Code No: **R1642023** **R16** **Set No. 1**

IV B.Tech II Semester Regular Examinations, September - 2020

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 FOUR questions from Part-B

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PART–A *(14 Marks)*

1. a) What is loss factor? [2]
   b) What are the various factors that are to be considered in selecting primary feeder rating? [3]
   c) What is the importance of % voltage drop in feeder lines? [3]
   d) How is the coordination between main fuse and sectional fuse achieved? [2]
   e) What is series capacitor compensation in feeder lines? [2]
   f) What are the different methods for voltage control? [2]

PART–B *(4x14 = 56 Marks)*

2. a) Explain the classification of loads. [7]
   b) A substation is to supply three regions of loads whose maximum values are 5000 kW,7500 kW and 5000 kW. The diversity factor of the load at the substation is 1.4 and the average annual load factor is 0.45. Find the peak demand on the substation and annual energy supplied from the substation. [7]

3. a) What is a distribution system? How is it subdivided to cater the needs of the customers? [7]
   b) Discuss how an ideal substation with feeders can be arranged? How is it analyzed for % voltage drop? [7]

4. a) Describe the differences between a 3-phase balanced and non 3-phase primary line. [7]
   b) A 3-ϕ radial feeder is receiving end voltage 12.6 kV, a total impedance of (5.2 +j12) ohms/phase, and a load of 6 MW with a lagging power factor of 0.90. Determine the sending end phase and line voltages and the load angle. [7]

5. a) Explain the principle of operation of circuit reclosers with neat diagram. [7]
   b) Describe the residual current circuit breaker with diagram. [7]

6. a) How does p.f improvement help in reduction in % voltage drop and hence voltage regulation of distribution transformer. [7]
   b) A star connected 450h.p (metric), 2500V, and 60Hz motor works at a p.f of 0.8 lag. A bank of mesh-connected condensers is used to raise the p.f to 0.9 lag. Determine the capacitance of each unit and total number of units required, if each unit is rated 500V, 60 Hz. The motor efficiency is 82%. [7]

7. a) Explain the basic function of booster transformer? How does it increase the line voltage? [7]
   b) How an AVB can control voltage? With the aid of suitable diagram explain its function. [7]

Code No: **R1642023** **R16** **Set No. 2**

IV B.Tech II Semester Regular Examinations, September - 2020

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 FOUR questions from Part-B

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PART–A *(14 Marks)*

1. a) How is loss factor related to load factor? [2]
   b) What are the basic differences between radial and loop types of primary distribution feeders? [3]
   c) What is the importance of % power loss in feeder lines? [2]
   d) What are the different protective devices used in the distribution system? [3]
   e) How does p.f improvement help in reduction in % voltage drop? [2]
   f) What is a line drop compensator? [2]

PART–B *(4x14 = 56 Marks)*

2. a) Explain how is load modeling done in distribution systems. [7]
   b) What is distribution system? Give and explain classification of load, with their characteristics. [7]

3. a) What are the various factors that are to be considered in selecting primary feeder rating? Draw typical primary distribution feeder. [7]
   b) How do you analyze the distribution substation area as square and hexagonal? [7]

4. a) What is the importance of % voltage drop in feeder lines? What are the factors that affect the % voltage drop? [7]
   b) Derive the expression for the total series voltage drop and total copper loss per phase of a uniformly distributed load. Give the assumption made, if any. [7]

5. a) What are the common faults in a single phase, 2-wire and 3-wire system? Explain how fault current is computed with proper single line diagram? [7]
   b) Explain the coordination procedure between a fuse and a circuit breaker. [7]

6. a) What is series capacitor compensation in feeder lines? How does it improve the regulation of the lines? [7]
   b) A 3-phase, 50 Hz, 30 km transmission line supplies a load of 10MW at power factor 0.8 lagging to the receiving end where the voltage is maintained constant at 12 kV. The line resistance and inductance are 0.02 ohm and 0.75 mH per phase per km respectively. A capacitor is connected across the load to raise the power factor to 0.9 lagging. Determine (i) the value of the capacitance per phase and (ii) voltage regulation. [7]

7. What are the different methods for voltage control? Discuss them with neat diagrams [14]

Code No: **R1642023** **R16** **Set No. 3**

IV B.Tech II Semester Regular Examinations, September - 2020

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 FOUR questions from Part-B

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PART–A *(14 Marks)*

1. a) What is the significance of loss factor? [2]
   b) What is a distribution system? [2]
   c) Why is voltage drop consideration important in distribution system? [3]
   d) What are the different types of faults that can occur on distribution system? [2]
   e) What is the need for p.f improvement in distribution systems? [3]
   f) What is the need of voltage control in distribution systems? [2]

PART–B *(4x14 = 56 Marks)*

2. a) Describe the characteristics of different loads. [7]
   b) A feeder supplies 2.5MW to an area. The total losses at peak loss are 120 kW and units supplied to that are during a year are 5.5×10^6. Determine the loss factor and average power loss. [7]

3. a) Draw and explain the basic design practice of the secondary distribution system. [7]
   b) What is the advantage of square type distributor and service area and how is the substation capacity arrived at? [7]

4. a) What is the importance of % power loss in feeder lines? What are the factors that affect the % power loss? [7]
   b) Derive the expression for voltage drop and power loss for non-uniformly radial type distribution load. [7]

5. a) Obtain the sequence impedance equivalent circuit for L-L and L-G faults? Compare the magnitude of fault current in both cases. [7]
   b) Explain the principle of a sectionalizer. How is it coordinated with a fuse? [7]

6. a) What are the different locations of capacitors for p.f improvement? Discuss their relative merits and demerits. [7]
   b) A 50 kW induction motor has power factor 0.9 and efficiency 0.8 at full1oad, power factor 0.75 and efficiency 0.6 at half-load. At no-load, the current is 25% of the full-load current and power factor 0.25. Capacitors are supplied to make the line power factor 0.9 at half-load. With these capacitors in circuit, determine the line power factor at (i) full load and (ii) no-load. [7]

7. a) What is a line drop compensator? How is it used along with tap changer of transformer for voltage control? [7]
   b) Describe how series capacitors control the voltage in the distribution systems with necessary diagrams. [7]

Code No: **R1642023** **R16** **Set No. 4**

IV B.Tech II Semester Regular Examinations, September - 2020

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 FOUR questions from Part-B
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PART–A *(14 Marks)*

1. a) Define the coincidence factor and give its significance. [3]
   b) What is the need of substation? [2]
   c) How is power loss in a distributor system estimated approximately? [2]
   d) What are the objectives of a distribution protection? [3]
   e) Write a short note on Power factor correction. [2]
   f) Why you need to maintain good voltage profile in distribution systems? [2]

PART–B *(4x14 = 56 Marks)*

2. a) Obtain the relationship between the load factor and loss factor with different cases. [7]
   b) The load curves of two different categories of load and system peak load are as follows. Find the diversity factor and coincidence factor for the system
   Maximum load of industrial load = 2000 kW
   Maximum load of residence load = 2500 kW
   System maximum load = 3200 kW [7]

3. a) Compare the % voltage drop of the feeders with square type service area and hexagonal type service area. [7]
   b) How do you choose the primary feeder arrangement from reliability point of view? Discuss the arrangement with suitable diagrams. [7]

4. a) Why is voltage drop consideration important in distribution system? How is it computed when line parameters and load density of an area are given [7]
   b) Illustrate the computation of the voltage drop of a balanced three-phase feeder, supplied at one end, in terms of the load and the line parameters. [7]

5. a) What are the different types of faults that can occur on distribution system? Explain them with line diagram. [7]
   b) What are the different protective devices used in the distribution? Give comparison between them. [7]

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6. a) Explain how reduction in line current and hence power losses are obtained with p.f improvement. [7]
   b) A single phase system supplies the following loads:
      i) Light load of 50 kW at unity power factor
      ii) Induction motor load of 120 kW at p.f. 0.8 lagging
      iii) Synchronous motor load of 6 kW at p.f 0.85 leading
      iv) Other miscellaneous loads of 20 kW at p.f. 0.7 lagging.

      Calculate the total kW and kVA delivered by the system and p.f at which it works. [7]

7. a) Describe the operation of AVR with neat diagram. [5]
   b) A 3ϕ feeder having a resistance of 3Ω and reactance of 10 Ω supplies a load of 2 MW at 0.85 p.f. lag. The receiving end voltage is maintained at 11 kV by means of static condenser drawing 2.1 MVAr from the line. Calculate the sending end voltage and power factor. What is the regulation and efficiency of the feeder? [9]