

## Nirma University

<b>Institute:</b>	<b>Institute of Technology, School of Engineering</b>
<b>Name of Programme:</b>	<b>B.Tech.</b>
<b>Semester:</b>	<b>VII</b>
<b>Course Code:</b>	<b>4EE207IE25</b>
<b>Course Title:</b>	<b>Design of Electrical Transmission and Distribution Systems</b>
<b>Course Type:</b>	<b>Interdisciplinary Minor - (Elective Course-II)</b>
<b>Year of Introduction:</b>	<b>2025 – 2026</b>

L	T	Practical component				C
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### Course Learning Outcomes (CLOs):

At the end of the course, students will be able to –

1. evaluate the electrical parameters of the transmission line (BL4)
2. estimate the mechanical aspects of the transmission line (BL5)
3. assess the performance of various transmission lines (BL4)
4. comprehend the basic practices followed in the substation and distribution system (BL2)

Unit	Contents	Teaching hours (Total 45)
<b>Unit-I</b>	<b>Electrical Design of Transmission Lines</b> Transmission line parameters, calculation of inductance and capacitance, bundled conductors – GMD and GMR for computation of effective radius of bundled conductors, string efficiency and its improvement	10
<b>Unit-II</b>	<b>Mechanical Design of Transmission Lines</b> Sag – tension calculations, sag template – stringing chart, transmission tower types and design, types of insulators, line supports, wind and ice loading effect, site details and related civil construction aspects, length and clearance required for cross arms, pole depth, role of soil conditions.	10
<b>Unit-III</b>	<b>Performance of Transmission Lines</b> Classification and performance of short lines, medium and long transmission lines, generalized constants, Ferranti effect, use of capacitor and reactors as a compensator.	10
<b>Unit-IV</b>	<b>Electrical Substations</b> Sub-stations types and equipment, layouts and bus-bar configuration, substation automation	05
<b>Unit-V</b>	<b>Design of Distribution Systems</b> Primary and secondary feeder design considerations; type of conductor and cable, earthing, lightning design, protection and reliability; distributed generation, and smart grid application.	10

**Self-Study:**

The self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study content.

**Tutorial Work:**

This shall consist of at least 06 tutorials based on the above syllabus.

**Suggested Readings:**

1. D.P. Kothari and I. J. Nagrath, *Modern Power System analysis*, McGraw Hill.
2. J. D. McDonald (Ed)., *Electric Power Substations Engineering*, CRC Press
3. James A. Momoh., *Electric Power Distribution, Automation, Protection and Control*, CRC Press
4. William D Stevenson, John J. Grainger, *Power System Analysis*, McGraw Hill Education India
5. Chakrabarti A., M. L.Soni, U.S. Bhatnagar and P.V. Gupta, *Power System Engineering*, Dhanpat Rai Publishers.
6. S. Sivanagaraju and S. Satyanarayana, *Electric Power Transmission and Distribution*, Pearson Education.
7. J. B. Gupta, *A Course in Electrical Power*, Dhanpat Rai Publishers.
8. H. Cotton, *Transmission & Distribution*, CBS Publishers.
9. P. S. Satnam and P. V. Gupta, *Substation Design and Equipment*, Dhanpat Rai and Sons
10. Turan Gonen., *Electric Power Distribution System Engineering*, BSP Books Pvt. Ltd.