BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

AUGS DIVISION

SECOND SEMESTER 2020-21

Course Handout (Part II)

18/01/2021

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: **P.SRINIVASAN.**

Tutorial Instructors: **Vivek Tiwari.**

Scope and Objective: This course has been design 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.

Learning Objective:

LO1: Understanding the working principle of different types of power plants.

LO2: Economics of power generation and selection of different energy sources for power generation.

LO3: Thermal design of coal based power plants.

L04: Environmental impact of Power Generation

Text Book:

Nag P.K. *Power Plant Engineering*, Tata McGraw-Hill Pub. Co. Ltd, New Delhi (Fourth Edition), 2016, Eighth Reprint 2016.

Reference Books:

1. **S P Sukhatme J N Nayak**, " Solar Energy Principle of Thermal Collection and storage", Tata McGrawhill 2008.
2. Basics of Boiler and HRSG Design, Brad Beukcer. 24x7 E book of BITS,Library. http://library.books24x7.com/toc.aspx?bookid=17316.

Course Plan:

Lect. No	Learning Objectives	Topics to be covered	Ref to text
1.	Introduction and power scenario of India and need for power plant engineering.	Introduction and Selection of Power Plant	Class notes
2.	Steam power cycles analysis for power generation	Analysis of steam cycles	Ch. 2
3.	Efficiency improvement of stem power cycles to generate electricity from economic perspective,.		
4.	Working of fluid power cycles increasing efficiency using combined cycle.	Combined cycle Power Generation	Ch. 3
5.	Important fuels	Fuels and combustion	Ch. 4
6.	Stoichiometry		
7.	Control of excess air		
8.	Draught systems & fans	Draught systems and fans	Ch. 4
9.	Enthalpy value of combustion		
10.	Kinematics	Combustion mechanism, Firing methods	Ch. 5

Lect. No	Learning Objectives	Topics to be covered	Ref to text
11.	Fluidized bed combustion		
12.	Coal gasification		
13.	Types of boilers	Steam Generators	Ch. 6
14.	Efficiency improvement of boilers		
15.	Efficiency improvement of boilers		
16.	Pollution control of boilers		
17.	Nozzles	Steam Turbines	Ch. 7
18.	Turbine blading		
19.	Electrical energy generation		
20.	Condensers	Feed water, Circulating water system	Ch. 8
21.	Cooling towers		
22.	Feed water treatment	Feed water treatment	Ch. 6
23.	Power Plant layout	Power Plant layout	----
24.	Optimization of hydro-thermal mix	Hydroelectric Power Plant	Ch. 10
25.	Hydro turbines		
26.	Cavitation		
27.	Performance of turbines		
28.	Types of plants	Diesel engine, Gas Turbine Power Plants	Ch. 11
29.	Efficiency evaluation		
30.	Basics	Nuclear Power Plant	Ch. 9
31.	Nuclear reactors		

Lect. No	Learning Objectives	Topics to be covered	Ref to text
32.	Nuclear reactors		
33.	Renewable energy sources	Non-Conventional Power Generation	Class Notes
34.	Solar and Wind based power generation		
35.	Biomass , Geothermal & other sources for power generation		
36.	Load curve	Economics of power generation	Ch. 1
37.	Availability of power		
38.	Power plant economics		
39.	Electricity pricing		

Evaluation Scheme:

Components	Duration	Weightage (%)	Date & Time	Remarks

Mid semester test	90 min.	25%	12/3 2:00 - 03:30 PM	Closed Book
Project presentation and report of case study.	__	15%		Open book.
Tutorial Tests*	50 min.	20%		6 best of 9 (OB)
Comprehensive Examination	3 hrs.	40%	4/5 FN	Closed Book

Mid-semester grading: It will be announced normally in the month of March. It is done in the same manner as that of the final grading

Chamber Consultation Hours: To be announced in the class.

Notices: All notices related to this course will be put up on Nalanda only.

Make-up will be given only to the genuine students. The request application for make-up test must reach the Instructor-in-charge before commencement of the scheduled test (documentary proof is essential). No make-up will be allowed for the Tutorial tests.

Prof.P.Srinivasan

Instructor-in-charge

ME F420 Power Plant Engineering