

**R13**

Code No: 117CT

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, April/March - 2018

**ELECTRICAL DISTRIBUTION SYSTEMS**

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART-A**

(25 Marks)

- 1.a) Define the coincidence factor and give its significance. [2]
- b) How the loads are classified? What are its various types? [3]
- c) List the design and operation aspects affected by the primary feeder voltage level. [2]
- d) What are the merits and demerits of loop type primary feeders? [3]
- e) What is the significance of voltage drop calculations in distribution systems? [2]
- f) In terms of resistance and reactance of the circuit, derive the equation for load power factor for which voltage drop is maximum? [3]
- g) What are the types of common faults that occur in a distribution system? [2]
- h) What is the principle of operation of fuse? [3]
- i) What are the various methods adopted for voltage control. [2]
- j) What is the need of power factor control in distribution systems? [3]

**PART-B**

(50 Marks)

- 2.a) Explain the typical features of distribution systems.
  - b) A substation is to supply three regions of loads whose maximum values are 6000 kW, 10000 kW and 5000 kW. The diversity factor of the load at the substation is 1.5 and the average annual load factor is 0.65. Calculate the peak demand on the substation and annual energy supplied from the substation. [5+5]
- OR**
- 3.a) Explain load modelling and its characteristics.
  - b) Determine the number of units supplied annually, diversity factor and the demand factor of a substation which supplies the loads as follows: 20000 kW, 10000 kW, 7500 kW, 5000 kW and 500 kW. The substation has a maximum demand of 21000 kW and annual load factor is 55%. [5+5]
- 4.a) Draw the single line diagram of radial type primary feeder and mention the factors that influence the selection of primary feeder.
  - b) How do you choose primary feeder arrangement from the reliability point of view? Describe the arrangement with suitable diagram. [5+5]

**OR**

5.a) Explain the basic design practice of the secondary distribution system with neat diagram.

b) How do you determine the rating of the distribution sub-station and derive the voltage drop for square area is served by four primary feeders. [5+5]

6.a) Derive the expressions for voltage drop and power loss of uniformly distributed load of three phase feeder.

b) Prove that the power loss due to load currents in the conductors of the single-phase two-wire ungrounded lateral with full capacity neutral is 6 times larger than the one in the equivalent three phase 4-wire lateral. [5+5]

OR

7.a) Explain the differences between a 3-phase balanced and non-3-phase primary line.

b) A single-phase feeder circuit has total impedance  $1+j3$  ohms, receiving end voltage is 2.4 kV and current is  $50\angle-30^\circ$  A. Determine (i) p.f. of load. (ii) Load p.f. for which the drop is maximum (iii) Load p.f. for which impedance angle is maximum. [5+5]

8.a) What are the main objectives of distribution system protection? Discuss.

b) What types of protective devices are used to reduce various types of faults? Explain with a typical radial feeder protection diagram. [5+5]

OR

9.a) What are the types of co-ordination procedure? Explain fuse to circuit breaker co-ordination.

b) Describe in detail about the operation of line sectionalizer. [5+5]

10.a) Describe the operation of AVR with neat diagram.

b) Justify the importance of voltage control and p.f. Correction. [5+5]

OR

11.a) Explain about line drop compensation.

b) Explain how series capacitors control the voltage in the distribution systems. [4+6]