

**B.Tech III Year I Semester****JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA****19AEE54a- ELECTRICAL DISTRIBUTION SYSTEMS****(Professional Elective-I)**

L	T	P	C
3	0	0	3

**Course Objectives:**

- To know about fundamental aspects of distribution system
- To understand principle of distribution substations
- To know about classification of various loads
- To understand difference between conventional load flow studies of power system and distribution system load flow
- To know about evaluation of voltage droop and power loss calculations
- To know about distribution automation and management system, SCADA

**UNIT – I: DISTRIBUTION SYSTEM FUNDAMENTALS****9 Hrs**

Brief description about electrical power transmission and distribution systems, Different types of distribution sub-transmission systems, Substation bus schemes, Factors effecting the substation location, Factors effecting the primary feeder rating, types of primary feeders, Factors affecting the Primary feeder voltage level, Factors affecting the primary feeder loading.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To understand various distribution system classifications **L1**
- To know more about primary feeders rating, types , factors effecting the primary feeder loading **L2**

**UNIT – II: DISTRIBUTION SYSTEM SUBSTATIONS AND LOADS****9 Hrs**

**Substations:** Rating of a distribution substation for square and hexagonal shaped distribution substation service area, K constant, Radial feeder with uniformly and no uniformly Distributed loading.

**Loads:** Various types of loads, Definitions of various terms related to system loading, detailed description of distribution transformer loading, feeder loading, Modeling of star and delta connected loads, two-phase and single-phase loads, shunt capacitors.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about uniformly and non-uniform distributed loading in distribution substations **L1**
- To understand about modeling of various types of loads and shunt capacitor **L2**

**UNIT – III: DISTRIBUTION SYSTEM LOAD FLOW****9 Hrs**

Exact line segment model, Modified line model, approximate line segment model, Step-Voltage Regulators, Line drop compensator, Forward/Backward sweep distribution load flow algorithm – Numerical problems

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about various distribution line models **L1**
- To evaluate distribution load flow pattern using sweeping algorithms **L3**

**UNIT – IV: VOLTAGE DROP AND POWER LOSS CALCULATION****9 Hrs**

Analysis of non-three phase primary lines, concepts of four-wire multi-grounded common- neutral distribution system, Percent power loss calculation, Distribution feeder cost calculation methods, Capacitor installation types, types of three-phase capacitor bank connections, Economic justification for capacitors – Numerical problems

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about analysis of various distribution system configurations L1
- To know how to calculate percent power loss calculations L2

**UNIT – V: DISTRIBUTION AUTOMATION**

**9 Hrs**

Distribution automation, distribution management systems, distribution automation system functions, Basic SCADA system, outage management, decision support applications, substation automation, control feeder automation, database structures and interfaces.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about basic concept of automation of distribution systems L1
- To know about various distribution management /automation systems and functions L2

**Text Books:**

1. Distribution System Modelling and Analysis, William H. Kersting, CRC Press, Newyork, 2002.
2. Electric Power Distribution System Engineering, TuranGonen, McGraw-Hill Inc., New Delhi, 1986.

**Reference Books:**

1. Control and automation of electrical power distribution systems, James Northcote- Green and Robert Wilson, CRC Press (Taylor & Francis), New York, 2007.

**Course Outcomes:**

At the end of this Course the student will be able to

- To understand basics of distribution systems and substations L1
- To understand about modelling of various loads L2
- To perform distribution load flow solutions L3
- To evaluate power loss and feeder cost L4
- To know the principles of SCADA, Automation distribution system and management L5

