

III Year B.Tech. EEE – I Semester

23A02503	POWER SYSTEMS-II (Professional Core)	L	T	P	C
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Course Objectives:

To study about line parameters and constants

To study the performance of transmission lines

To know about overhead line insulators, corona, sag and tension in transmission lines

To study about symmetrical components and different types of faults in power system.

To understand the concept of voltage control, compensation methods

Course Outcomes:

CO	Statements	Blooms Level
CO1	Analyse the transmission lines and obtain the transmission line parameters and constants.	L4
CO2	Analyse transmission line performance	L4
CO3	Design transmission lines to meet the day to day power requirements.	L5
CO4	Understand the concepts of cables and transients in transmission lines	L2
CO5	Apply load compensation techniques to control reactive power.	L3

UNIT I Transmission Line Parameters:

Types of Conductors - Calculation of Resistance for Solid Conductors, Bundle Conductors, Skin effect, Proximity effect, Concept of GMR & GMD- Transposition of Power lines- Calculation of inductance for single phase and three phase, Single and Double circuit lines, Symmetrical and asymmetrical conductor configurations with and without transposition. Calculation of Capacitance for 2 wire and 3 wire systems, effect of ground on Capacitance, Capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems

UNIT II Performance Of Transmission Lines:

Classification of Transmission Lines-Short, medium and long line and their models representation - Nominal-T, Nominal- π and A, B, C, D Constants for symmetrical networks, Numerical Problems and solutions for estimating regulation and efficiency of all types of lines. Ferranti effect and Charging Current

UNIT III Overhead Line Insulators:

Types of Insulators, String efficiency and Methods for improvement, – Voltage Distribution, Calculation of String efficiency, Capacitance Grading and Static Shielding., Numerical Problems.

Sag and Tension: Sag and Tension Calculations with equal and unequal heights of towers, Effect of wind and ice on weight of conductor, Stringing chart, Sag template and its applications Numerical Problems.

Corona: Corona- factors affecting corona, critical voltages and Power loss due to Corona. Radio Interference

UNIT IV Underground Cables:

Comparison between Underground and Overhead systems Construction of cables, Classification, Properties of insulating materials, Insulation resistance of single core cable, Capacitance of single core cable, Grading of cable

Power System Transients:

Types of system transients – Travelling or propagation of surges – Attenuation, Distortion, Reflection and Refraction co-efficients – Termination of lines with different types of conditions – Bewley's Lattice diagrams

UNIT V Voltage Control and Power Factor Improvement:

Methods of voltage control, shunt and series capacitors / Inductors, tap changing transformers, synchronous phase modifiers, power factor improvement methods.

Compensation in Power Systems: Concepts of Load compensation Load ability characteristics of overhead lines – Uncompensated transmission line – Symmetrical line – Radial line with asynchronous load – Compensation of lines.

Text Books:

1. C.L. Wadhwa, "Electrical Power Systems", New Age International Pub. Co, Third Edition, 2001.
2. D.P. Kothari and I.J. Nagrath, "Modern Power System Analysis", Tata Mc Graw Hill Pub. Co.,New Delhi, Fourth edition, 2011.
3. B.R.Gupta,"Power System Analysis and Design", S.ChandPublishing.1998.

Reference Books:

1. A. Chakrabarti, M.L. Soni, P.V. Gupta, U.S. Bhatnagar, "A Text book on Power System Engineering", Dhanpat Rai Publishing Company (P) Ltd, 2008.
2. John J. Grainger & W.D. Stevenson, "Power System Analysis", Mc Graw Hill International,1994.
3. Hadi Sadat, "Power System Analysis", Tata Mc Graw Hill Pub. Co. 2002.
4. W.D. Stevenson, "Elements of Power system Analysis", McGraw Hill International Student Edition.

Online Learning Resource:

1. https://onlinecourses.nptel.ac.in/noc22_ee17/preview