POWER PLANT ENGINEERING

(Professional Elective-III)

COURSE CODE:15ME1132

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Prerequisites:

Thermal Engineering.

COURSE OUTCOMES:

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

CO 1 Acquire knowledge about energy conversion from steam, handling and burning of fuel.

CO 2 Gain knowledge in hydro power plants and apply concepts of non conventional energy sources.

CO 3 Apply energy conversion from diesel oil and gas.

CO 4 Gain knowledge about nuclear fuels and nuclear reactor.

CO 5 Estimate various costs applicable to power plants.

UNIT-I **(12 Lectures)**

THERMALPOWERPLANTS:

Introduction to the sources of energy. Plant layout, fuel handling–types of coals, gradesofcoal, coalhandling-layout of fuel handling equipments, coalhandling, choice of handling equipment, coalstorage.

COMBUSTION:

Combustion equipment for solid fuels – burning of coal – burners(over feed stokers, under feed stokers) – fluidized bed combustion – ashhandling – dustcollectors–cooling ponds and cooling towers-feed water treatment–advantages and disadvantages.

UNIT-II **(10 Lectures)**

HYDRO-ELECTRICPOWERPLANTS:

Waterpower–hydrological cycle/flow measurement–drainage area

characteristics–hydrographs–storage and pond age–classification of dams and spillways.

HYDROPROJECTSANDPLANT:

Classification–typical layouts–plant auxiliaries–plant operation pumped storage plants.

NON-CONVENTIONALENERGYSOURCES:

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

UNIT-III (10 Lectures)

DIESELPOWERPLANTS:

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

GASTURBINE 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 POWERPLANTS:

Nuclearfuel – 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)

POWERPLANT ECONOMICS AND IMPACT ON ENVIRONMENT:

Capitalcost, investment of fixed charges,operating costs, general arrangement of power distribution, loadcurves, load durationcurve, definitions of connected load, maximum demand, demand factor, average load, loadfactor, diversity factor–related exercises.

Pollution:Introduction–pollution from thermal powerplants-pollution from nuclear powerplants-pollution from hydro electric power plants.

TEXTBOOK:

P.K.Nag, "Power plant engineering", 3rd Edition, Tata McGraw-Hill- NewDelhi, 2007.

REFERENCES:

1. R K Rajput, "A text book of power plant engineering", LaxmiPublications, NewDelhi, 2012.
2. Arora and Domkundwar, "Acoursein Powerplant engineering", 3rd Edition, TataMcGraw-Hill, NewDelhi, 1988.
3. Manojkumar Gupta, "Powerplantengineering", Prentice HallInc., NewDelhi, 2012.