

Course Title: Power Plant Engineering

Course Code: EPEG 425

Credit Hours: 3

Course Description:

The course intends to impart students the fundamental knowledge of economics, construction and working of different power plants with major focus on hydropower plants.

Course Contents:

Unit 1: Fundamentals of power plants

Classification of power plants, Power plant development present and future in Nepal, Resources for electric power generation in Nepal, choice of power plants, location of power plants

Unit 2: Steam Power Plant

Rankine Cycle, Layout of a Steam power plant and working principle, economizer, evaporator, super-heater, reheating, regeneration, , co-generation, steam generators and types, steam turbine and types, compounding of steam turbines, governing of steam turbine, Operation and maintenance of steam power plant, Site selection of a steam power plant

Unit 3: Gas Turbine Power Plant

Open and closed loop cycle gas turbine power plants, components of gas turbine power plants, regeneration and reheating, starting, ignition, lubrication, fuel system and control, gas turbine control, gas turbine efficiency, Operation and maintenance of gas turbine power plant, site selection of a gas turbine power plant, Combined cycle Gas-steam turbine power plant and its advantage

Unit 4: Nuclear Power Plant

Fundamentals of nuclear energy, nuclear fusion and fission, chain reaction, Components of nuclear reactor, types of nuclear reactors- pressurized water reactor, boiling water reactor, gas cooled reactor, site selection of nuclear power plant, safety measures

Unit 5: Diesel Power Plant

Diesel Cycle, layout of diesel power plant, components of diesel power plant, performance of diesel power plant, fuel system, lubrication system, air intake system, supercharging system, cooling system, governing, speed control, efficiency of diesel power plant, applications

Unit 6: Hydro Power Plant

Layout of a hydropower plant, classification of hydropower plants, Nepalese power plants and their features, estimation of hydropower potential, advantages and disadvantages of hydropower, selection of site for hydropower plant, hydrological cycle, hydrographs, mass curve, flow duration curve, measurement discharge, measurement of head, components of a hydropower plant: catchment area, intake and types, reservoir, dam and its types, hydraulic tunnels and open channels, surge tanks, spill ways and types, gates types and locations, settling basin, penstock and supports structures, valves and types, draft tubes, hydraulic turbines and its classification, Turbine types, their physical characteristics and performances: Pelton Francis, Kaplan, Bulb,

Deriaz, comparison of hydraulic turbines, Governing of hydraulic turbine, selection of turbines, hydraulic pumps their types and performance characteristics, power house, hydropower plant design guideline, micro hydropower plant and its components

Unit 7: Non-Conventional methods of Power Generation

Solar photovoltaic system its components and types, Wind energy conversion system and its components and types, tidal power plant and its components, geothermal power plant and its components, ocean thermal energy conversion, biomass and biogas power plants, Fuel Cell, Energy Storage Systems and types

Unit 8: Economics of Power Generation

Load curve, load duration curves peak load, base load, , load factor, plant capacity factor, reserve factor, demand factor, diversity factor, plant use factor, load sharing between power plants, power, cost of power, tariff and types, factors to be considered for fixing of tariff, Environmental assessment and permits

References:

1. P.K. Nag “*Power Plant Engineering*” Tata Mc Graw Hill
2. Black & Veatch “*Power Plant Engineering*” Springers
3. A K Raja, A. P. Srivastava and M. Dwivedi, “*Power Plant Engineering*” New Age International Publishers
4. M.M. Dandekar, K.N. Sharma, “*Water power Engineering*”, Vikash Publishing House

Evaluation:

In-Semester Evaluation: 50%

End-Semester Evaluation: 50%