Code No: **R194202A** **R19** **Set No. 1**

**IV B.Tech II Semester Regular Examinations, April – 2023**

# ELECTRICAL DISTRIBUTION SYSTEMS

**(Electrical and Electronics Engineering)**

**Time: 3 hours** **Max. Marks: 75**

***Answer any FIVE Questions***
***ONE Question from Each unit***
***All Questions Carry Equal Marks***

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## UNIT I

1 a) What are the various distribution losses? Discuss them. [9]

b) A feeder supplies 2.8MW to an area. The total losses at peak load are 107kW and units supplied to that area during an year are 6.87 million. Determine the loss factor? [6]

(OR)

2 a) Derive the relationship between the load factor and loss factor. [7]

b) Describe the characteristics of various types of loads. [8]

## UNIT II

3 a) List out and describe the factors to be considered for locating the distribution substation? [7]

b) Describe the design considerations of distribution feeders with specifications? [8]

(OR)

4 a) What are the methods derived for optimum location of distribution substation? Explain. [9]

b) Elaborate various factors which will decide the voltage levels of the distribution feeder? [6]

## UNIT III

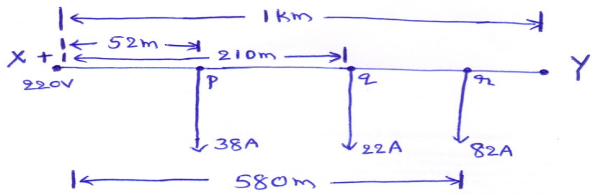
5 a) Derive the voltage drop expression of the radial feeder with uniform by distributed loading condition? [7]

b) Compare three phase balanced system with single phase 2 wire un grounded system with relevant relations? [8]

(OR)

6 a) Explain in detail about the process for estimation of power loss of a radial feeder? [7]

b) The feeder shown in following figure is connected to 220V DC supply and has the loading as shown. The resistance of the line is 0.18 ohms per kilo meter. Find the voltage drop, voltage at the far end and the power loss? [8]




**UNIT IV**

7 a) Discuss in detail about the operation of circuit reclosures and write its advantages and disadvantages? [7]

b) Describe the general coordinated operation of protective devices? [8]

(OR)

8 a) Compare the operation of line sectionalizers with the operation of circuit breaker by drawing diagrams? [7]

b) Elaborate the role of SCADA in the distribution automation? [8]

**UNIT V**

9 a) List out and explain different types of power capacitors used for the load compensation? [7]

b) Elaborate the objectives and outcomes of voltage control in the distribution networks? [8]

(OR)

10 a) Draw the phasor diagram and explain the operation of load connected with parallel capacitor? [7]

b) An induction motor takes 57kW at 0.66 power factor lagging from a 420V, 3 phase supply. It is needed to improve the power factor to 0.98. Find the kVAr of the capacitor bank needed? [8]

Code No: **R194202A** **R19** **Set No. 2**

**IV B.Tech II Semester Regular Examinations, April – 2023**

# ELECTRICAL DISTRIBUTION SYSTEMS

**(Electrical and Electronics Engineering)**

**Time: 3 hours** **Max. Marks: 75**

***Answer any FIVE Questions***
***ONE Question from Each unit***
***All Questions Carry Equal Marks***
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## UNIT I

1 a) Define the following and give its significance
i) coincidence factor ii) contribution factor and iii) loss factor [9]

b) Describe the load modelling of constant current and constant impedance loads? [6]

(OR)

2 a) Draw the characteristics and compare domestic and commercial loads? [7]

b) Discuss the methods that are adopted for reduction of distribution system losses. [8]

## UNIT II

3 a) Derive the expression for rating of distribution substation for the square shaped service area? [7]

b) What is meant by a distribution feeder? Explain about the loop type distribution feeder with diagram? [8]

(OR)

4 a) Explain different approaches for identifying the best location of distribution substation? [7]

b) Compare the radial and loop type distribution feeders with circuit diagrams? [8]

## UNIT III

5 a) Derive the total power loss expression of the radial feeder with uniform loading condition? [7]

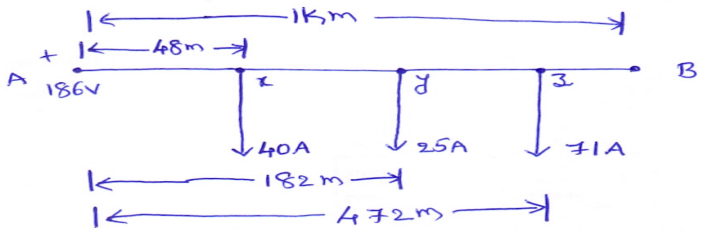
b) Compare the three phase balanced system with single phase 2 wire uni grounded system with relevant relations? [8]

(OR)

Code No: **R194202A** **R19** **Set No. 2**

6 a) Explain in detail about the process for estimation of voltage drop of a radial feeder? [7]

b) The feeder shown in following figure is connected to 186V DC supply and has the loading as shown. The resistance of the line is 0.48 ohms per kilo meter. Find the voltage drop, voltage at the far end and the power loss? [8]




**UNIT IV**

7 a) Draw the network diagram and explain the protection scheme of parallel feeders? [7]

b) By drawing neat diagram, explain the operating coils of residual current circuit breaker? [8]

(OR)

8 a) Describe the operation of modulated case circuit breaker by using neat diagram? [7]

b) Explain the coordinated operation of fuse and a circuit breaker with characteristics. [8]

**UNIT V**

9 a) Compare the effects of operation of fixed and switched capacitors to get the load compensation? [6]

b) Describe the procedure to determine the best capacitor location. [9]

(OR)

10 a) What are the advantages and disadvantages of series capacitor compensation? [6]

b) A 56H.P, 50Hz, 440V delta connected induction motor has full load efficiency of 0.81 and power factor 0.64. The power factor is to be improved to 0.88 by using static capacitors. Find the rating of the capacitor bank in kVAr, capacitance of each unit, if they are connected in delta and star? [9]

Code No: **R194202A** **R19** **Set No. 3**

**IV B.Tech II Semester Regular Examinations, April – 2023**

# ELECTRICAL DISTRIBUTION SYSTEMS

**(Electrical and Electronics Engineering)**

**Time: 3 hours** **Max. Marks: 75**

***Answer any FIVE Questions***
***ONE Question from Each unit***
***All Questions Carry Equal Marks***

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## UNIT I

1 a) How do you categorize the types of loads? Discuss in detail. [7]

b) Derive the relation between load factor and loss factor for zero off peak load condition? [8]

(OR)

2 a) Draw the characteristics and compare domestic and industrial loads? [7]

b) A Substation is to supply three regions of load whose maximum values are 3000 kW, 6000 kW and 8000 kW. The diversity factor of the load at the substation is 1.3 and the average annual load factor is 0.5. Find the peak demand on the substation and annual energy supplied from the substation. [8]

## UNIT II

3 a) Derive the rating of distribution substation for the hexagonal shaped service area? [7]

b) Discuss in detail about basic design practice of radial type distribution feeders? [8]

(OR)

4 a) List out the components and describe the functions of each component of the distribution substation? [7]

b) Explain the design considerations of distribution feeder loading. [8]

## UNIT III

5 a) Derive the voltage drop expression of the radial feeder with non uniform loading condition? [7]

b) Compare the three phase balanced system with multi grounded common neutral system with relevant relations? [8]

(OR)

6 a) Explain the voltage drop in AC distribution? How it is estimated approximately. [7]

b) A3-phase radial feeder is receiving end voltage 11kV, a total impedance of (3+j8) ohms per phase and a load of 6 MW with a lagging P.F of 0.80. Determine the sending end phase and line voltages and also the load angle. [8]

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**UNIT IV**

7 a) Draw the network diagram and explain the protection of ring main feeders? [7]

b) Describe the objectives and outcomes of coordination of protection devices by using time current characteristics? [8]

(OR)

8 a) Compare the operation of fuses and circuit reclosures in the distribution system? [7]

b) Describe the challenges solving by using the SCADA in the distribution networks? [8]

**UNIT V**

9 a) Discuss the economic justification of capacitor compensation. [7]

b) Draw the diagram and explain the principle of operation of AVB? [8]

(OR)

10 a) Describe step by step procedure to identify the best location for the capacitor used for shut compensation? [7]

b) A 33kV feeder has (0.4+j0.32) ohms impedance per phase per km and is supplying a load of 6.8MVA over a distance of 87km at 0.67 power factor. What will be the receiving end voltage and voltage drop of the line if compensated to 55% by series capacitance compensation? Find the receiving end voltage and the improvement in the voltage? [8]

Code No: **R194202A** **R19** **Set No. 4**

**IV B.Tech II Semester Regular Examinations, April – 2023**

# ELECTRICAL DISTRIBUTION SYSTEMS

**(Electrical and Electronics Engineering)**

**Time: 3 hours** **Max. Marks: 75**

***Answer any FIVE Questions***
***ONE Question from Each unit***
***All Questions Carry Equal Marks***

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## UNIT I

1 a) Describe the characteristics of Residential and Industrial loads. [7]

b) The load curves of two different categories of loads and the system peak load are as follows:
Peak load for industrial load 2020kW, peak load for residential load is 2025kW and the system peak load is 3066kW. Find the diversity factor and coincidence factor for the system? [8]

(OR)

2 a) Define the following and give their significances :
i) load factor ii) coincidence factor and iii) loss factor. [7]

b) Derive the relation between load factor and loss factor for short time peak condition? [8]

## UNIT II

3 a) Derive the rating of distribution substation for the service area having 'n' number of primary feeders? [7]

b) Draw the circuit diagram and explain the advantages and disadvantages of radial type distribution feeders? [8]

(OR)

4 a) List out and high light the important functions and factors of components of the distribution substation? [7]

b) Draw the network diagram and explain the design practice of secondary distribution system? [8]

Code No: **R194202A** **R19** **Set No. 4**

**UNIT III**

5 a) Discuss the importance of voltage drop and power loss calculations in distribution systems. [7]

b) A Single phase feeder circuit has impedance of (0.4+j0.2) ohms and $V_r$ = 440V and $I_r = 6\angle -45^0$ A, respectively. Determine the
i) P.F of the load,
ii) load P.F for which the impedance angle is maximum and
iii) load P.F for which impedance angle is maximum and also derive the formula used. [8]

(OR)

6 a) List out and elaborate the factors of loading of the distribution feeders? [7]

b) Compare the three phase balanced system with 2 phase neutral system with relevant relations? [8]

**UNIT IV**

7 a) Explain in detail about the principle of operation of earth leakage circuit breaker with neat diagram? [7]

b) Describe the protection schemes of parallel feeder with neat diagram. [8]

(OR)

8 a) Explain in detail about the observations to be made from the time current characteristics in the protection coordination? [7]

b) Describe the Residual current circuit breaker with diagram. [8]

**UNIT V**

9 a) What are the advantages of power factor correction? [7]

b) Draw the phasor diagram and explain about the series capacitor used in the distribution networks? [8]

(OR)

10 a) Draw the circuit diagram and explain the operation of AVR and write its draw backs? [7]

b) A 58H.P, 50Hz, 420V, delta connected induction motor has full load efficiency of 0.87 and power factor 0.48 lagging. The power factor is to be improved to 0.89 lagging by using shunt capacitors. Find the reactive power rating of the capacitor bank and the capacitance of each unit if they are connected in star as well as delta? [8]