DISTRIBUTION AUTOMATION

Course Code: 13EE2105 **L P C**
4 0 3

Pre requisites: Basic knowledge of electrical power distribution systems.

Course Outcomes:

At the end of the course, the student will be able to

CO 1: Describe the necessity of Distribution Automation, DAS Hardware and DAS Software.

CO 2: Outline DA Capabilities and Management Processes supported by DA.

CO 3: Distinguish between different Communication Systems used in DA

CO 4: Discuss the Technical Benefits of DA and Economic Evaluation, of DA on Distribution System.

CO 5: Explain the Procedure & Methods available for Economic Evaluation DA Alternate Plans.

UNIT-I

DISTRIBUTION AUTOMATION AND THE UTILITY SYSTEM:

Introduction to Distribution Automation (DA), Control System Interfaces, Control and Data Requirements, Centralized (Vs) Decentralized Control, DA System (DAS), DA Hardware, DAS Software.

UNIT-II DISTRIBUTION AUTOMATION FUNCTIONS:

DA Capabilities, Automation System Computer Facilities, Management Processes, Information Management, System Reliability Management, System Efficiency Management, Voltage Management, Load Management, Management Process (Function) Interaction, Operating and Objective Priorities.

UNIT-III COMMUNICATION SYSTEMS FOR DA:

DA Communication Requirements - Communication Reliability, Cost Effectiveness, Data Rate Requirements, Two Way Capability, Ability to communicate during outages and faults, Ease of Operation and Maintenance, Conforming to the Architecture of Data Flow. Communication Systems used in DA - Distribution Line Carrier (Power

line carrier), Ripple Control, Zero Crossing Technique, Telephone, Cable TV, Radio, AM Broadcast, FM SCA, VHF Radio, UHF Radio, Microwave, Satellite, Fibre Optics, Hybrid Communication Systems, Communication Systems used in Field Tests.

UNIT-IV TECHNICAL BENEFITS:

DA Benefit Categories, Capital Deferred Savings, Operation and Maintenance Savings, Interruption Related Savings, Customer-related Savings, Operational Savings, Improved Operation, Function Benefits, Potential Benefits for Functions, Function-shared Benefits, Guidelines for Formulation of Estimating Equations, Parameters Required, Economic Impact Areas, Resources for determining benefits, Integration of System Benefits into Economic Evaluation, Impact of DA on Distribution System.

UNIT-V ECONOMIC EVALUATION METHODS:

Development and Evaluation of Alternate Plans, Select Study Area, Select Study Period, Project Load Growth, Develop Alternatives, Calculate Operation and Maintenance Costs, Evaluate Alternatives. Economic Comparison of Alternate Plans: Classification of Expenses and Capital Expenditures, Comparison of Revenue Requirements of Alternative Plans, Book Life and Continuing Plant Analysis, Year-by-Year Revenue Requirement Analysis, Short Term Analysis, End of Study Adjustment, Break-Even Analysis, Sensitivity Analysis, Major Steps in Utility Economic Evaluation of DA (Flow-Chart) Computational Aids.

Text Book:

1. D. Bassett, K. Clinard, J. Grainger, S. Purucker, and D. Ward, "*Tutorial Course: Distribution Automation*", *IEEE Tutorial Publication 88EH0280-8-PWR*, 1988.

Reference Books:

1) James Northcote-Green, Robert Wilson "*Control and Automation of Electrical Power Distribution Systems*" CRC Press, Taylor and Francis Group, 2007.

2) James A. Momoh "*Electric Power Distribution, Automation, Protection, and Control*", CRC Press, Taylor and Francis Group, '07.

3) Dr.M.K. Khedkar and Dr.G.M.Dhole," *A Textbook of Electric Power Distribution Automation"*, University Science Press (Laxmi Publications Pvt. Ltd.), 2011.