

IV Year B.Tech. Mechanical Engg. I-Semester	L	T	P	To	C
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ME429 POWER PLANT ENGINEERING

Course Description & Objectives:

Understand the sources of energy and their contributions to the energy and power needs of the nation and the world. Know percentages and have understanding for magnitudes of energy and resources used. Describe sources of energy and types of power plants. List different types of fuels used in power plants and estimate their heating values. List types, principles of operations, components and applications of steam turbines, steam Generators, condensers, feed water and circulating water systems.

Course Outcomes:

The expected learning outcomes are that the student will be able to:

- 1. Describe sources of energy and type of power plants.*
- 2. Should be able to understand the machines and accessories used in thermal power plant.*
- 3. Describe basic working principle of Gas turbine and Diesel engine power plant.*
- 4. List the principle components and type of nuclear reactors.*
- 5. Define terms and factors associated with power plant economics. Calculate present worth depreciation and const of different types of power plants. Estimate the cost of power production per kW.*

UNIT - I Introduction:

Various Energy Sources, types of power plants.

Thermal Power Plant : General Plant Layout, Working of Different circuits, types of coals, coal analysis, coal and ash handling systems. Burning of coal, traveling grate stokers, spreader stokers, retort stokers, pulverized fuel burning system and its components, combustion needs and draught system, cooling towers and ponds.

UNIT - II Diesel Power Plant:

Introduction, field of use - Plant layout with auxiliaries - fuel supply system, air starting equipment, lubrication and cooling system - super charging.

Gas Turbine Plant : Introduction - classification - Layout with auxiliaries - Principles of working of closed and open cycle gas turbines.

UNIT - III Hydro Electric Power Plant:

Hydrology, Rainfall, Run off and their measurement, hydrograph, Flow duration curve, Mass curve and calculation of storage capacity, site selection of hydro plant, different types of hydro plants.

Power from Non-conventional Sources: Solar Energy : Solar cells, solar energy storage, solar ponds, solar energy utilization and applications.

Wind Power : Basic principle, different types of wind mills, wind energy conversion systems, applications.

UNIT - IV Nuclear Power Plants:

Nuclear Fission, Nuclear Fuels, Components of Reactor, Types of Reactors - Pressurized water reactor, boiling water reactor, fast Breeder reactor, Homogeneous reactor, Gas cooled reactor, Radiation Hazards and shielding - radioactive waste disposal.

UNIT - V Power Plant Economics:

Fixed costs, operating costs, cost per kwh, comparison of fixed and operating costs of hydro, thermal, nuclear plants, power tariffs.

Pollution Control : Introduction, Particulate and gaseous pollutants, thermal pollution and solid waste pollution, methods to control pollution, brief description.

TEXT BOOKS :

1. Mohammad El Wakil, "Power Plant Technology", 2nd ed., Mc Graw-Hill, 2010.
2. R.K. Rajput, "Power Plant Engineering", 3rd ed., Lakshmi Publication, 2008.

REFERENCE BOOKS :

1. P.K. Nag, "Power Plant Engineering", 3rd ed., Tata McGraw-Hill, 2014.
2. Arora and S.Domkundwar, "A Course in Power Plant Engineering", 1st ed., Dhanpat Roy & Sons, 2013.
3. G.D. Rai, "An Introduction to Power Plant Technology", 3rd ed., Khanna Publishers, 2013.