

### ME351 Power Plant Engineering

L	T	P	Credit	Area		CWS	PRS	MTE	ETE	PRE
3	0/1	2/0	4	DEC/GEC		15/25	25	20/25	40/50	-

**Objective:** To enable the students to understand the fundamental of classification of power plants, base load and Peak load power stations. To impart in-depth knowledge of steam generators, combined cycle power plants and concept of energy conservation and energy auditing.

Syllabus		Contact Hours
<b>Unit-1</b>	Indian energy scenario, Indian coals: formation, properties, analysis, beneficiation and heating value calculation of coals; coking and noncoking coals, fuel handling systems; coal gasification. Classification of power plants, base load and Peak load power stations, co-generated power plant, captive power plant, and their fields of application & selection criteria.	8
<b>Unit-2</b>	<b>Steam Generators:</b> High pressure utility boiler, natural and forced circulation, fuel handling, coking and non-coking coal, coal beneficiation, coal pulverization, pulverized fuel firing system, combustion process, need of excess air, cyclone furnace, fluidized bed boiler, placement of evaporator, economizers, super heaters, re-heaters, air pre-heater in the boiler, de-aeration, boiler blow-down, ash collection by bag house, gravity separation, electrostatic precipitators and wet scrubbers, boiler efficiency calculations, water treatment: external and internal treatment.	8
<b>Unit-3</b>	<b>Combined Cycle Power Plants:</b> Binary vapour cycles, coupled cycles, gas turbine- steam turbine power plant, gas pipe line control, MHD- Steam power plant, thermionic steam power plant, integrated coal combined cycle (IGCC) power plant.	6
<b>Unit-4</b>	<b>Other power plants:</b> Nuclear power plants - working and types of nuclear reactors, boiling water reactor, pressurized water reactor, fast breeder reactor, controls in nuclear power plants, hydro power plant -classification and working of hydroelectric power plants, tidal power plants, diesel and gas power plants.	6
<b>Unit-5</b>	<b>Instrumentation and Controls in power plants:</b> Important instruments used for temperature, flow, pressure, water/steam conductivity measurement; flue gas analysis, drum level control, combustion control, super heater and re-heater temperature control, furnace safeguard and supervisory system (FSSS), auto turbine run-up system (ATRS), interlocks and protection of turbines.	8
<b>Unit-6</b>	<b>Environment Pollution and Energy conservation:</b> Economics of power generation: load duration curves, power plant economics, pollution from power plants, disposal/management of nuclear power plant waste, concept of energy conservation and energy auditing.	6
<b>Total</b>		<b>42</b>

#### Reference Book:

1 **Power Plant Engineering** by M.M. Elwakil, Tata McGraw Hill, ISBN- 0070662746.

2	<b>Power Plant Engineering</b> by P.K Nag, Tata McGraw Hill, ISBN- 0070435993.
3	<b>Steam and Gas turbines</b> by A Kostyuk and V Frolov, MIR Publishers, ISBN-9785030000329.
4	<b>Modern Power Plant Engineering</b> by J Wiesman and R Eckart, Prentice hall India Ltd, ISBN- 97801359725.
5	<b>Planning Fundamentals of thermal Power Plants</b> by F.S Aschner, John Wiley, ISBN- 07065159X.
6	<b>Applied Thermodynamics</b> by T.D Eastop and McConkey, Longman Scientific and Technical, ISBN- 0582305351.
7	<b>CEGB volumes on power plant, Central Electricity Generation Board, ISBN- 0080155680.</b>
8	<b>NTPC/NPTI publications on Power plants, ISBN- 9788132227205.</b>

#### Course Outcomes

CO1	Importance of coal based thermal power plants and other power plants.
CO2	Working of components of power plants, combined power plants, coal handling
CO3	Controls in power plants, power plant economics, energy conservation.
CO4	Understand the concept of combined cycle plants
CO5	Importance of Controls in power plants
CO6	Applications of power plant economics, energy conservation.

#### CO-PO/PSO Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	2	1	0	1	0	0	3	3	2	2
CO2	2	3	3	2	1	1	0	1	2	0	2	2	2	2	2
CO3	2	2	2	3	1	1	0	0	0	0	0	3	3	1	1
CO4	3	3	3	3	2	2	1	0	1	0	0	3	3	2	2
CO5	2	3	3	2	1	1	0	1	2	0	2	2	2	2	2
CO6	3	3	3	3	2	2	1	0	1	0	0	3	3	2	2