment	-	10%	-	Open book
Comprehensive Examination	3 hours	45%	28/12 AN	Closed book

6. Chamber Consultancy Hour: To be announced in the class.

7. Notices

All notices concerning this course will be displayed in *Mechanical Engineering* notice board. Students are advised to visit regularly *CMS* (institute's web based **C**ourse **M**anagement **S**ystem) for all notices and updates.

8. Make-up Policy

Make-up request for tests shall be granted only for the genuine cases with sufficient evidence. Request letter duly signed by the student should reach the under signed well in advance.

9. Academic Honesty and Integrity Policy:

Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Dr. Mrinal Ketan Jagirdar
Instructor-in-charge (I/C)
(ME F420)