| | | | | | | **CWS** | **PRS** | **MTE** | **ETE** | **PRE** |
|---|---|---|---|---|---|---|---|---|---|---|

## ME316 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 fundamentals of fuel handling systems and Steam Generators. To understand Combined Cycle Power Plants and Nuclear power plants.

| **Syllabus** | | **Contact Hours** |
|---|---|---|
| **Unit-1** | Indian energy scenario, Indian coals: formation, properties, analysis, benefication 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** |
| **Unit-2** | **Steam Generators:** High pressure utility boiler, natural and forced circulation, fuel handling, coking and non-coking coal, coal benefication, 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 |
| **Unit-3** | **Combined Cycle Power Plants:** 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** |
| **Unit-4** | **Other power plants:** 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. | **7** |
| **Unit-5** | **Instrumentation and Controls in power plants:** 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. | **7** |
| **Unit-6** | **Environment Pollution and Energy conservation:** 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 |
| | **Total** | 42 |

| **Reference Book:** | |
|---|---|
| 1 | **Power Plant Engineering** by M.M. Elwakil, Tata McGraw Hill, ISBN- 0070662746. |
| 2 | **Power Plant Engineering** by P.K Nag, Tata McGraw Hill, ISBN- 0070435993. |
| 3 | **Steam and Gas turbines** by A Kostyuk and V Frolov, MIR Publishers, ISBN-9785030000329. |
| 4 | **Modern Power Plant Engineering** by J Wiesman and R Eckart, Prentice hall India Ltd, ISBN- 97801359725. |
| 5 | **Planning Fundamentals of thermal Power Plants** by F.S Aschner, John Wiley, ISBN- 07065159X. |
| 6 | **Applied Thermodynamics** by T.D Eastop and McConkey, Longman Scientific and Technical, ISBN-0582305351. |
| 7 | **CEGB volumes on power plant, Central Electricity Generation Board, ISBN- 0080155680.** |
| 8 | **NTPC/NPTI publications on Power plants**, ISBN- 9788132227205. |

**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 | 2 | 2 | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 1 |