

15AEE82-ELECTRICAL DISTRIBUTION SYSTEMS

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Course Objectives:

This course enables the students to:

- Analyze the distribution end of the power system in which the characteristics of load.
- Understand the classification of distribution system and their characteristics
- Find the location of substations and classification substations.
- Understand the concept of power factor improvement and to analyze the different methods of power factor improvement.
- Know the objectives of distribution system protection and know the operation of protective devices.

UNIT – I LOAD MODELING AND CHARACTERISTICS

Introduction to Distribution Systems, Load Modeling and Characteristics, Coincidence Factor, Contribution Factor, Loss Factor - Relationship between Load Factor and Loss Factor. Classification of Loads (Residential, Commercial, Agricultural and Industrial) and Their Characteristics.

UNIT – II CLASSIFICATION OF DISTRIBUTION SYSTEMS

Classification of Distribution Systems - Comparison of DC Vs AC, Under-Ground Vs Over - Head Distribution Systems- Requirements and Design Features of Distribution Systems Design Considerations of Distribution Feeders: Radial and Loop Types of Primary Feeders, Voltage Levels, Feeder Loading, Basic Design Practice of the Secondary Distribution System. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following Cases: Power Factors Referred to Receiving end Voltage and with respect to Respective Load Voltages.

UNIT – III SUBSTATIONS

Location of Substations: Rating of Distribution Substation, Service Area within Primary Feeders. Benefits Derived Through Optimal Location of Substations. Classification of Substations: Air Insulated Substations - Indoor & Outdoor Substations: Layout Showing the Location of all Substation Equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like Single Bus Bar, Sectionalized Bus Bar, Main and Transfer Bus Bar Double Breaker – One and Half Breaker System with Relevant Diagrams.

UNIT – IV POWER FACTOR IMPROVEMENT

Voltage Drop and Power-Loss Calculations, Derivation for Voltage Drop and Power Loss in Lines, Manual Methods of Solution for Radial Networks, Three Phase Balanced Primary Lines. Causes of Low P.F -Methods of Improving P.F -Phase Advancing and Generation of Reactive KVAR Using Static Capacitors-Most Economical P.F. for Constant KW Load and Constant KVA Type Loads, Numerical Problems. Capacitive Compensation for Power Factor Control - Effect of Shunt Capacitors (Fixed and Switched), Power Factor Correction- Economic Justification - Procedure to Determine the Best Capacitor Location.

G. S. S. S.
BOS-chairman

UNIT – V PROTECTIVE DEVICES

Objectives of Distribution System Protection, Types of Common Faults and Procedure for Fault Calculations. Protective Devices: Principle of Operation of Fuses, Circuit Reclosures, Line Sectionalizers, and Circuit Breakers, Coordination of Protective Devices: General Coordination Procedure.

Course Outcomes:

- Ability to know power system concepts required to engineering problems.
- Design power system components for a specified system and application.
- Ability to discuss various power sources for generation of power Merit/Demerits, Formulate A.C and D.C distribution networks for necessary variable calculation.
- Ability to discuss functions of Substation and understanding different types of protecting devices

TEXT BOOKS:

1. “Electric Power Distribution System, Engineering” – by TuranGonen, McGraw-hill Book Company.
2. Electric Power Distribution – by A.S. Pabla, Tata McGraw-hill Publishing Company, 4th edition, 1997.

REFERENCE BOOK:

1. Electric Power Distribution Automation by Dr. M. K. Khedkar and Dr. G. M. Dhole, University Science Press.
2. Electrical Power Distribution Systems by V. Kamaraju, Right Publishers.
3. Electrical Power Systems for Industrial Plants by Kamalesh Das, JAICO Publishing House.
4. Hand Book of Electric Power Distribution by G. Ramamurthy, 2nd Edition, Universities Press.

