Code No: M0228/R07 **Set No. 1**

IV B.Tech I Semester Regular Examinations, November 2012
ELECTRICAL DISTRIBUTION SYSTEMS
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Discuss about different load modeling and their characteristics. [16]
2. (a) Discuss the various voltage levels of distribution system.
   (b) Discuss design considerations of distribution feeders. [8+8]
3. Give the relationship between the service areas of the four and six feeder patterns if the feeder circuits are voltage drop limited. [16]
4. (a) Draw and explain typical four - wire multi - grounded common neutral distribution system.
   (b) Derive the condition of load factor for which the voltage drop is maximum. [10+6]
5. What are the different types of over current protective devices and explain their merits and demerits. [16]
6. Explain different types of coordination of protective devices. [16]
7. (a) Justify the importance of power factor correction.
   (b) A 3-phase,50Hz , 2200V induction motor develops 400H.P at a power factor 0.8lag and efficiency 90%. The power factor is to be raised to unity by connecting a bank of condensers in delta across supply mains. If each of the capacitance unit built up of 4 similar 550V condensers, calculate the required capacitance of each condenser and its KVA rating. [8+8]
8. (a) Describe different types of equipment for voltage control with neat diagrams.
   (b) What is a line drop compensator? How is it used along with tap changer of transformer for voltage control? [8+8]

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Code No: M0228/R07 **Set No. 2**

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ELECTRICAL DISTRIBUTION SYSTEMS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Give the classification of loads and draw their characteristics.
   (b) 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 4200kWh. Find the demand factor, the 15 min. weekly load factor of the substation and its associate loss factor. [8+8]

2. What are the various factors that are to be considered in selecting a primary feeder rating? Describe the arrangement with suitable diagram. [16]

3. (a) Compare four and six feeder patterns.
   (b) Mention the various factors that are to be considered in selecting the location of substation. [10+6]

4. (a) Consider a balanced three phase circuit shown in fig. 4 . R +jX represent the total impedance of the line. The power factor of the load is cos θ = cos $(\theta_{VR} - \theta_r)$. Find the load power factor for which the voltage drop is maximum?
   (b) Prove the power loss due to load currents in the conductors of the 2 phase, 3 - wire lateral with multi - grounded neutral is approximately 1.64 times larger than the one in the equivalent three phase lateral. Also show that $VD_{pu,2\Phi} = 2 \times VD_{pu,3\Phi}$. [6+10]

5. (a) Explain when Maximum faults and Minimum faults occur in distribution system.
   (b) The per unit positive, negative and zero sequence impedances of a distributed network are 0.08, 0.08 and 0.05 respectively. Determine the fault current for L-L and L-G faults. [10+6]

6. (a) Explain:
   (i) What is coordination? (ii) What is a protecting device?
   (b) Explain Recloser -Recloser coordination. [8+8]

7. (a) How is economical p.f arrived at for a given distribution system with different loads.
   (b) Explain shunt capacitors compensation. [8+8]

8. (a) Explain the basic functions of booster transformer and how it increases the line voltage.
   (b) Describe the operation of AVR/AVB with neat diagram. [8+8]

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Set No. 2

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Code No: M0228/R07 **Set No. 3**

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ELECTRICAL DISTRIBUTION SYSTEMS
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Discuss the characteristics of the following loads:
   (a) Residential
   (b) Agricultural
   (c) Industrial. [16]

2. What is meant by primary feeder loading? Give some of the factors which will affect the design loading of a feeder. [16]

3. (a) A 3 - Φ, 4.16kV wye grounded feeder main has 4 copper conductors with an equivalent spacing of 1.0 m between phase conductors and a lagging load power factor of 0.9. Determine the 'k' constant of the main feeder. Let r = 1.503Ω/m and x=0.7456 Ω/m. Also calculate the percent voltage drop in the main if a lumped sum load of 500 kVA with a lagging p.f. of 0.9 is connected at the end of 1m long feeder main.
   (b) List out the benefits obtained from optimal location of substations. [8+8]

4. A 1-Φ feeder circuit has total impedance (1+j3) ohms, receiving end voltage is 11kV and current is $50\angle -30^0$ A. Determine:
   (a) p.f. of load
   (b) load p.f. for which the drop is maximum
   (c) load p.f. for which impedance angle is maximum and derive the formula used. [16]

5. (a) What are the advantages and disadvantages of a circuit recloser.
   (b) Obtain the sequence impedance computed for a L-L and L-G faults. Compare the magnitude of fault current in both cases. [6+10M]

6. (a) Explain Fuse-Fuse coordination.
   (b) Explain Recloser- Circuit breaker coordination. [8+8]

7. (a) Explain the computerized method to determine the economic power factor.
   (b) A feeder supplies an Industrial consumer with a cumulative load:
      i. Induction Motors totaling 200HP which runs at an average efficiency of 89% and a lagging average p.f. of 0.85.
      ii. Synchronous motors totaling 100HP with an average efficiency of 85% and

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iii. a heating load of 100KW. The Industrial consumer plans to use the synchronous motors to correct its overall power factor.
Determine the required p.f. of the synchronous motors to correct the overall p.f. at peak load to
A. unity
B. 0.95 lag. [6+10]

8. (a) Explain the use of induction regulator and voltage control.
(b) Discuss the effect of series capacitors on voltage control. [8+8]

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Code No: M0228/R07 **Set No. 4**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) The annual peak load input to a primary feeder is 2MW. The total copper loss at the time of peak load is 0.1MW. The total annual energy supplied to the sending end of the feeder is 5.61×10^6 kWh. Determine:
   i. The annual loss factor
   ii. The total annual copper loss energy and its value at Rs. 1.5 per kWh. [8]
   (b) Explain the following factors:
   i. Contribution factor
   ii. Load diversity
   iii. Loss factor. [3+3+2]

2. (a) Give a neat sketch of typical primary distribution system and specify parts of it.
   (b) A 3-ϕ radial express feeder has a line-to-line voltage of 30 kV at the receiving end, a total impedance of (5+ j 11) Ω/phase and a load of 6 Mw with a lagging p.f. of 0.92. Determine the line-to-line voltages at the sending end and the percent voltage regulation of the feeder. [8+8]

3. (a) A 3 - Φ, 4.16kV wye grounded feeder main has 4 copper conductors with an equivalent spacing of 1.0 m between phase conductors and a lagging load power factor of 0.9. Determine the 'k' constant of the main feeder. Let r = 1.503Ω/m and x=0.7456 Ω/m. Also calculate the percent voltage drop in the main if a lumped sum load of 500 kVA with a lagging p.f. of 0.9 is connected at the end of 1m long feeder main.
   (b) List out the benefits obtained from optimal location of substations. [8+8]

4. (a) Prove the power loss due to load currents in the conductors of the 2-phase, 3 wire lateral with multi-grounded neutral is approximately 1.64 times larger than the one in the equivalent 3-phase lateral.
   (b) Consider the three phase, 3 wire 240V secondary system with balanced loads at A, B and C as shown in figure 4b Determine:

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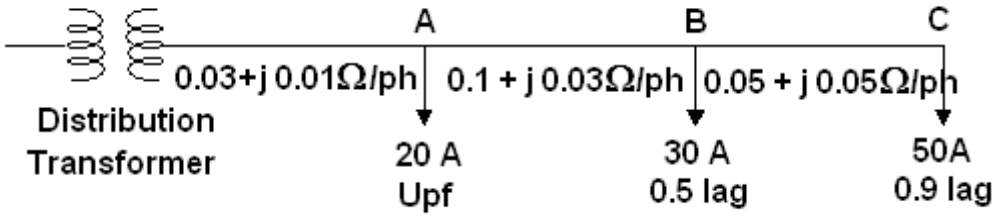

Figure 4b

i. The voltage drop in one phase of lateral
ii. The real power per phase for each load
iii. The reactive power per phase for each load. [8+8]

5. Describe the principle of operation of:
   (a) fuses
   (b) Circuit breakers
   (c) Line secionalizer
   (d) circuit recloser. [4×4]

6. (a) What is the data required for the general coordination procedure?
   (b) Explain Fuse-Recloser coordination procedure. [8+8]

7. (a) Justify the importance of power factor correction.
   (b) What are the different types of p.f improvement capacitors. Discuss their relative advantages and disadvantages. [8+8]

8. (a) Write the various ways to improve the distribution system overall voltage regulation?
   (b) Describe the operation of AVR/AVB with neat diagram. [8+8]

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