**20EE3103-POWER SYSTEMS-II**

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| **Course Category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-0-0 |
| **Pre-requisite:** | Generation of electric power, Circuits and Networks | **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 classification of and performance calculation of over head transmission lines.  2. The fundamental concepts of AC & DC electrical power distribution.  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 different types of insulators, methods of equalising the potential across the string of insulators and mechanical design of over head transmission lines. | |
| **Course Outcomes:** | After completing the course the student will be able to | |
| CO1 | Understand the classification and performance calculation of over head transmission lines. |
| CO2 | Design and evaluate the performance of D.C and A.C distribution. |
| 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 | Gain knowledge about the different types of insulators, methods of equalizing the potential across the string of insulators and also mechanical design of over head transmission lines. |
| **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.  **UNIT –II**  **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.  **UNIT-III**  **Underground Cables**: Types of Cables, Construction, 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 grounded system, Resistance, Reactance, Arc suppression coil earthing and grounding transformers. Arcing grounds, protection against arcing grounds.  **UNIT –VI**  **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, stringing chart.  **Overhead Line Insulators:** Introduction, Types of Insulators, potential distribution over a string of insulators, Methods of equalizing the potential, string efficiency. | |
| **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> | |