Code No: **RT41029** **R13** **Set No. 1**

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

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
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PART–A *(22 Marks)*

1. a) Define the demand factor and connected load. [3]
   b) How do you fix the rating of a distribution sub-station? [4]
   c) Why is voltage drop consideration important in distribution systems? [3]
   d) What is the need for coordination of protective devices? [4]
   e) What are the demerits for low p.f in the distribution system? [4]
   f) What is a line drop compensator? [4]

PART–B *(3x16 = 48 Marks)*

2. a) What is loss factor? How is it related to load factor. Discuss its significance? [8]
   b) Assume that a load of 100 kW is connected at the Riverside substation. The 15-min weekly maximum demand is given by 75 kW, and the weekly energy consumption is 4200 kWh. Assuming a week is 7 days; find the demand factor and the 15-min weekly load factor of the substation. [8]

3. a) Compare the % voltage drop of the feeders with square type service area and hexagonal type service area. [8]
   b) Draw a line diagram of a radial type primary feeder system and mention the factors that influence the selection of primary feeders. [8]

4. a) What are the power losses in distribution system? How is it estimated approximately? [6]
   b) In a three phase, 4-wire system if (5+j3) Ω, (5+j2) Ω and (8+j6) Ω are the loads connected and the supply voltage is 400V. Determine the line and phase currents as well as the current passing through neutral wire. [10]

5. What are the different types of faults that can occur in a distribution system? Explain them with line diagram. [16]

6. a) How in the capacitor bank ratings obtained when the load p.f is to be improved from $Cos\Phi_1$ to $Cos\Phi_2$. [6]
   b) A 3-phase, 50 Hz, 20 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 33 kV. The line resistance and inductance are 0.03 ohm and 0.9 mH per phase per km respectively. A capacitor is connected across the load to raise the power factor to 0.95 lagging. Calculate (i) the value of the capacitance per phase and (ii) voltage regulation. [10]

7. Explain in detail the numerous ways to improve the distribution system's overall voltage regulation. [16]

Code No: **RT41029** **R13** **Set No. 2**

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

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

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PART–A *(22 Marks)*

1. a) What are the factors affect the distribution system planning in the near future? [4]
   b) How do you select an ideal location for sub-station? [4]
   c) What are the manual methods of solution for radial networks? [4]
   d) What are the different protective devices used in the distribution system? [4]
   e) What is the justification for p.f improvement? [3]
   f) What are the different methods of voltage control? [3]

PART–B *(3x16 = 48 Marks)*

2. a) Describe the classification of loads with their characteristics. [8]
   b) The annual input to a sub-transmission system is 87,000 MW. On the peak-load day of the year, the peak is 25 MW and the energy input that day is 300 MWh. Find the load factor for the year and for the peak load day. [8]

3. a) What are the types of primary feeders and discuss the merits and demerits of them? [8]
   b) Explain the fix the rating of a distribution sub-station. [8]

4. a) Why is voltage drop consideration important in distribution systems? How is it computed when line parameters and load density of an area are given? [8]
   b) Show that the power loss due to load current in the conductors of the two-phase three wire lateral with multi grounded neutral is approximately equal to 3.625 times larger than the one in the equivalent three phase lateral. [8]

5. a) Describe the procedure for fault current calculations in a distribution system with an example. [8]
   b) Describe the principle of a sectionalizer. How is it coordinated with a fuse with neat diagram? [8]

6. a) Explain the need for p.f improvement in distribution systems. [6]
   b) A 50 kW induction motor has power factor 0.9 and efficiency 0.85 at full1oad, power factor 0.75 and efficiency 0.65 at half-load. At no-load, the current is 25% of the full-load current and power factor 0.3. Capacitors are supplied to make the line power factor 0.9 at half-load. With these capacitors in circuit, find the line power factor at (i) full load and (ii) no-load. [10]

7. a) Explain the function of booster transformer? How does it increase the line voltage in distribution system? [8]
   b) Describe the effect of series capacitor on voltage control for distribution systems with necessary diagrams. [8]

Code No: **RT41029** **R13** **Set No. 3**

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

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
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PART–A *(22 Marks)*

1. a) Define the coincident demand and contribution factor. [3]
   b) How do you choose primary feeder arrangement from the reliability point of view? [4]
   c) What are the significances for power loss calculations? [4]
   d) What are the objectives of a distribution protection? [4]
   e) How does p.f improvement help in reduction in % voltage drop? [4]
   f) What is the basic function of booster transformer? [3]

PART–B *(3x16 = 48 Marks)*

2. a) Describe the commercial and agricultural loads as well as their respective characteristics. [8]
   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. [8]

3. a) What are the basic differences between radial and loop types of primary distribution feeders? [8]
   b) Explain the methodology for optimal location of substations and indicate the benefits derived through this approach. [8]

4. a) What are the advantages for adopting 3-phase, 4-wire distribution for LV suppliers and 3-phase, 3-wire for HV distribution? [6]
   b) Obtain 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. [10]

5. a) What are the different protective devices used in the distribution system. Give comparison between them [8]
   b) Obtain the sequence impedance equivalent circuit for LL and LG fault. Compare the magnitude of fault current in both cases. [8]

6. a) Explain how reductions in line current and hence power losses are obtained with p.f improvement. [6]
   b) A single phase system supplies the following loads
      (i) Light load of 40 kW at unity power factor
      (ii) Induction motor load of 130 kW at p.f. 0.8 lagging
      (iii) Synchronous motor load of 80 kW at p.f 0.85 leading
      (iv) Other miscellaneous loads of 30 kW at p.f. 0.7 lagging.
      Determine the total kW and kVA delivered by the system and p.f at which it works. [10]

7. a) Explain the effect of series capacitor on voltage control with necessary diagrams. [8]
   b) What is a line drop compensator? How is it used along with tap changer of transformer for voltage control? [8]

Code No: **RT41029** **R13** **Set No. 4**

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

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) What are the classification of loads? [3]
   b) What are the types of basic distribution system? [3]
   c) What are the significances for voltage drop calculations? [4]
   d) What are the different types of faults that can occur on distribution network? [4]
   e) What are the different locations for p.f improvement capacitors? [4]
   f) What is the effect of series capacitor on voltage control? [4]

PART–B *(3x16 = 48 Marks)*

2. a) Define and explain the following terms with suitable examples:
   (i) load factor, (ii) loss factor , (iii) Contribution factor and (iv) diversity factor [8]
   b) A substation supplied the following loads: 175MW, 100MW, 75MW, 50MW and 10 MW. The station has a maximum demand of 250MW. Determine the following, if annual load factor of the station is 45%
   (i) Number of units supplied annually (ii) Diversity factor
   (iii) Demand factor. [8]

3. a) What are the various factors that are to be considered in selecting primary feeder rating? Give a neat sketch of typical primary distribution feeder. [8]
   b) Derive the percentage voltage drop of a substation service area with ‘n’ number of primary feeders. [8]

4. a) Obtain the expression for voltage drop and power loss for uniformly radial type distribution load. [8]
   b) If $Z_1 = 15 \angle -30^0$, $Z_2 = 20 \angle 80^0$ and $Z_3 = 20 \angle +90^0$ are the impedances connected in the form of delta and the supply voltage is 400V. Assume the RBY sequence and so find the phase currents, line currents and the total power absorbed. [8]

5. a) How is the coordination between main fuse and sectional fuse achieved with neat diagram? [8]
   b) What are the common faults in a single phase, 2-wire and 3-wire system? Explain how fault current is computed with single line diagram. [8]

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6. a) How is economical p.f arrived at for a given distribution system with different loads. [8]
   b) Give the best values of capacitor banks to improve the load p.f. from 0.75 to 0.9 from the following data: Load 800 kVA, operating voltage 3.3 kV (i) Star connection and (ii) Delta connection. [8]

7. a) Explain the necessity of voltage control and p.f. correction in distribution systems. [8]
   b) What are the numerous ways to improve the distribution system's overall voltage regulation? How is line drop compensation made? [8]