

Code No: RT41029

R13

Set No. 1

IV B.Tech I Semester Regular Examinations, November - 2016

ELECTRICAL DISTRIBUTION SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Write the significance of load factor? [3]
- b) Define feeder, distributor and service mains. Also show them with simple pictorial representation. [4]
- c) What is meant by voltage drop and voltage regulation? Derive the relationship between them. [4]
- d) What is meant by fault? Classify types fault occurred in distribution system. [3]
- e) What are the causes of low power factor? [4]
- f) Explain the effect of series capacitors on control of voltage. [4]

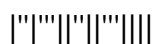
PART-B (3x16 = 48 Marks)

2. a) Discuss about the load modeling. [7]
 - b) The daily demands of three consumers are given below:

Time	Consumer1	Consumer2	Consumer3
12midnight to 8am	no load	200w	no load
8am to 2 pm	600w	no load	200w
2 pm to 4 pm	200w	1000w	1200w
4 pm to 10 pm	800w	no load	no load
10 pm to 12 midnight	no load	200w	200w

Plot the load curve and find

 - i) maximum demand of individual consumer
 - ii) load factor of individual consumer
 - iii) diversity factor and
 - iv) load factor of the station[9]
3. a) List the design and operational aspects that affects the primary feeder voltage level. [8]
 - b) How is the rating of distribution substation decided? Explain. [8]



4. a) Discuss importance of voltage drop and power loss calculations in distribution system. [8]
- b) A 2 wire DC distributor AB, 600m long is loaded as under distance from

Distance (mts)	150	300	350	450
Load (Amps)	100	200	250	300

The feeding point A is maintained at 440V and that of B at 430V. If each conductor has a resistance of 0.01 per 100m, calculate:

- i) The currents supplied from A to B ii) The power dispatched in the distributor. [8]
5. a) Discuss the co-ordination procedure between fuse and a circuit breaker. [8]
- b) Discuss about the objectives of distribution system protection. [8]
6. a) Write down the procedure to determine the best capacitor location. [8]
- b) A 3 phase overhead line has resistance and reactance per phase of 5 ohm and 20 ohm respectively. The load at the receiving end is 25MW at 33 kV and a power factor of 0.8 lagging. Find the capacity of the synchronous condenser required for this load condition if it is connected at the receiving end and the line voltages at both ends are maintained at 33kV. [8]
7. a) How an AVB can control voltage? With the aid of suitable diagram explain its function. [8]
- b) Discuss about the line drop compensation with the help of neat diagram. [8]

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Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) The average load factor of a substation is 0.65. Determine the average loss factor at i) Urban Area ii) Rural Area. [4]
- b) Classify different types of primary feeders and write their voltage levels. [3]
- c) Compare 2 wire and 3 wire DC distribution networks. [4]
- d) Discuss about the advantages and disadvantages of fuses. [3]
- e) Explain why the power factor of distribution system to be controlled or compensated. [4]
- f) What is meant by voltage control? List out various types of equipment used for voltage control? [4]

PART-B (3x16 = 48 Marks)

2. Classify the types of loads and draw their characteristics in detail. [16]
3. a) Classify different types of primary feeders and give their merits and demerits. [8]
- b) Enumerate the various factors to be considered for ideal location of substation. [8]
4. a) Derive the voltage drop and power loss of non - three phase distribution systems and compare with the three phase balanced system. [8]
- b) A 2 wire dc distributor AB is 300m long. The end A is fed at 205 V and end B at 200V. The distributor is uniformly loaded at 0.15A/meter length and has concentrated loads of 50A, 60A and 40A at point distant 75, 175, 225m respectively from the end A. The resistance of each conductor is 0.14ohm per kilometer. Calculate (i) the point of minimum potential (ii) currents fed at ends A & B [8]



5. a) Briefly discuss the general coordination procedure. [8]
b) List out types protective devices used and explain principle of operation of any two of them. [8]
6. a) Compare and explain the role of shunt and series capacitors for power factor correction. [8]
b) A 3- phase 500 hp, 50 Hz 11 kV star connected induction motor has a full load efficiency of 85% at a lagging p.f of 0.75 and connected to a feeder. If it is desired to correct it to a p.f of 0.9 lagging load. Determine the following
i) The size of the capacitor bank in KVAR.
ii) The capacitance of each unit if the capacitors are connected in star as well as delta. [8]
7. Briefly write the various methods adapted for voltage control and write the merits and demerits of it. [16]



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Set No. 3

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Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

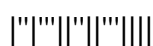
Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Define hot reserve and spinning power. [3]
- b) What is a substation? How substations are classified? Mention any two layouts of laying out a substation? [4]
- c) Discuss about the types of DC distribution. [4]
- d) Discuss about the difference between circuit reclosures and circuit breakers. [3]
- e) What is meant by power capacitor? Mention the types of power capacitors. [4]
- f) Explain about the line drop compensation in distribution systems. [4]

PART-B (3x16 = 48 Marks)

2. a) What is meant by load factor and loss factor? Obtain the relation between load factor and loss factor. [8]
- b) Assume that the annual peak load of a primary feeder is 2000 KW, at which the power is 80 KW per three phases. Assuming an annual loss factor of 0.15. Determine i) the total annual energy loss due to the copper losses of the feeder
ii) The average annual power loss [8]
3. a) How do you analyze a substation service area with 'n' primary feeders? [8]
- b) List the design and operational aspects that affects the primary feeder voltage level. [8]
4. Show that power loss due to load currents of the two phase, 3 wire lateral with full capacity neutral is exactly equal to 2.25 times larger than the one in which equivalent three phase lateral is used. Also prove that $VD_{pu, 2\phi} = 2.1 \times VD_{pu, 3\phi}$ for the above system. [16]



5. a) Explain the principle of operation of i) line sectionalizers ii) circuit breaker. [8]
b) Discuss in detail about the Residual current circuit breaker. [8]
6. a) Explain in detail about the effect of shunt compensation on distribution system [8]
b) A 440 V, 50 cycles three phase line delivers 250 KW at 0.7 p.f (lag). It is desire to bring the line p.f to unity by installing shunt capacitors. Calculate the capacitance if they are: i) star connected ii) Delta connected. [8]
7. What is meant by voltage control? List out the equipment that is used for voltage control. How an AVR can control voltage? With the aid of suitable diagram explain its function. [16]

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Answer ALL sub questions from Part-A

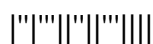
Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) Define coincidence factor and write its significance on distribution system. [3]
- b) Mention any two comparisons between indoor and outdoor substations. [4]
- c) Write down the importance of voltage control and explain how this effects on power loss of distribution networks. [4]
- d) What is meant by coordination of protective devices used in protection of distribution system? [3]
- e) Explain about the significance of power factor improvement. Also mention the methods of power factor improvement. [4]
- f) Discuss about the AVB method of voltage control. [4]

PART-B (3x16 = 48 Marks)

2. a) What is meant by load modeling and explain their characteristics. [8]
- b) A 120 MW substation delivers 120 MW for 3 hours 60 MW for 8 hours and shut down for rest of each day. It is also shut down for the maintenance for 15 days each year. Calculate its annual load and annual loss factor. [8]
3. a) Enumerate the various factors to be considered for ideal location of substation. [8]
- b) Discuss briefly the design considerations in distribution system. [8]
4. a) Derive the relationship for voltage drop and power loss for uniformly radial type distribution load. [8]
- b) Discuss about the manual method of solution for radial networks. [8]



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5. a) List out the types of common faults occurred on distribution system and explain the procedure for fault calculations. [8]
b) Explain in detail about fuse- fuse coordination. [8]
6. a) Explain the economic justification of power factor correction. [8]
b) A single-phase motor connected to a 230V, 50 Hz supply takes 25 A at p.f. of 0.7 lag. A capacitor is shunted across the motor terminals to improve the p.f to 0.9 lag. Determine the capacitance of the capacitor to be used. [8]
7. Describe different types of equipment for voltage control with neat diagrams. [16]