(ELECTIVE – A/II)

4/4 B.Tech. SEVENTH SEMESTER

EE7T6A ELECTRICAL DISTRIBUTION SYSTEMS Credits:3

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Course Objective:

This course discusses the basic fundamentals of the distribution systems planning and automation. It enhances the practical knowledge about electrical distribution systems for the student. It enriches the knowledge about transmission of power from generating stations to distribution substation. It also deals the voltage control.

Course Outcomes:

After completing this course, student is able to

1. Understand different loads and their characteristics and design the distribution feeders.
2. Design substations and their optimal location
3. Know functions of various protective devices and their co-ordination
4. Know control aspects power factor and voltage

Unit I

Distribution Systems Planning And Load Characteristics:

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, load characteristics, definitions, relationship between the load and loss factors, load growth, rate structure.

Unit II

Distribution Transformers, Design Of Sub Transmission Lines and Distribution Substations:

Different types of distribution transformers, regulation and efficiency. sub-transmission systems, distribution substation, sub-station bus schemes, sub-station location, rating of a distribution substation. Substation service area with 'n' primary feeders, comparison of four and six feeder patterns.

Unit III

Design Considerations on Primary and Secondary Systems:

Introduction: 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.

Unit IV

Power Factor Improvement and Voltage Control

Power capacitors, shunt and series capacitors, effect of series and shunt capacitors (fixed and switched), power factor correction, economic justification of capacitors, procedure to determine the best capacitor location. voltage regulators, effect of AVB/AVR, line drop compensation.

Unit V

Distribution system protection.

Basic definitions, over current protection devices-fuses, automatic circuit reclosers, automatic line sectionalizers, automatic circuit breakers. Objectives of distribution system protection, co-ordination of protective devices- fuse to fuse co-ordination, recloser to recloser coordination, fuse to circuit breaker, recloser to fuse co-ordination, recloser to circuit breaker co-ordination.

Learning Resources

Text Books:

1. Electric Power Distribution system Engineering by Turan Gonen, CRC press, 3rd edition, 2014.
2. Electric Power Distribution by A.S.Pabla, Tata Mc Graw-hill Publishing Company,6th edition,2011.

Reference Books:

1. Electrical Power Distribution and Automation by S.Sivanagaraju,V.Sankar,Dhanpat Rai&Co, 2014
2. Electrical Power Distribution Systems by V.Kamaraju, Overseas Publishers,Hyderabad, 3rd edition, 2008.