

### 3/4 B.Tech FIRST SEMESTER

EE5T5

TRANSMISSION AND DISTRIBUTION

Credits: 3

Lecture: 3 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

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#### 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

#### Learning 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 line and their model representations, regulation and efficiency. Medium lines- Nominal-T, Nominal-PI 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, Calculations 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.

#### **TEXT BOOKS**

1. A course in Electrical Power systems by J.B. Gupta, Kataria Publications
2. Principles of Power Systems by V.K Mehta and Rohit Mehta S.CHAND& COMPANY LTD., New Delhi 2004.
3. John J Grainger and William D Stevenson Jr: -Power System Analysis, McGraw Hill

#### **REFERENCE BOOKS**

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