



GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

POWER GENERATION AND DISTRIBUTION

Course Code: GR15A2040
II Year II Semester

L:3 T:1 P:0 C:4

Prerequisites: Knowledge of Basic Electrical Engineering

Course Objectives

- To introduce the concepts and phenomenon of different sources of Power Generation
- To give an idea about the fundamental concepts of electrical power distribution, both AC & DC.
- To familiarize the students with the Tariff methods for electrical energy consumption in the prospect of optimum utilization of electrical energy.
- To impart the knowledge of different turbines used in the generating stations with the analytical methods.

Course Outcomes

- Articulate power system concepts required to engineering problems.
- Design power system components for a specified system and application
- Ability to discuss various power sources for generation of power Merit/Demerits.
- Formulate A.C and D.C distribution networks for necessary variable calculation.
- Ability to calculate usage of electrical power
- Ability to plot the power /Energy demand in the form of graph.
- Ability to discuss functions of Substation.

Unit-I

Thermal Power Stations: Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, as hand flue gasses. Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers.

Gas and Nuclear Power Stations: Nuclear Power Stations: Nuclear Fission and Chain reaction, Nuclear fuels. Principle of operation of Nuclear reactor. Reactor Components: Moderators, Control rods, Reflectors and Coolants. Radiation hazards: Shielding and Safety precautions. Types of Nuclear reactors and brief description of PWR, BWR and FBR.

Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only)



Unit-II

Hydro electric power stations: Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

Hydraulic Turbines: Classification of turbines, Impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, Work done, Efficiencies, Hydraulic design–Draft tube-Theory-Functions and efficiency.

Unit-III

D.C. Distribution Systems: Classification of Distribution Systems, Comparison of DC vs AC and Under-Ground vs. Over Head Distribution Systems. Requirements and Design features of Distribution Systems.-Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) And Ring Main Distributor. A.C. Distribution Systems. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

Unit-IV

Substations: Classification of substations: Air insulated substations- Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.

Gas insulated substations (GIS) –Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, busbar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

Unit-V

Economic Aspects of Power Generation: Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors-Numerical Problems.

Tariff Methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a Tariff Method. Tariff Methods: Flat Rate, Block- Rate, two-part, three – part, and power factor tariff methods and Numerical Problems.



Teaching Methodologies

1. PS-I ppts
2. Assignments uploaded in website

Text Books

1. Electrical Power Systems by C. L. Wadhwa New Age International(P) Limited, Publishers1997.
2. A Text Book on Power System Engineering by M. L. Soni, P. V. Gupta, U. S. Bhatnagar and A. Chakraborti, Dhanpat Rai & Co.Pvt.Ltd.,1999.