

ELECTRICAL DISTRIBUTION SYSTEM

Course Code	23EE4701C	Year	IV	Semester	I
Course Category	Professional Elective-IV	Branch	EEE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Electrical Circuit Analysis, Power Systems
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Understand the concepts of electrical distribution systems including load characteristics, substations, feeder design, system analysis, protection schemes, power factor improvement, and voltage control methods.
CO2	Use load modeling, load characteristics, and distribution system factors to compute and select substation ratings, locations, and feeder configurations. (L3)
CO3	Compute voltage drop and power losses in distribution systems for uniformly and non-uniformly distributed loads. (L3)
CO4	Analyze the operation and coordination of protective devices in distribution systems. (L4)
CO5	Analyze the effect of power factor improvement and voltage control methods on distribution system performance. (L4)

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

SYLLABUS		
Unit No.	Contents	Mapped CO
I	General Concepts Introduction to distribution systems - Distribution system losses – Coincidence factor – Contribution factor – loss factor – Relationship between	CO1 CO2

	the load factor and loss factor – Numerical Problems – Load modeling and characteristics – Classification and characteristics of loads (Residential - Commercial - Agricultural and Industrial).	
II	Substations Selection for location of substations - Rating of distribution substation – Service area with ‘n’ primary feeders – Benefits and methods of optimal location of substations. Distribution Feeders Design Considerations of distribution feeders: Radial and loop types of primary feeders – Voltage levels – Feeder loading – Basic design practice of the secondary distribution system.	CO1 CO2
III	System Analysis Voltage drop and power loss calculations: Derivation for voltage drop and power loss in lines – Uniformly distributed loads and non-uniformly distributed loads – Three phase balanced primary lines and Non three phase balanced primary lines.	CO1 CO3
IV	Protection Objectives of distribution system protection –Time current characteristics – Protective devices: Principle of operation of fuses – Circuit reclosures – Line sectionaliser and circuit breakers - Earth leakage circuit breakers – Protection schemes of parallel & Ring-main feeders. Coordination of protective devices General coordination procedure –Various types of co-ordinated operation of protective devices - Residual Current Circuit Breaker.	CO1 CO4
V	Compensation for Power Factor Improvement Capacitive compensation for power factor control – Different types of power capacitors – shunt and series capacitors – Effect of shunt capacitors (Fixed and switched) – Power factor correction – Capacitor allocation – Economic justification – Procedure to determine the best capacitor location. Voltage Control Equipment for voltage control – Effect of series capacitors – Effect of AVB/AVR – Line drop compensation.	CO1 CO5

Learning Resources	
Textbooks:	
1. “Electric Power Distribution system - Engineering” – by Turan Gonen - McGraw–hill - 2nd edition - 2008.	
Reference Books:	
1. Electrical Distribution Systems by Dale R.Patrick and Stephen W.Fardo - CRC press - 2nd edition.	
2. Electric Power Distribution – by A.S. Pabla - Tata McGraw–hill Publishing Company - 4 th edition - 1997.	
3. Electrical Power Distribution Systems by V.Kamaraju - Right Publishers.	

E-Resources:

1. <https://nptel.ac.in/courses/108107112>
2. <https://www.mooc-list.com/tags/electrical-distribution>