

3/4 B.Tech. FIFTH SEMESTER**EE5T5****TRANSMISSION AND DISTRIBUTION****Credits: 3****Lecture: 3 periods/week****Internal assessment:30marks****Tutorial: 1 period/week****Semester end examination:70marks****Course Objective:**

This course is an extension of Electrical Power Generation. The aim is to enrich the students with the fair knowledge of transmission line parameters, cables and insulators, distribution systems and also the recent trends in power Transmission and Distribution Systems which helps them in industry oriented learning.

Course Outcomes:

Upon completion of the course students will be able to

1. Analyze the Performance of Transmission Lines and their parameter calculations.
2. Understand the various types of insulators, mechanical design of overhead lines and underground cables.
3. Analyze travelling waves and termination of lines with different types of conditions.
4. Understand basics of Corona, Sag and other problems arise in Transmission Lines.
5. Understands the difference between AC & DC distribution systems

UNIT I**Transmission Line Parameters**

Types of conductors, Skin and Proximity effect, calculation of resistance for solid conductors, calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. 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****Over head lines**

Classification of Transmission Lines -Short, medium and long lines and their model representations, regulation and efficiency. Medium lines- Nominal-T, Nominal- Π and End condenser methods. Long lines-rigorous methods of solution, ABCD constants for all types of lines, Ferranti effect, Surge Impedance and SIL of Long Lines, Numerical Problems.

Underground Cables

Construction, Types of Insulating materials, Types of Cables, Calculation of Insulation resistance and stress in insulation, Capacitance of Single and 3-Core belted cables, Grading of Cables, Numerical Problems.

UNIT III**Mechanical design of Overhead lines**

Types of Insulators, Methods of improving string efficiency- Capacitance grading and Static Shielding. Corona, factors affecting corona, power loss, Numerical Problems. Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Stringing chart and Sag template, Numerical Problems.

UNIT IV**Travelling waves**

Travelling waves - Interpretation of long line equations. Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions, Numerical Problems.

UNIT V**DC & AC Distribution systems**

Classification of Distribution Systems - Comparison of DC distribution vs. AC distribution and Under-Ground cables vs. Over - Head Distribution Systems.

D.C. Distribution Systems - Voltage Drop Calculations (Numerical Problems) in D.C. Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

A.C. Distribution Systems - Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

Learning Resources**Text Books:**

1. A course in Electrical Power systems, J.B. Gupta, Kataria Publications.
2. Principles of Power Systems, V.K Mehta and Rohit Mehta, S.Chand & Company LTD.
3. Power System Analysis, John J Grainger and William D Stevenson Jr, McGraw Hill.

Reference Books:

1. Electrical power systems, C.L.Wadhwa, New Age International (P) Limited, Publishers.
2. A Text Book on Power System Engineering, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
3. Electrical power systems, Dr.S.L.Uppal, Khanna publishers.