**17EE2102-GENERATION OF ELECTRIC POWER**

**(EEE)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Category:** | Professional core | **Credits:** | 4 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-2-0 |
| **Pre-requisite:** | Fundamental knowledge of DC power generation, renewable and non renewable sources. | **Sessional Evaluation:**  **External Exam Evaluation:**  **Total Marks:** | 40  60  100 |

|  |  |  |
| --- | --- | --- |
| **Course Objectives:** | 1. This course aims to equip the student with a basic understanding of concepts of the electrical power generation by conventional and nonconventional sources. 2. Learn the Principle of renewable energy generation and economic aspects of power generation. | |
| **Course Outcomes:** | After completing the course the student will be able to | |
| CO1 | Understand the operation of various components involved in thermal power plant. |
| CO2 | Gain the knowledge of operation, construction and design of various components of hydro power plant. |
| CO3 | Know the operation, construction, safety and design of various components of nuclear power plant. |
| CO4 | Describe the working principle of PV cell and applications of solar energy. |
| CO5 | Demonstrate knowledge on wind power generation. |
| CO6 | Evaluate Tariffs by different methods and economical aspects of power generation. |
| **Course Content:** | **UNIT-I**  **Thermal Power Stations (TPS):** Introduction, Selection of site for TPS, description of Thermal Power Station showing paths of coal, steam, water, air, ash and flue gases, Brief description of TPS components: Economisers, Boilers, types of Boilers, Super heaters, steam Turbines, Impulse & Reaction type, Condensers, Jet and surface types of Condensers, Electrostatic precipitator, Chimney and Cooling towers- Advantages & disadvantages of TPS, TPS in India.  **UNIT-II**  **Hydro-Electric Power Plants:** Introduction, Selection of site for Hydro – electric Power plants, classification of Hydro – electric plants, Layout of Hydro Electric Power plant, working principle, Description of main components, water power equation, types of turbines - Pelton, Fransis & Kaplan turbines, Pumped storage plant, Advantages and disadvantages of hydro power plant - Hydro power plants in India.  **UNIT –III**  **Nuclear Power Stations:** Introduction, Nuclear fuels and properties - Nuclear Fission and Chain reaction. - Principle of operation of Nuclear power plant, Nuclear Reactor components and their functions, Moderators, Control rods, Reflectors and Coolants.- Radiation hazards, Shielding and Safety precautions, Types of Nuclear reactors and brief description of pressurised Water Reactor (PWR), Boiling Water Reactor (BWR) and Fast Breeder Reactor, Merits and demerits of Nuclear Power Plant.  **UNIT –IV**  **Renewable Energy sources:** Introduction, solar radiation, solar energy collectors, Flat plate collectors, concentrating collectors, solar thermal power plant, working principle of photo voltaic cell, solar energy storage, solar applications.  **UNIT –V**  **Wind Energy:** Introduction, power in the wind mills, site selection considerations for installing wind mill, Construction details of the wind mill (Wind Turbine Gear System), working principle of wind mill, variation of power output with wind speed, Betz criterion, Applications.  **UNIT –VI**  **Economic Aspects of power generation:** Load curve, load duration and integrated load duration curve, number and size of generator units, Connected load, Maximum demand, Load Factor, Demand Factor, Diversity Factor, Plant use factor, Plant Capacity Factor, Utilization Factor - Power Factor, causes of low power factor.  **Cost of Electrical Energy:** Cost of generation and their division into fixed, semi fixed and running costs. Tariff, Objectives of tariff, flat rate, block rate, two part, three part and power factor tariff methods. Numerical problems. | |
| **Text Books & Reference Books:** | **TEXT BOOKS:**   1. “A course in electrical Power” by J.B.Gupta S.K. kataria & sons, 11 th   Edition(Reprint 2014).   1. “Generation of Electrical Energy”- by B.R Gupta-S.Chand Publications,6 th Edition(Reprint 2014). 2. “A Text Book on Power System Engineering” by M.L Soni, P.V Gupta, O.S Bhatnagar- Dhanpat Rai & Co, Reprint 2009.   **REFERENCE BOOKS:**   1. “Generation, Distribution and Utilization of Electrical Energy” by C.L   Wadhwa-New age International   1. “Non Conventional Energy Sources” by G.D Roy- Khanna-Publishers. 2. “A Course in Power Plant Engineering” by [Subhash C. Arora](https://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22Subhash+C.+Arora%22&source=gbs_metadata_r&cad=3),   [S.Domkundwar](https://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22S.+Domkundwar%22&source=gbs_metadata_r&cad=3), Dhanpat Rai. | |
| **E-Resources:** | http://nptel.ac.in/courses  http://iete-elan.ac.in  http://freevideolectures.com/university/iitm | |