**Sri Venkateswara College of Engineering & Technology**

**(Autonomous), Chittoor**

**POWER PLANT ENGINEERING (14AME42)**

**IV B.Tech- I Sem (ME) L T P C**

**3 1 0 3**

**(Choice Based Credit Course, Departmental)**

**Objectives:**

*To make the students learn:*

1. *The economics power generation.*
2. *The operation of various systems in the steam plant.*
3. *The need for diesel and gas turbine power plants.*
4. *The importance of the hydrology and hydroelectric power plant*
5. *The necessity o f the nuclear power plant and non-conventional energy sources.*

**UNIT – I**

**Introduction to the Sources of Energy** – Sources of Energy and Development of Power in India.

**Economics of Power Generation**: Introduction-Terms and Definitions-connected load, demand, maximum demand, demand factor, load factor, diversity factor, utilization factor, Plant capacity factor, Plant use factor, Load curve-its significance, and load duration curve, Location of Power Plant, Cost analysis-capital cost, operational costs, Factors affecting economics of generation and distribution of power, Tariff for electrical energy- Problems on load curves only.

**UNIT II**

**Steam Power Plant:** Introduction, Classification of steam power plants, Layout of a Modern Steam Power Plant, Selection of site for steam power station - Fuel handling-introduction, lay out of fuel handling equipment, out plant handling of coal, coal storage at plant site, inplant handling of coal, and Ash handling systems.

**Combustion Process** : Coal- Classification of coal- Properties of coal –Coal Burning methods, Stoker Firing-classification, Overfeed stokers-travelling grate stokers, spreader stokers, Underfeed stokers- retort stokers, Pulverized fuel firing, pulverized fuel handling systems, Fluidized bed combustion, Cyclone furnace-design and construction, Dust collectors, Cooling ponds and cooling towers

**UNIT – III**

**Internal Combustion Engine Plant:** Diesel Power Plant: Introduction – IC Engines, types, construction– Plant layout with auxiliaries – Different systems of diesel power plant, Fuel injection system-types

**Gas Turbine Plant:** Introduction – classification - construction – Layout with auxiliaries – Principles of working of closed and open cycle gas turbines. Advantages and disadvantages, Combined Cycle Power Plants.

**UNIT – IV**

**Hydrology**: Introduction ,hydrological cycle, rainfall and its measurement – runoff and its measurement – Hydrographs – Classification of dams and spill ways.

**Hydro Electric Power Plants:** Introduction, Site selection, Classification – Typical layouts – plant operation, Pumped storage plants, General arrangement of storage type hydro-electric power plant and its operation.

**UNIT V**

**Nuclear Power**: Nuclear fuels –Release of energy by Nuclear reaction, Types of Nuclear reactions, Initiation of nuclear reactions, Nuclear fission, fertile materials and breeding.

**Nuclear Reactors:** Introduction –Components of nuclear reactor, Types of Reactors- Pressurized water reactor, Boiling water reactor, Sodium-Graphite reactor, Fast Breeder Reactor, Homogeneous Reactor, Gas cooled Reactor, Selection of materials for reactor components.

**Outcomes:**

After completion of the course, the student will be able to:

1. *Identify and classify various power plants like steam, Gas turbine, hydro-electric and nuclear based on requirement.*
2. *Illustrate and develop with system approach to solve industry problems and social obligations*
3. *Select the best solution with application of advanced technology and to promote system integration and synergy for organization development with cost effectiveness.*
4. *Survey and decide about resources available to install a power plant in a location with environmental concern to attain long term goals.*
5. *Organize a team to promote Research and higher learning to serve mankind.*

**Text Books:**

1. R.K. Rajput, A Text Book of Power Plant Engineering, Laxmi Publication.
2. Arora & S. Domkundwar, A Course in Power Plant Engineering, Dhanpat Rai & Co.

**References:**

1. P.C. Sharma, Power Plant Engineering, S.K. Kataria Publishers.
2. P.K. Nag, Power Plant Engineering, Tata McGraw Hill.
3. M.M. El-Wakil, Power Plant Technology, [Tata McGraw-Hill Education](http://www.tatamcgrawhill.com/).

**Mapping of COs with POs:**

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