

2/4 B.Tech. FOURTH SEMESTER**EE4T3****ELECTRICAL POWER GENERATION****Credits: 3****Lecture: 3 periods/week****Internal assessment: 30 marks****Tutorial: 1 period /week****Semester end examination: 70 marks****Course Objective:**

Electrical Power plays significant role in day to day life of entire mankind. The aim is to impart the basic knowledge on different types of power generation & power plants in detail so that it helps them in industry oriented learning.

Course outcomes:

Upon completing this course student will be

1. Familiar with techniques of power generation, operation and maintenance of power plants.
2. Able to know the economical aspects of power generation along with different methods of tariffs.
3. Gain knowledge on different types of substations and their equipments.
4. Able to understand the impact of power solutions on the society and will be aware of contemporary issues.

UNIT I**Hydroelectric power stations**

Introduction –General layout of Hydro electric plant, selection of site, classification - run off river plants with pondage and without pondage - storage reservoir plants -pumped storage plants. Hydrology, Catchment area, Mass curve - storage - discharge - station capacity - estimation of power developed from a given catchment area; heads and efficiencies, Merits and demerits of hydroelectric power plant - Numerical Problems.

UNIT II**Thermal Power Stations**

General layout of Modern thermal plant, selection of site, coal handling, pulverization of coal, ash handling systems, dust collection systems, ESP system ,draught system-natural and artificial. Brief description of: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers. Numerical Problems- Comparison of thermal and hydel power plants.

UNIT III**Nuclear Power Plants**

Nuclear fuels- Fissile and fertile materials, Nuclear Fission, Chain reaction, Principle of operation of Nuclear reactor – General layout of Nuclear power plant, Reactor Components, Radiation hazards, Brief description of PWR, BWR and FBR.

Introduction to Non Conventional Sources (elementary treatment only):

Solar Energy, Wind Energy, Ocean Energy, Tidal Energy, Wave Energy, Fuel Cells, and Biomass.

UNIT IV**Economic Aspects and Tariffs**

Load curve, load duration and integrated load duration curves, load, demand, diversity, capacity, utilization and plant use factors. Generation cost and its classification, interest and depreciation, effect of load factor and diversity factor on cost of energy generated, Numerical Problems.

Tariffs: Base load and peak load stations, load sharing between base load and peak load stations, objectives of tariff ,factors affecting tariff, types of tariffs – block and stepped tariff – Two part tariff and three part tariff – Frequency dependent tariff- unscheduled interchange based tariff, Numerical problems.

Unit V

Substations

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

Gas insulated substations: Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, Comparison of Air insulated substations and Gas insulated substations.

Learning Resources

Text Books:

1. A course in Electrical Power systems ,J.B. Gupta, Kataria Publications
2. A Text Book on Power System Engineering, M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakrabarti, Dhanpat Rai & Co. Pvt. Ltd.
3. A Text Book on Power System engineering, R.K.Rajput, Laxmi Publication (P) Ltd.

Reference Books:

1. Generation, Distribution and Utilization of Electrical Energy, C.L.Wadhwa,New Age International publishers.
2. Elements of Power Station design and practice, M.V. Deshpande, Wheeler Publishing company.
3. Gas insulated substations, M.S.Naidu, I K International Publishing House.