

EE420 ELECTRICAL DISTRIBUTION SYSTEMS (Dept. Elective - VI)

Course Description & Objectives:

To Understand the distribution system planning and automation. To Understand the Design Considerations of Distribution Feeders. To Understand the different types of distribution substations. To Understand design of protection in distribution systems.

Course Outcomes:

- I Able to Explain the distribution system planning and automation.
- I Able to design primary and secondary distribution systems
- I Able to Calculate fault levels in distribution systems
- I Able to Determine capacitor rating for power factor correction

UNIT I - Introduction to Distribution Systems :

General Concepts : Introduction to distribution systems, Load modelling and characteristics. 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.

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.

UNIT II - Substations & Analysis :

Substations : Location of Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

System Analysis : 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.

UNIT III - Distribution System Protection:

Protection : Objectives of distribution system protection, types of common faults and procedure for fault calculations. Protective Devices: Principle of

operation of Fuses, Circuit Reclosures, line sectionalizes, and circuit breakers.

Coordination : Coordination of Protective Devices: General coordination procedure.

UNIT IV - 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.

UNIT V - Voltage Control :

Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

TEXT BOOKS:

1. Turan Gonen, "Electric Power Distribution system Engineering" 2nd ed., CRC Press, 2010.
2. A.S. Pabla, "Electric Power Distribution", 4th ed., Tata Mc Graw-hill Publishing company, 1997.

REFERENCE BOOKS:

1. S. Sivanagaraju "Electric Power Transmission and Distribution", Pearson Education India, First Edition, 2008
2. Anthony J. Pansini "Electrical Distribution Engineering", CRC Press, First edition, 2005.
3. H Lee Willis, "Distributed Power Generation Planning and Evaluation", CRC Press, First edition 2000.