**19EE2205-POWER SYSTEMS-II**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Category:** | Professional core | **Credits:** | 4 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-1-0 |
| **Pre-requisite:** | Generation of electric power, Circuits and Networks | **Sessional Evaluation:**  **External Exam Evaluation:**  **Total Marks:** | 40  60  100 |

|  |  |  |
| --- | --- | --- |
| **Course Objectives:** | Students undergoing this course are expected to learn : | |
| 1. The classification of transmission lines and performance calculation of  transmission lines.  2. The different types of insulators , methods of equalising the potential across  the string of insulators.  3.The various types of underground cables and the methods of grading of  underground cables.  4. The transients and travelling wave phenomenon on transmission lines.  5. The objective of power system earthing and methods of earthing.  6. The fundamental concepts of electrical power distribution, both AC & DC. | |
| **Course Outcomes:** | After completing the course the student will be able to | |
| CO1 | Understand the classification of transmission lines and performance calculation of over head transmission lines. |
| CO2 | Gain knowledge about the different types of insulators, methods of equalizing the potential across the string of insulators. |
| CO3 | Acquire the knowledge on underground cables and methods grading of underground cables. |
| CO4 | The transients and travelling wave phenomenon on transmission lines. |
| CO5 | Understand the objective of power system earthing and methods of earthing. |
| CO6 | Design and evaluate the performance of D.C distribution and A.C distribution. |
| **Course Content:** | **UNIT- I**  **Performance of transmission lines**: Representation of lines, Short transmission lines, Medium transmission lines, Nominal pie and T representation of long lines by distributed parameters, Equivalent T and Pie representation of long transmission lines, Evaluation of ABCD parameters of long lines, Ferranti effect.  **UNIT –II**  **Overhead Line Insulators:** Introduction, Types of Insulators, potential distribution over a string of insulators, Methods of equalizing the potential, string efficiency.  **UNIT-III**  **Underground Cables**: Types of Cables, Construction, insulation types, insulating materials for EHV voltage cables, classification of cables, parameters of single core cable, Grading of cables, Capacitance grading, Inter-sheath grading, Capacitance of three core belted cable.  **UNIT-IV**  **Power system transients:** Introduction, Circuit closing transients, Recovery transient due to removal of a short circuit, Travelling waves on transmission line, Surge impedance and wave velocity, Specification of travelling waves, Reflections and refractions of waves, Different types of terminations, Forked line, Successive reflections, Bewley’s Lattice diagram, Attenuation and distortion.  **UNIT-V**  **Power system earthing:** Objectives, definitions, Tolerable limits of body currents, Soil resistivity, Earth resistance, Tolerable Step and touch voltages, Neutral earthing, Ungrounded and effectively earthed system, Resistance, Reactance, Arc suppression coil earthing and grounding transformers. Arcing grounds, protection against arcing grounds.  **UNIT –VI**  **DC & AC Distribution :** Comparison of single Phase , 3-phase three wire and 3- phase four wire system, Types of primary distribution systems, Types of Secondary distribution systems, DC distribution fed at one end and at both ends(Concentrated loads), AC distribution fed at one end and at both ends(Concentrated loads ), Kelvin’s law - limitation of Kelvin’s law - Numerical problems. | |
| **Text Books**  **&**  **Reference Books:** | **TEXT BOOKS:**  1. “Electrical power systems”, by C.L.Wadhwa, New Age International (P) Limited, 6th Edition, Reprint 2014.  2. “Power system analysis and Design”, by B.R.Gupta S.chand company Pvt. Ltd New Delhi, Reprint-2015.  **REFERENCE BOOKS:**  1.“Power System Engineering”, by I.J Nagarath and D.P Kothari, TMH Publications.  2.“A course in power systems”, by J.B.Gupta, S.K.Kataria & sons, Reprint-2016. | |
| **e-Resources:** | <http://nptel.ac.in/courses>  http://iete-elan.ac.in  <http://freevideolectures.com/university/iitm> | |