**17EE2203-POWER SYSTEMS-I**

**(EEE)**

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| **Course Category:** | Professional core | **Credits:** | 4 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-2-0 |
| **Pre-requisite:** | Generation of electric power, Circuits and Networks | **Sessional Evaluation:****External Exam Evaluation:****Total Marks:** | 4060100 |

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| **Course Objectives:** | 1. Learn the fundamental concepts of electrical power distribution, both AC & DC
2. Learn the different issues related to overhead lines and underground cables.
3. Learn fundamentals in power system concepts required to solve engineering problems.
4. Learn the mechanical design of transmission lines, types of cables and insulators.
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| **Course Outcomes:** | After completing the course the student will be able to |
| CO1 | Design and evaluate the performance of D.C distribution and A.C distribution |
| CO2 | Calculate the various Transmission line parameters. |
| CO3 | Understand various effects governing performance of transmission lines |
| CO4 | Gain knowledge about the different types of insulators , methods of equalising the potential across the string of insulators |
| CO5 | Perform the calculations of sag for different cases. |
| CO6 | Acquire the knowledge on underground cables and estimate the performance of underground cables with grading |
| **Course Content:** | **UNIT-I****DC & AC Distribution :** Comparison of single Phase , 3-phase 3 wire and 3 phase 4 wire system Types of primary distribution systems- Types of Secondary distribution systems-DC distribution fed at one end and at both ends -AC distribution fed at one end and at both ends – Kelvin’s law –limitation of Kelvin’s law.**UNIT-II****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-III****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.**UNIT- IV****Overhead Line Insulators:** Introduction – Types of Insulators- potential distribution over a string of insulators – Methods of equalizing the potential, string efficiency.**UNIT-V****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.**UNIT-VI****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. |
| **Text Books & Reference Books:** | **TEXT BOOKS:** 1. “Electrical power system” by C.L Wadhwa-New age International, 6th Edition.
2. “Generation of electrical energy”, by B.R. Gupta S.Chand publications, 6th Edition, Reprint 2014.
3. “A Text book on Power System engineering” by M.L. Soni, P.V. Gupta, U.S.Bhatnagar-Dhanpat Rai&Co, 2009.

**REFERENCES BOOKS:**1. “Power System Engineering” by I.J Nagarath& D.P Kothari, TMH

Publications, 2nd Edition.1. “Elements of power system analysis” by William D.Stevenson. Jr Mc Graw-Hill International publication. 4th Edition.
2. Electric Power Systems by S. A. Nasar, Schaum’s Outline Series, TMH, 3rd Edition,2008.
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| **E-Resources:** | http://nptel.ac.in/courseshttp://iete-elan.ac.inhttp://freevideolectures.com/university/iitm |