

Program : Diploma in Mechanical Engineering	
Course Code : 5023C	Course Title: Power plant Engineering
Semester : 5	Credits: 4
Course Category: Program Elective	
Periods per week: 4 (L:4, T:0, P:0)	Periods per semester: 60

Course Objectives:

- To familiarize with the present power scenario of India, methods of power production and the fuels used for power generation.
- To identify the impact of power plants on environment and safety standards prevailing.

Course Prerequisites:

Topic	Course Code	Course Name	Semester
Basic idea on properties of fluids		Applied Physics I&II	1 & 2
Basics of Thermal engineering		Thermal Engineering	5

Course Outcomes

On completion of the course, the student will be able to:

CO _n	Description	Duration (Hours)	Cognitive level
CO1	Explain the power scenario of India, Thermal power plants, fuels and combustion	14	Understanding
CO2	Describe the working of hydro power plant, Diesel power plant and Gas turbine power plant.	15	Understanding
CO3	Describe the components and working of Nuclear power plant.	15	Understanding
CO4	Identify the issues and necessity of safety in power plants.	14	Understanding
	Series Test	2	

CO-PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3				2		2
CO2	3		1				2
CO3	3						2
CO4	3				3	3	2

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	Explain the power scenario of India, Thermal power plants, fuels and combustion		
M1.01	Explain the term power plant and understand the power scenario in India	2	Understanding
M1.02	Identify the Location of power plant; Choice of Power plant; Classification of power plants. Explain the methods of load calculation.	3	Understanding
M1.03	Illustrate the Line diagram of thermal power plant. Identify Modern steam turbines – reheating- bleeding – regeneration.	3	Understanding
M1.04	Explain Fuels, types, Merits, Demerits, requirements of a good fuel, properties, flashpoint, fire point, pour point, Octane number, Cetane number, calorific values HCV, LCV	3	Understanding
M1.05	Describe the working of Bomb Calorimeter - Junker's Gas Calorimeter	3	Understanding
<p>Contents: - Introduction to Power plant: Introduction to power plant; Energy scenario in India; Location of power plant; Choice of Power plant; Classification of power plants. Elementary level idea on load calculation. Thermal power plants and Steam turbines Line diagram of thermal power plant. Modern steam turbines – reheating- bleeding – regeneration. Fuels & Combustion Fuels - types - Merits - Demerits - requirements of a good fuel- properties – flash- fire - pour point-Octane number- Cetane number- calorific values- HCV – LCV- Bomb Calorimeter - Junker's Gas Calorimeter.</p>			

CO2	Describe the working of hydro power plant, Diesel power plant and Gas turbine power plant		
M2.01	Illustrate the General layout of Hydroelectric power plant and it's working.	2	Understanding
M2.02	Explain the classification of Hydroelectric power plant	2	Understanding
M2.03	List the advantages and disadvantages of hydroelectric power plant.	2	Understanding
M2.04	Illustrate General layout and working of Diesel power plant.	3	Understanding
M2.05	Explain the working and component details of Gas turbine power plants with schematic diagram.	3	Understanding
M2.06	Familiarize Combined cycle power generation.	3	Understanding
	Series Test – I	1	
<p>Contents: Hydroelectric power plant: Introduction to Hydroelectric power plant; General layout of Hydroelectric power plant and it's working. Classification of the Plant-Run off river plant, storage river plant, pumped storage plant- Advantages and disadvantages of hydroelectric power plant. Diesel Power Plant- General layout- working Gas turbine power Plant-Schematic diagram, components and its working Combined cycle power generation (only flow diagram).</p>			
CO3	Describe the components and working of Nuclear power plant		
M3.01	Define Nuclear Power Engineering.	1	Remembering
M3.02	Explain Nuclear reaction, Fission and fusion, chain reaction	2	Understanding
M3.03	Illustrate the working of a nuclear reactor with schematic diagram.	3	Understanding
M3.04	Identify the Principal parts of a Reactor and Describe them.	3	Understanding
M3.05	Describe the fuel material, Uranium, Thorium, Plutonium, moderators- Graphite- Beryllium, Beryllium oxide-light - heavy oxide, coolants –water- liquid metal- gas - organic liquids	3	Understanding

M3.06	Explain different types of nuclear reactors like Boiling water reactor (BWR) - Pressurized water reactor (PWR) - Fast Breeder Reactor (FBR).	3	Understanding
<p>Contents: - Nuclear Power Engineering-Introduction-Nuclear reaction- Fission and fusion - chain reaction- Principal parts of a Reactor- Main parts of a reactor- Brief description of reaction control by Control rods- Brief description of the fuel material- Uranium- Thorium- Plutonium- moderators – Graphite, Beryllium -Beryllium oxide- light - heavy oxide-coolants – water- liquid metal- gas -organic liquids – Nuclear reactors-name different types – working of Boiling water reactor (BWR) - Pressurized water reactor (PWR) - Fast Breeder Reactor (FBR) power plants -Working of a nuclear power plant – schematic diagram.</p>			
CO4	Identify the issues and necessity of safety in power plants.		
M4.01	Identify the Environmental impact of Power plant, Social and Economic issues of power plant.	2	Understanding
M4.02	Explain Greenhouse effect; Acid precipitation-Acid rain, Acid snow, Dry deposition and Acid fog	3	Understanding
M4.03	Be aware of Air, water, Thermal pollution from power plants; Radiations from nuclear power plant effluents.	3	Understanding
M4.04	Familiarize Plant safety concept; Safety policy to be observed in power plants; Safety practices to be observed in boiler operation.	2	Understanding
M4.05	Identify Safety in oil handling system; Safety in Chemical handling system.	2	Understanding
M4.06	Describe Statutory provision related to boiler operation.	2	Understanding
	Series Test – II	1	
<p>Contents: - Environmental impact of Power plant: Social and Economic issues of power plant; Greenhouse effect; Acid Precipitation-Acid rain, Acid snow, Dry deposition, Acid fog; Air, water, Thermal pollution from power plants; Radiations from nuclear power plant effluents. Power plant safety: Plant safety concept; Safety policy to be observed in power plants; Safety practices to be observed in boiler operation; Safety in oil handling system; Safety in Chemical handling system; Statutory provision related to boiler operation.</p>			

Text /Reference:

T/R	BookTitle/Author
T1	Nag. P.K, Power Plant Engineering, McGraw Hill, New Delhi, ISBN: 978-9339204044
T2	Text Book of Thermal Engg., -R.S. Khurmi& J.K. Gupta, S Chand Puiblications
R3	Non-Conventional Energy sources - G.D. Rai
R4	Power plant Engineering – Frederick T. Morse, Litton Educational Publishing Inc. 1953
R5	Power Plant Engineering – P.C. Sharma, S.K.Kataria& sons, 2009.
R6	Power System Engineering – R.K. Rajput, Firewell Media,2006.

Online resources

SI No	Website Link
1	https://npti.gov.in/post-graduate-certificate-course-thermal-power-plant-engineering
2	https://www.powerengineers.com/onlinecourses
3	https://www.tpctraining.com/collections/power-plant-operations-training