Set No. 1

|6+10|

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011 ELECTRICAL DISTRIBUTION SYSTEMS (Electrical & Electronic Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions All Questions carry equal marks ****

- 1. (a) Define loss factor and load factor.
 - (b) The annual peak load input to a primary feeder is 2000kW. The total copper loss at the time of peak load is 100kW. The total annual energy supplied to the sending end of the feeder is 6.7×10^6 kWh. Then:
 - i. Determine the annual loss factor
 - ii. Calculate the total annual copper loss energy and its value at Rs. 2.50/kWh.

2. Draw the one line diagram of radial type primary feeder and mention the factors that influences the selection of primary feeder. [6+10]

- 3. Compare the four and six feeder patterns of substation service area if they are thermally loaded. [16]
- 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:

36	А	в	С
∃ ∈ _{0.03+j 0.0})1Ω/ph 0.1 + j ($0.03\Omega/\text{ph} 0.05 + j 0.05$.05 Ω /ph
Distribution Transformer	↓ 20 A	↓ 30 A	50A
Transformer	Upf	0.5 lag	0.9 lag

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. (a) Discuss the procedure for fault current calculation in following faults:
 - i. 3-phase fault.
 - ii. Single Line-Ground fault
 - (b) Explain about the operation of a circuit breaker. [10+6]

- 6. (a) What is the data required for the general coordination procedure?
 - (b) Explain Fuse-Recloser coordination. [8+8]
- 7. A 37.3KW induction motor has a p.f 0.9 and efficiency 0.9 at full load, power factor 0.6 and efficiency 0.7 at half load. At no load, the current is 25% of the full load current and p.f 0.1. capacitors are supplied to make the line power factor 0.8 at half load. With these capacitors in circuit, Find the line power factor at :
 - (a) Full load and
 - (b) no load. [8+8]
- 8. (a) Briefly explain the line drop compensation on voltage control.
 - (b) Write the various ways to improve the distribution system overall voltage [10+6]



Set No. 2

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011 ELECTRICAL DISTRIBUTION SYSTEMS (Electrical & Electronic Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions All Questions carry equal marks $\star \star \star \star \star$

- 1. (a) Define loss factor and load factor.
 - (b) The annual peak load input to a primary feeder is 2000kW. The total copper loss at the time of peak load is 100kW. The total annual energy supplied to the sending end of the feeder is 6.7×10^6 kWh. Then:
 - i. Determine the annual loss factor
 - ii. Calculate the total annual copper loss energy and its value at Rs. 2.50/kWh. [6+10]
- 2. Explain the different types of primary feeders in distribution system. [16]
- 3. (a) Give detailed analysis of square shape service area is served by four primary feeders from a central feed point.
 - (b) Derive the equation of percent voltage drop of hexagonal shape service area of substation. [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:

36	А	В	С
∋ ∈ _{0.03+j 0.}	01Ω/ph 0.1 + j ($0.03\Omega/\text{ph} 0.05 + j 0$.05Ω/ph
Distribution	+	+	- +
Transformer	20 A	30 A	50A
	Upf	0.5 lag	0.9 lag

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. What are common types of faults in a single phase 2-wire and 3-wire system. Explain how fault current is computed with proper single line diagrams. [16]
- 6. (a) Explain Recloser -Recloser coordination.

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

- 7. A 37.3KW induction motor has a p.f 0.9 and efficiency 0.9 at full load , power factor 0.6 and efficiency 0.7 at half load. At no load, the current is 25% of the full load current and p.f 0.1. capacitors are supplied to make the line power factor 0.8 at half load. With these capacitors in circuit , Find the line power factor at :
 - (a) Full load and

(b) no load.

- [8+8]
- 8. (a) Briefly explain the line drop compensation on voltage control.
 - (b) Voltage control and p.f. correction are necessary in power systems? Explain. What are the disadvantages of low voltage and low p.f. of the system? [6+10]



Set No. 3

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011 ELECTRICAL DISTRIBUTION SYSTEMS (Electrical & Electronic Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions All Questions carry equal marks * * * * *

- 1. (a) Show that loss factor = $(load factor)^2$ for very short lasting peak load.
 - (b) The yearly average load is 1200kW and peak monthly load is 3500 kW. Then find load factor and loss factor if this load is varying steadily. [10+6]
- 2. (a) Explain the basic design practice of secondary distribution system.
 - (b) Mention different standard voltage levels of secondary distribution system.
 - (c) Find the new load and area that can be served with the same percent voltage drop if the new feeder voltage level is increased to twice the previous voltage level of the feeder. [6+6+4]
- 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 = $1.503\Omega/m$ and $x=0.7456 \Omega/m$. 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 the load currents in the conductors of single phase lateral ungrounded neutral case is 2 times large than one in the equivalent three phase lateral.
 - (b) Prove the power loss due to load currents in the conductors of the single phase two-wire ungrounded lateral with full capacity neutral is 6 times larger than the one in the equivalent 3-Φ, 4 wire lateral. [8+8]
- 5. What are the various factors considered while selecting a over current protective device. Explain the operation of a Line sectionalizer and a fuse. [16]
- 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) 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]

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Set No. 3

- 8. (a) Briefly explain the line drop compensation on voltage control.
 - (b) Voltage control and p.f. correction are necessary in power systems? Explain. What are the disadvantages of low voltage and low p.f. of the system? [6+10]

Route

Set No. 4

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011 ELECTRICAL DISTRIBUTION SYSTEMS (Electrical & Electronic Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions All Questions carry equal marks *****

- 1. The annual peak load of a substation is 4500kW and the total annual energy supplied to the feeder is 10×10^5 kWh. The peak demand occurs in August is due to air-conditioning load. Then find:
 - (a) Annual average power demand
 - (b) Annual load factor
 - (c) Annual loss factor using approximate formula. [16]
- 2. Explain the different types of primary feeders in distribution system. [16]
- 3. Show that the service area of six feeders can carry 1.5 times as much load as the four feeders if they are thermally loaded. [16]
- 4. A 1- Φ feeder circuit has total impedance (1+j3) ohms, receiving end voltage is 11kV and current is 50 \angle 30⁰ ADetermine:
 - (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) Discuss the procedure for fault current calculation in following faults:
 - i. 3-phase fault.
 - ii. Single Line-Ground fault
 - (b) Explain about the operation of a circuit breaker. [10+6]
- 6. (a) Explain the salient points in general co-ordination procedure.
 - (b) Explain Fuse-Recloser coordination. [8+8]
- 7. (a) Explain power capacitors?
 - (b) What is the justification for power factor improve and what are the benefits. [8+8]
- 8. (a) Describe different types of equipment for voltage control with neat diagrams.
 - (b) What are different methods for voltage control? Briefly explain them. [8+8]

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