

POWER STATION ENGINEERING AND ECONOMY

MODULE-1:

14 classes

Introduction to different sources of energy and general discussion on their application to generation, Indian Energy Scenario. (Nag-1.5)

Load duration curves, Load Factor, Capacity Factor, Reserve Factor, Demand Factor, Diversity Factor, Plant Use Factor, Base Load, Intermediate Load and Peak Load Plants. (Nag-1.2)

ECONOMICS OF POWER GENERATION:

Construction costs, Fixed cost and Depreciation, Fuel cost, Economic scheduling principle, Annual Operating Costs, Effect of Load Factor on cost per kWh. (Vopat- 29.2- 29.5, 29.13- 29.22, Nag-1.4)

NUCLEAR POWER STATION:

Introduction to fission & fusion, reactor construction, controlled chain reaction, operational control of reactors, Brief study of various types of reactors (Boiling water, pressurized water, heavy water, breeder) , Location and layout of nuclear power plant (Nag- 9.5, 9.6, 9.13, 9.15 - 9.21)

MODULE-2:

10 classes

HYDEL POWER STATION:

Selection of site for hydro-electric power plant. (Nag-10.4)

Hydrology: Hydrological cycle, precipitation, run-off and its measurement, hydrograph, flow duration and mass curves, Estimation of amount stored by a dam across the river, Storage and Pondage. (Vopat- 25.2, 25.3, 25.5, Nag – 10.5 - 10.7)

Turbines: Operational principle of Kaplan and Francis Turbine and Pelton wheel, Speed and Pressure Regulation, Work done, efficiency (Vopat – Chapter-26, Nag- 10.10 – 10.15, 10.24 - 10.25)

Essential Elements of a Hydro-electric Power Plant: Catchment area, Reservoir, Dam, Head Gate, Spillways, Pen stock, Surge Tanks, Scroll case, Draft tubes and Tail Race, Power House, Classification of Hydroelectric Power Plants. (Vopat- 25.6 – 25.9, Nag- 10.8, 10.9) Governors, Plant auxiliaries (Nag – 10.21)

MODULE-3:

11 classes

THERMAL POWER STATION:

Selection of site for thermal power plant. (Vopat-31.3, Nag-1.3)

Overall Block Diagram indicating the air circuit, coal and ash circuit, water and steam circuit, various types of steam turbines, ash and coal handling system, High Pressure and High capacity water tube boilers, Economizer, Superheaters, De-Superheater, Re-heater, Air Pre-heater. (Vopat – 7.4, Chap-8, Chap-10, Nag-2.15, 6.3.1, 6.3.2, 6.4-6.6, 6.8, 6.12 - 6.15)

Draft System: Natural, Induced Forced and Balance Draft, PA fan, FD fan, ID fan, Chimney. (Vopat – 9.1, 9.4, Nag- 4.14.1, 4.14.3, 4.15)

Condensers, Feed water heaters, Evaporators, Make-up water, Bleeding of steam, Cooling water system. (Vopat- 14.1, 14.6, 18.2, 18.13, Nag – 8.1- 8.6),

Electrostatic Precipitator: Basic working Principle and constructional details (Nag-6.10)

Governors, Plant auxiliaries (Vopat- 12.14)

TEXT BOOKS AND REFERENCES:

- 1) P. K. Nag, "Power Plant Engineering", 3rd Edition, Tata McGraw Hill Publication
- 2) Bernhard G. A. Skrotzki, William A. Vopat, 'Power Station Engineering and Economy', 2nd Ed, Tata McGraw Hill Publication
- 3) M. V. Deshpande, Elements of Electrical Power Station Design, PHI
- 4) Arora & Domkundwar, 'A Course in Power Plant Engineering', Dhanpat Rai and sons.
- 5) R. K. Rajput, 'A Text Book of Power Plant Engineering', 3rd Edition, Laxmi Publishing.