

R13

Code No: 117CT

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, January/February - 2023

ELECTRICAL DISTRIBUTION SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

- 1.a) What is meant by distribution system? [2]
- b) Define the Coincidence factor and contribution factor. [3]
- c) What is need of distribution substation? [2]
- d) What are the merits of loop type of primary feeder? [3]
- e) What is the significance of power loss calculation for distribution systems? [2]
- f) What are the differences between a 3-phase balanced and non 3-phase primary line. [3]
- g) What are the types of common faults occur in power system? [2]
- h) What is the principle of operation of Fuse? [3]
- i) What is the need of voltage control? [2]
- j) What are the merits for p.f improvement? [3]

PART – B

(50 Marks)

- 2.a) Derive the relationship between the load and loss factors with different conditions.
- b) The annual input to a sub-transmission system is 50,000 MW. On the peak-load day of the year, the peak is 25 MW and the energy input that day is 200 MWh. Find the load factor for the year and for the peak load day. [5+5]

OR

- 3.a) What are the classifications of loads? Explain its characteristics.
- b) A customer connected loads are 15 lamps of 60W each and two heaters of 1,500W each. His maximum demand is 3kW. On the average he uses 10 lamps 7 hours a day and each heater for 5 hours a day. Find his (i) average load, (ii) monthly energy consumption and (iii) load factor. [5+5]

- 4.a) Draw and explain the single line diagram of radial type primary feeder.
- b) What are the various factors that influence the voltage levels in the design and operation of the distribution system? [5+5]

OR

- 5.a) What are the factors to be consider an ideal location for distribution sub-station?
- b) Derive the expression for percentage voltage drop of sub-station service area with 'n' primary feeders. [5+5]

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- 6.a) In terms of resistance and reactance of the circuit, derive the equation for load power factor for which voltage drop is maximum.
- b) A 3ϕ , 3-wire star connection having the loads $(1+j2)\Omega$, $(3+j4)\Omega$ and $(5+j3)\Omega$ and the supply voltage is 440V. Determine line currents, line voltages, phase currents and phase voltages. [5+5]

OR

- 7.a) Obtain the expression for voltage drop and power loss per phase of a uniformly distributed load. Give the assumption made, if any.
- b) A single-phase feeder circuit has total impedance $(2+j5)$ ohms, receiving end voltage is 3.6 kV and current is $50\angle-30^\circ$ A. Calculate (i) p.f. of load, (ii) Load p.f. for which the drop is maximum and (iii) Load p.f. for which impedance angle is maximum. [5+5]

- 8.a) What are the objectives of a distribution protection? Explain.
- b) What are the different protective devices used in the distribution system? Give comparison between them. [4+6]

OR

- 9.a) Describe the general coordination procedure of protective devices.
- b) What are the various types of co-ordinate operation of protective devices? Discuss the fuse to circuit breaker coordination. [5+5]

- 10.a) Explain the procedure to determine the best capacitor location in distribution systems
- b) A 3-phase, 50-Hz, 3.3 kV motor develops 500 h.p. (447.6 kW), the power factor being 0.75 lagging and the efficiency 0.93. A bank of capacitors is connected in delta across the supply terminals and power factor raised to 0.95 lagging. Each of the capacitance units is built of five similar 600- V capacitors. Determine capacitance of each capacitor. [5+5]

OR

- 11.a) Explain different types of capacitors.
- b) With the aid of suitable diagram, explain how an AVB can control voltage? [5+5]

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