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 systems, essentials of combustion equipment | Fuels, Combustion and Draught systems | 4.1 – 4.3, 4.12, 4.15, 5 |
| 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**:

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| --- | --- | --- | --- | --- |
| 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 |

1. **Chamber Consultancy Hour:** To be announced in the class.
2. **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.

1. **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)**