

## Electrical Distribution Systems

<b>Course Code</b>	19EE4501A	<b>Year</b>	III	<b>Semester</b>	I
<b>Course Category</b>	Program Elective - I	<b>Branch</b>	EEE	<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L-T-P</b>	3-0-0	<b>Prerequisites</b>	NIL
<b>Continuous Internal Evaluation:</b>	30	<b>Semester End Evaluation:</b>	70	<b>Total Marks:</b>	100

<b>Course Outcomes</b>	
Upon successful completion of the course, the student will be able to	
<b>CO1</b>	<b>Understand</b> distribution system planning, voltage control and need of power factor improvement (L2)
<b>CO2</b>	<b>Describe</b> sub-transmission lines, distribution substations, distribution feeders and protection devices. (L2)
<b>CO3</b>	<b>Illustrate</b> the co-ordination of protective devices and the characteristics of various loads (L3)
<b>CO4</b>	<b>Analyze</b> the voltage drop & power loss calculations and the effect of capacitors in distribution systems. (L3)
<b>CO5</b>	<b>Determine</b> relation between load factor and loss factor, rating of distribution substation (L3)

<b>Contribution of Course Outcomes towards achievement of Program Outcomes &amp; Strength of correlations (3:High, 2: Medium, 1:Low)</b>														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	2	2	3	2				1	1		2	3	2
<b>CO2</b>	3	2	2	2					1	1		2	3	2
<b>CO3</b>	3	2	2	2					1	1		2	3	2
<b>CO4</b>	3	2	2	2	2				1	1		2	3	2
<b>CO5</b>	3	2	2	2					1	1		2	3	2

<b>Syllabus</b>		
<b>Unit No.</b>	<b>Contents</b>	<b>Mapped CO</b>
I	<b>Distribution Systems Planning And Load Characteristics:</b> Introduction, distribution system planning, factors affecting system planning, Coincidence factor, contribution factor, loss factor, Relationship between the load factor and loss factor, Classification of loads (residential, commercial, agricultural and industrial) and their characteristics.	CO1 CO3 CO5
II	<b>Design of Sub Transmission Lines and Distribution Substations:</b> Introduction, Sub-transmission systems, distribution substation, sub-station bus schemes, sub-station location, rating of a distribution substation, Substation service area with 'n' primary feeders, comparison of four and six feeder patterns.	CO2 CO5
III	<b>Design Considerations of Distribution Feeders:</b> Introduction, Radial type and loop type primary feeders, primary network, primary feeder voltage levels, primary feeder loading, radial feeders with uniformly distributed load and non-uniformly distributed loads, Basic design	CO2 CO4

	practice of the secondary distribution system. Voltage drop and power loss calculations; three phase balanced primary lines, non three phase primary lines.	
IV	<b>Distribution system protection.</b> Basic definitions, over current protection devices-fuses, automatic circuit reclosers, automaticline sectionalizers, automatic circuit breakers. Objectives of distribution system protection, co-ordination of protective devices- fuse to fuse co-ordination, recloser to recloser coordination, fuse to circuit breaker, recloser to fuse co-ordination, recloser to circuit breaker co-ordination.	CO2 CO3
V	<b>Power Factor Improvement and Voltage Control</b> Power capacitors, shunt and series capacitors, effect of series and shunt capacitors (fixed and switched), power factor correction, economic justification of capacitors, procedure to determine the best capacitor location. voltage regulators, effect of AVB/AVR, line drop compensation.	CO1 CO4
<b>Learning Resources</b>		
<b>Text Books</b>		
<ol style="list-style-type: none"> <li>1. Electric Power Distribution system Engineering by Turan Gonen, CRC press, 3rd edition, 2014.</li> <li>2. Electric Power Distribution by A.S.Pabla, Tata Mc Graw-hill Publishing Company,6<sup>th</sup> edition,2011.</li> </ol>		
<b>Reference Books</b>		
<ol style="list-style-type: none"> <li>1. Electrical Power Distribution and Automation by S.Sivanagaraju,V.Sankar,Dhanpat Rai&amp;Co, 2014</li> <li>2. Electrical Power Distribution Systems by V.Kamaraju, Overseas Publishers,Hyderabad, 3<sup>rd</sup> edition, 2008</li> </ol>		