POWER PLANT ENGINEERING
(Elective – I)

Course Code: 13ME1129

L	T	P	C
4	0	0	3

Pre requisites: Thermal Engineering.

Course Outcomes:

At the end of the course, the student will be able to

CO 1 Describe construction, working principles and advantages of steam and hydro electric power plants

CO 2 Describe working principles of diesel and gas turbine power plants

CO 3 Apply the concepts of non-conventional energy sources

CO 4 Outline different technologies adopted in nuclear power plants

CO 5 Apply pollution control techniques, economic analysis in power plant

UNIT-I **(12 Lectures)**

Thermal power plants: Introduction to the sources of energy. plant layout, fuel handling – types of coals, grades of coal, coal handling – layout of fuel handling equipments, coal handling, choice of handling equipment, coal storage.

COMBUSTION:

combustion equipment for solid fuels – burning of coal – burners – fluidized bed combustion - ash handling – dust collectors - draught system (no mathematical treatment) – cooling ponds and cooling towers - feed water treatment – advantages and disadvantages

UNIT-II **(16 Lectures)**

HYDRO-ELECTRIC POWER PLANTS:

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.

NON-CONVENTIONAL ENERGY SOURCES:

utilization of solar- collectors- principle of working, wind energy – types – HAWT, VAWT -Tidal Energy. Direct energy conversion: solar cell, fuel cells, MHD generation.

UNIT-III (14 Lectures)

DIESEL POWER PLANTS:

Introduction – IC engines, types, construction– plant layout with uxiliaries – fuel supply system, air starting equipment, lubrication and cooling system – super charging.

GAS TURBINE POWER PLANTS:

Introduction – application - selection of site - classification – plant layout – components of gas turbine plant - combined cycle power plants - advantages and disadvantages.

UNIT-IV (10 Lectures)

NUCLEAR POWER PLANTS:

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-V (08 Lectures)

POWER PLANT ECONOMICS AND IMPACT ON ENVIRONMENT:

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.

Pollution: Introduction – pollution from thermal power plants - pollution from nuclear power plants - pollution from hydroelectric power plants.

TEXT BOOK:

R K Rajput, *"A text book of power plant engineering"*, Laxmi Publications, New Delhi, 2012.

REFERENCES:

1. P. K. Nag, *"Power plant engineering"*. 3rd Edition, Tata McGraw-Hill- New Delhi, 2007.
2. Arora and Domkundwar, *"A course in Power plant engineering"*, 3rd Edition, Tata McGraw-Hill, New Delhi, 1988.
3. Manoj kumar Gupta, *"Power plant engineering"*, Prentice Hall Inc., New Delhi, 2012.