DISTIBUTION SYSTEM PLANNING & AUTOMATION

Course Code	20EE4601A	**Year**	III	**Semester(s)**	II
Course Category	Professional Elective -II	**Branch**	EEE	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Electrical Power Generation, Transmission and Distribution
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 distribution system planning and automation. **(L2)**
CO2	**Apply** the knowledge of distribution system planning and forecasting. **(L3)**
CO3	**Apply** the concepts of sub transmission lines, distribution substations, primary and secondary Systems. **(L3)**
CO4	**Analyze** the theory of distribution automation and SCADA systems. **(L4)**
CO5	**Examine** the mechanism of network reconfiguration, improvement in voltage profile, Capacitor placement in distribution system. **(L4)**
CO6	**Show** the ability to apply the various distribution system planning and automation concepts and submit a report.

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	PO12	PSO1	PSO2
CO1													**3**	**3**
CO2	**3**												**3**	**3**
CO3	**2**					**2**							**3**	**3**
CO4			**2**				**2**						**3**	**3**
CO5		**2**				**2**							**3**	**3**
CO6									**3**	**3**		**3**	**3**	**3**

SYLLABUS		
Unit No.	**Contents**	**Mapped CO**
I	**Distribution Systems Planning:** Introduction, Distribution system planning, Factors affecting system planning, Present distribution planning techniques, Distribution system planning in the future, Future nature of distribution planning, Central role of the computer in distribution planning, Impact of Dispersed Storage and Generation , Load characteristics, Load forecasting, Long term forecasting, Technological forecasting.	**CO1 CO2 CO6**

II	**Design Of Sub transmission Lines and Distribution substations:** Sub-transmission, Distribution substations, Sub-station bus schemes, Sub-station location, Rating of distribution substation, Substation service area with 'n' primary feeders, Comparison of four and six feeder patterns.	**CO1** **CO3** **CO6**
III	**Design Considerations of Primary and Secondary Systems:** 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, Secondary voltage levels, Secondary banking, and Secondary networks-Secondary mains Voltage drops and power loss calculations-three phase balanced primary lines, non-three phase primary lines.	**CO1** **CO3** **CO6**
IV	**Distribution Automation** Problems of existing Distribution System, Need for Distribution Automation, Characteristics of Distribution System, Distribution Automation (Objectives, Functions, Benefits), Communication Requirements for DA, Remote Terminal Unit (RTU) ,Network reconfiguration, Improvement in Voltage Profile, Capacitor Placement in Distribution System for Reactive Power Compensation, Algorithm for location of capacitor..	**CO1** **CO4** **CO5** **CO6**
V	**SCADA SYSTEM** Introduction, Block Diagram, Components of SCADA, Functions of SCADA, and SCADA applied to Distribution Automation, Advantages of DA through SCADA, Requirements and Feasibility, DA Integration Mechanisms, Communication Protocols in SCADA Systems.	**CO1** **CO4** **CO6**

Learning Resources
Text Books
1. Dr M K Khedkar and Dr G M Dhole, "A Textbook of Electric Power Distribution automation", University Science Press, 1st Edition 2011.
2. Turan Gonen , "Electric Power Distribution system Engineering", CRC press, 3rd edition, 2014
Reference Books
1. A.S. Pabla, "Electric Power Distribution " Tata Mc Graw-hill Publishing Company, 6 th edition, 2011.
2. Control and Automation of Electrical Power Distribution systems by James North cote and Robert Wilson, CRC press, 1st edition 2006.
Web Links
1. https://www.youtube.com/playlist?list=PLwdnzlV3ogoWKGs1XQdyB0qcgijA1PfYJ 2. https://www.youtube.com/watch?v=DlGSGJISxUI&list=PLLy_2iUCG87DxrqJr3dBhSruMiRHK0rNr