**19EE2102-POWER SYSTEMS-I**

**(EEE)**

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| **Course Category:** | Professional core | **Credits:** | 4 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-1-0 |
| **Pre-requisite:** | Fundamental knowledge of DC power generation, renewable and non renewable sources. | **Sessional Evaluation:**  **External Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Objectives:** | Students undergoing this course are expected to learn: | |
| 1. The concepts of the electrical power generation by Themal power stations.  2. The concepts of the electrical power generation by Hydro power stations.  3. The concepts of the electrical power generation by Nuclear power stations.  4. The economic aspects of power generation.  5. The calculation of various Transmission line parameters.  6.The various factors governing performance of transmission lines and  mechanical design of OH transmission lines. | |
| **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 | Evaluate tariffs by different methods and economical aspects of power generation. |
| CO5 | Calculate the various Transmission line parameters. |
| CO6 | Understand various effects governing performance of transmission lines and mechanical design of over head transmission lines. |
| **Course Content:** | **UNIT-I**  **Thermal Power Stations (TPS):** Introduction - Selection of site for TPS - block diagram 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 - types of turbines – Pelton - Francis & Kaplan turbines - Pumped storage plant - Advantages and disadvantages of hydro power plant .  **UNIT –III**  **Nuclear Power Stations:** Introduction - 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 their brief description - Pressurised Water Reactor (PWR), Boiling Water Reactor (BWR) and Fast Breeder Reactor - Merits and demerits of Nuclear Power Plant.  **UNIT –IV**  **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 - Numerical problems.  **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.  **UNIT-V**  **Transmission Line Parameters:** Inductance and capacitance, Calculation of Transmission line Resistance, Inductance and Capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, bundled conductor, effect of earth on capacitance.  **UNIT-VI**  **Various factors governing the performance of Transmission line:** Skin and Proximity effects, Ferranti effect, Charging Current.  **Corona**: Description of the phenomenon, Factors affecting corona, critical voltages and power loss, Radio Interference.  **Mechanical design of Overhead Transmission Line:** Calculation of sag for equal and unequal supports, loading on the conductors in an overhead line, variation of sag with load and temperature, string chart. | |
| **Text Books**  **&**  **Reference Books:** | **TEXT BOOKS:**   1. “A course in electrical Power”, by J.B.Gupta S.K. kataria & sons, 11th Edition (Reprint 2014). 2. “Generation of Electrical Energy”, by B.R Gupta-S.Chand Publications, 6th Edition (Reprint 2014). 3. “Electrical power system”, by C.L Wadhwa-New age International, 6th Edition.   **REFERENCE BOOKS:**   1. “Generation, Distribution and Utilization of Electrical Energy”, by C.L Wadhwa- New age International Pvt 2015. 2. “Power System Engineering”, by I.J Nagarath & D.P Kothari, TMH   Publications, 2nd Edition.   1. “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 | |