III B. Tech – II Semester

(20ME6319) POWER PLANT ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

Pre-Requisites: Thermodynamics, Fluid mechanics

Course Objectives:

The students will acquire the knowledge:

- To learn the working of different circuits of the steam power plant.
- To learn the layout and auxiliaries of the diesel and gas power plants.
- To learn the different elements in the hydroelectric and nuclear power plants.
- To learn the basic concepts for power production in combined plants
- To learn the concepts of power plant economics

UNIT-I: Steam Power Plant:

Plant layout, working of different circuits, fuel and handling equipment's, types of coals, coal handling, and choice of handling equipment, coal storage, and ash handling systems. Combustion: properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cyclone furnace, design and construction, dust collectors, cooling towers and heat rejection. Corrosion and feed water treatment.

UNIT-II: Internal Combustion and Gas Turbine Power Plants:

Diesel Power Plant: Plant layout with auxiliaries – fuel supply system, air starting equipment, super charging.

Gas Turbine Plant: Introduction – classification - construction – layout with auxiliaries, combined cycle power plants and comparison.

UNIT-III: Hydroelectric Power Plant:

Waterpower – hydrological cycle / flow measurement – drainage area characteristics –hydrographs– storage and poundage–classification of dams and spill ways.

Hydro Projects And Plant: Classification – typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT-IV: Nuclear Power Station:

Nuclear fuel – breeding and fertile materials – nuclear reactor – reactor operation.

Types Of Reactors: Pressurized water reactor, boiling water reactor, sodium-graphite reactor, fast breeder reactor, homogeneous reactor, gas cooled reactor, radiation hazards and shielding – radioactive waste disposal.

UNIT-V: Combined Operations Of Different Power Plants

Advantages of combined working, load division between power stations, storage type hydro- electric plant in combination with steam plant, run-of-river plant in combination with steam plant, pump storage plant in combination with steam or nuclear power plant,

Power Plant Economics: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, load curves, load duration curve, definitions of connected load, maximum demand, demand factor, average load, load factor, diversity factor – related exercises

Course Outcomes:

After successful completion of the course, the students will be able to:

S. No	Course Outcome	BTL
1.	Identify the different circuits of the steam power plant for power production	L3
2.	Illustrate the layouts and different auxiliaries used in the diesel and gas power plant for power production	L3
3.	Understand how the power can be produced by hydro-electric and nuclear power plants	L2
4.	Understand how the power can be produced by nuclear power plants	L2
5.	Interpret the power production by combined power plants. Analyze power plant economics	L5

Correlation of COs with POs& PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	2	1	1	1	2	2	2	2	2	3	2
CO2	2	2	1	1	1	1	1	1	2	2	2	1	2	2
CO3	2	2	2	2	3	1	1	1	1	2	2	1	3	1
CO4	2	2	1	1	1	1	1	2	1	2	2	2	3	2
CO5	2	2	1	1	1	1	1	1	1	2	2	2	3	2

Text Books:

1. A course in Power Plant Engineering / Arora and Domkundwar / Dhanpatrai & Co.
2. Power Plant Engineering / P.C.Sharma / S.K.Kataria Pub

References:

1. Power Plant Engineering: P.K.Nag / II Edition / TMH.
2. Power station Engineering – El Wakil / McGraw Hill.
3. An Introduction to Power Plant Technology / G.D.Rai / Khanna Publishers