

IV Year B.Tech. Mech. Engg. II-Sem.

**POWER PLANT ENGINEERING**  
**(DEPARTMENTAL ELECTIVE – III)**

**UNIT – I**

Introduction to the Sources of Energy – Resources and Development of Power in India.

**STEAM POWER PLANT:** Plant Layout, Working of different Circuits, Fuel handling equipments, types of coals, coal handling, choice of handling equipment, coal storage, Ash handling systems.

**UNIT II**

**STEAM POWER PLANT:** 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 – III**

**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 – IV**

**HYDRO ELECTRIC POWER PLANT:** Water power – Hydrological cycle – flow measurement – drainage area characteristics – Hydrographs – storage and pondage – classification of dams and spill ways.

**HYDRO PROJECTS AND PLANT:** Classification – typical layouts – plant auxiliaries – plant operation pumped storage plants.

**UNIT – V**

**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 – VI**

### **COMBINED OPERATIONS OF DIFFERENT POWER PLANTS:**

Introduction, 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, co-ordination of hydro-electric and gas turbine stations, co-ordination of hydro-electric and nuclear power stations, co-ordination of different types of power plants.

## **UNIT – VII**

**POWER PLANT INSTRUMENTATION AND CONTROL:** Importance of measurement and instrumentation in power plant, measurement of water purity, gas analysis, O<sub>2</sub> and CO measurements, measurement of smoke and dust, measurement of moisture in carbon dioxide circuit, nuclear measurements.

## **UNIT – VIII**

### **POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS:**

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. effluents from power plants and Impact on environment – pollutants and pollution standards – methods of pollution control.

### **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

### **REFERENCE BOOKS:**

1. Power Plant Engineering: P.K.Nag/ II Edition /TMH.
2. Power station Engineering – ElWakil / McHill.
3. An Introduction to Power Plant Technology / G.D. Rai.