HYBRID POWER PLANT ENGINEERING

(Elective-I)

Course Code: 15ME2306

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Pre requisites: Thermodynamics and Thermal Engineering

Course Outcomes: At the end of the course, the student will be able to

CO1: analyze advanced steam and gas turbine cycles.
CO2: discuss binary and advanced power cycles.
CO3: explain advances in nuclear and MHD power plants.
CO4: explain how to combine different power plants and pollution caused by power plants.
CO5: design for different loads and explain economic analysis of power plant.

UNIT – I (10-Lectures)

Rankine Cycle – performance – thermodynamic analysis of cycles, cycle improvements, superheaters, reheaters – condenser and feed water heaters – operation and performance – layouts.

gas turbine cycles – optimization – thermodynamic analysis of cycles – cycle improvements – multi spool arrangement. intercoolers, reheaters, regenerators – operation and performance – layouts.

UNIT- II (10-Lectures)

Binary and combined cycle – coupled cycles – comparative analysis of combined heat and power cycles – IGCC – AFBC/PFBC cycles – thermionic steam power plant.

UNIT- III (10-Lectures)

Overview of Nuclear power plants – radioactivity – fission process – reaction rates –diffusion theory, elastic scattering and slowing down – criticality calculations – critical heat flux – power reactors – nuclear safety. MHD and MHD – steam power plants.

UNIT- IV (10-Lectures)

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 – coordination of hydro-electric and gas turbine stations – coordination of hydro-electric and nuclear power station – coordination of different types of power plants. Air and water pollution –acid rains – thermal pollution – radioactive pollution –standardization – methods of control.

UNIT-V (10-Lectures)

Load curves–effects of variable load on power plant design and operation–peak load plant– requirements of peak load plants–cost of electrical energy–selection of type of generation– selection of generating equipments–performance and operating characteristics of power plants.

TEXT BOOKS:

1. Nag, P.K., "*Power Plant Engineering"*, Tata Mcgraw Hill Publishing Co Ltd, NewDelhi, 1998.
2. Arora and Domkundwar, "*A course in power Plant Engineering"*, Dhanpat Rai and CO, 2004.

REFERENCES:

1. Haywood, R.W," *Analysis of Engineering Cycles"*, 4th Edition, Pergamon Press, Oxford, 1991.
2. Wood, A.J., Wollenberg, B.F," *Power Generation, operation and control"*, John Wiley, NewYork, 1984.
3. Gill, A.B., "*Power Plant Performance",* Butterworths, 1984.
4. Lamarsh, J.R., "*Introduction to Nuclear Engg."*, 2nd edition, Addison-Wesley, 1983.