# INSTITUTE OF AERONAUTICAL ENGINEERING

**(Autonomous)**
Dundigal, Hyderabad - 500 043

## Department of Electrical and Electronics Engineering

## QUESTION BANK

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|---|---|---|
| **Course Name** | **:** | **ELECTRICAL DISTRIBUTION SYSTEMS** |
| **Course Code** | **:** | **A70226** |
| **Class** | **:** | **IV B. Tech I Semester** |
| **Branch** | **:** | **Electrical and Electronics Engineering** |
| **Year** | **:** | **2018– 2019** |
| **Course Faculty** | **:** | Dr. P Sridhar, Professor, EEE |

### OBJECTIVES

This course gives the complete knowledge of electrical distribution systems, the design of feeders, substations. It also gives conceptual knowledge on how to determine the performance of a distribution system through its important parameters i.e. voltage drops and power loss and the very important thing that protection of the system by means of protective devices and their co-ordination during the several fault conditions. It also specifies how to improve the voltage profiles and power factor of the system to better value using various voltage control and compensation techniques.

| S. No | Question | Blooms Taxonomy Level | Course Outcome |
|---|---|---|---|
| | **UNIT - 1<br>GENERAL CONCEPTS** | | |
| | **Part - A (Short Answer Questions)** | | |
| 1 | Discuss about load management functions? | Understand | 01 |
| 2 | Define Demand. | Remember | 01 |
| 3 | Obtain the relation between the load factor and loss factor? | Remember | 02 |
| 4 | Define coincidence Factor. | Remember | 01 |
| 5 | Discuss about contribution factor. | Remember | 02 |
| 6 | Discuss about loss factor. | Remember | 02 |
| 7 | Define load factor? | Remember | 02 |
| 8 | Discuss about load diversity. | Remember | 02 |
| 9 | What is Maximum demand? | Remember | 02 |
| 10 | Define coincident demand? | Remember | 02 |
| 11 | Define Non-coincident demand? | Understand | 02 |
| 12 | What is meant by term load? How loads can be classified? | Remember | 02 |
| 13 | Define distribution system? | Remember | 02 |
| 14 | Define Demand factor. | Remember | 02 |
| 15 | Define load. | Remember | 02 |
| | **Part - B (Long Answer Questions)** | | |
| 1 | List out the various factors affecting the distribution system planning? | Remember | 01 |
| 2 | Draw a block diagram in flow chart form for a typical distribution system planning process and explain the techniques for distribution planning. | Remember | 01 |
| 3 | Discuss about different load modelling and its characteristics | Understand | 01 |

<table>
<tr><th>S. No</th><th>Question</th><th>Blooms Taxonomy Level</th><th>Course Outcome</th></tr>
<tr><td>4</td><td>Obtain the relation between the load factor and loss factor.</td><td>Understand</td><td>02</td></tr>
<tr><td>5</td><td>Discuss in detail about residential and industrial loads and their respective characteristics.</td><td>Remember</td><td>02</td></tr>
<tr><td>6</td><td>Discuss the characteristics of different loads.</td><td>Understand</td><td>01</td></tr>
<tr><td>7</td><td>Explain briefly the classification of loads and modeling of load in distribution networks?</td><td>Remember</td><td>01</td></tr>
<tr><td>8</td><td>Describe the load characteristics of distribution system?</td><td>Understand</td><td>01</td></tr>
<tr><td>9</td><td>Write the characteristics of the Residential loads.</td><td>Remember</td><td>02</td></tr>
<tr><td>10</td><td>Discuss the characteristics of the Agriculture loads.</td><td>Remember</td><td>02</td></tr>
<tr><td>11</td><td>Write the characteristics of the Commercial loads.</td><td>Remember</td><td>02</td></tr>
<tr><td>12</td><td>Write the characteristics of the Industrial loads.</td><td>Remember</td><td>02</td></tr>
<tr><td>13</td><td>Discuss about load modeling characteristics.</td><td>Remember</td><td>02</td></tr>
<tr><td>14</td><td>Distinguish between DC and AC systems.</td><td>Remember</td><td>02</td></tr>
<tr><td>15</td><td>Discuss about load curve.</td><td>Understand</td><td>02</td></tr>
<tr><td colspan="4">Part – C (Analytical Questions)</td></tr>
<tr><td>1</td><td>At the end of a power distribution system, a certain feeder supplies three distribution transformer, each one supplying a group of customers whose connected loads are as under, if the diversity factor among the transformers is 1.3, find the maximum load on the feeder.
<table>
<tr><th>Transformer</th><th>Load</th><th>Demand Factor</th><th>Diversity Factor</th></tr>
<tr><td>No.1</td><td>10kw</td><td>0.65</td><td>1.5</td></tr>
<tr><td>No 2</td><td>12kw</td><td>0.</td><td>3.5</td></tr>
<tr><td>No.3</td><td>15kw</td><td>0.7</td><td>1.5</td></tr>
</table></td><td>Understand</td><td>01</td></tr>
<tr><td>2</td><td>Distribution substation experiences an annual peak load of 3, 500 KW. The total annual energy supplied to the primary feeder circuits is $10^7$ kwh. Find i)The annual average Factor ii) The annual Load Factor</td><td>Understand</td><td>01</td></tr>
<tr><td>3</td><td>Annual peak load input to a primary feeder is 2000kw at which the power loss is total copper loss at the time of peak load is $\sum I^2R$=100kw. The total annual energy supplied to the sending end of the feeder is $5.61*10^6$ kwh. Determine. I) Annual loss factor<br>ii) Total annual copper loss energy and its value Rs.1.50 per kwh</td><td>Understand</td><td>01</td></tr>
<tr><td>4</td><td>Assume that load of 100kw is connected at the riverside substation, the 15 min. weekly maximum demand is given as 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.</td><td>Understand</td><td>01</td></tr>
<tr><td>5</td><td>Discuss how the maximum demand and average demand can be obtained from daily demand variation curve.</td><td>Remember</td><td>02</td></tr>
<tr><td>6</td><td>A 50 MW hydro generator delivers 320 million kwh during the year. Calculate the plant load factor.</td><td>Understand</td><td>02</td></tr>
<tr><td>7</td><td>Annual peak load input to a primary feeder is 2000kw at which the power loss is total copper loss at the time of peak load is $\sum I^2R$=100kw. The total annual energy supplied to the sending end of the feeder is $5.61*10^6$ kwh. Determine. I) Annual loss factor<br>ii) Total annual copper loss energy and its value Rs0.03 per kwh</td><td>Understand</td><td>02</td></tr>
<tr><td>8</td><td>Assume that the annual peak load of a primary feeder is 2000 kw , at which the power is 80 kw per three phase. Assuming an annual loss factor of 0.15, determine<br>i) The average annual power loss.<br>ii) The total annual energy loss due to the copper loss of the feeder.</td><td>Understand</td><td>02</td></tr>
<tr><td>9</td><td>A small city experiences an annual peak load of 3500 kw. The total annual energy supplied to the primary feeder’s circuits is $10* 10^6$ kwh. The peak demand occurs in July/August and Is due to air Conditioning load.<br>i) Find the annual average power demand</td><td>Understand</td><td>02</td></tr>
</table>

| S. No | Question | Blooms Taxonomy Level | Course Outcome |
|---|---|---|---|
| | ii) Find the annual load factor<br>iii) Find the annual loss factor | | |
| 10 | The annual average load is 1241 kw and monthly peak load is 3600 kw. Find the load factor by using approximate formula. | Understand | 02 |
| | **UNIT – II**<br>**DISTRIBUTION FEEDERS** | | |
| | **Part - A (Short Answer Questions)** | | |
| 1 | Discuss the differences between radial and loop types of primary distribution feeders | Remember | 04 |
| 2 | Draw neat sketches radial type and loop type sub transmission systems. | Understand | 03 |
| 3 | Define the terms feeder and Distributor. | Understand | 04 |
| 4 | List out the advantages and disadvantages of loop type primary distribution feeder | Remember | 04 |
| 5 | Draw the neat sketch of ring main distribution system. | Remember | 03 |
| 6 | Compare Radial and loop type feeders. | Remember | 04 |
| 7 | List out the advantages and disadvantages of radial type primary distribution feeder? | Remember | 05 |
| 8 | Distinguish between loop type and ring main. | Remember | 05 |
| 9 | List out the advantages and disadvantages of Switching scheme of Single bus? | Remember | 05 |
| 10 | List out the advantages and disadvantages of ring bus scheme? | Remember | 05 |
| 11 | List out the advantages and disadvantages are of inter connected primary distribution feeder? | Understand | 05 |
| 12 | List out the advantages and disadvantages of switching scheme of double bus double breaker? | Understand | 05 |
| 13 | Define substation. | Remember | 06 |
| 14 | Define distribution transformer. | Remember | 06 |
| 15 | Give the classification of Different types of substations. | Remember | 06 |
| 16 | List out the advantages and disadvantages of outdoor substations? | Understand | 06 |
| 17 | List out the rules to be considered to locate the substation? | Remember | 06 |
| 18 | Discuss advantages of optimal location of substation? | Remember | 06 |
| 19 | List out the advantages and disadvantages of indoor substations? | Remember | 06 |
| 20 | What are the advantages and disadvantages of underground substations? | Analyze | 06 |
| 21 | Discuss about industrial substation. | Remember | 06 |
| 22 | Differentiate Indoor and outdoor substation? | Evaluate | 06 |
| | **Part - B (Long Answer Questions)** | | |
| 1 | Discuss the various factors that are to be considered in selecting a primary feeder rating? Describe the arrangement with suitable diagram. | Understand | 04 |
| 2 | Draw the single line diagram of radial type feeder and mention the factors that influences the selection of primary feeder | Understand | 04 |
| 3 | With neat sketches explain the various types of sub transmission systems. | Remember | 03 |
| 4 | Discuss the basic design practice of the secondary distribution system | Remember | 05 |
| 5 | Describe various factors that influence voltage levels in design and operation of the distribution system | Remember | 05 |
| 6 | Distinguish between primary and secondary distribution systems with suitable examples. | Remember | 05 |
| 7 | State the Different voltage levels of secondary distribution system. | Remember | 05 |
| 8 | Classify different types of primary feeders and give their merits and demerits. | Remember | 04 |
| 9 | Derive the condition of load factor for which the voltage drop is maximum. | Remember | 03 |

| S. No | Question | Blooms Taxonomy Level | Course Outcome |
|---|---|---|---|
| 10 | Explain radial type primary feeder with neat diagram? | Understand | 04 |
| 11 | Draw and explain secondary network supplied by three primary feeders. | Understand | 04 |
| 12 | List out the various factors that are to be considered in selecting optimal location of substation? | Remember | 06 |
| 13 | Compare the four and six feeder's patterns in substation location. | Remember | 06 |
| 14 | How the rating of distribution substation can be calculated. Explain taking a general case with`n' no. of feeders? | Understand | 06 |
| 15 | How do you analyze a substation service area with `n' primary feeders? | Understand | 04 |
| 16 | Discuss how the rating of distribution substation is fixed. | Understand | 06 |
| 17 | Explain the criteria for location of a substation and what are the benefits obtained through optimal location of substation. | Understand | 06 |
| 18 | Explain the single bus bar system with sectionalization and what are its merits and demerits? | Understand | 06 |
| 19 | Discuss the main and transfer bus bar system with circuit diagram. | Understand | 05 |
| 20 | List out the difference between single bus bar with and without sectionalization arrangement? | Understand | 04 |
| 21 | Discuss about the classification of different types of substations. State the advantages and disadvantages of each substation. | Understand | 06 |
| | **Part – C (Analytical Questions)** | | |
| 1 | A 3 phase radial express feeder has a line to line voltage of 22.0 kv at the receiving end, a total impedance of 5.25+J10. 95 Ω/ phase, and a load of 5MW with a logging power factor of 0.90. determine the following<br>i)Line to neutral and line to line voltage at the sending end<br>ii) Load angle | Understand | 04 |
| 2 | Show that with an increase in working voltage to n times, the cross section of a feeder and a distributor would be reduced to 1/n and $1/n^2$ of their respective values. | Understand | 04 |
| 3 | Define secondary banking and explain different connections of secondary banking. | Understand | 05 |
| 4 | How do you apply an concept of ABCD constants to radial feeders? | Understand | 04 |
| 5 | A 2-wire DC distributor AB, 600m long as loaded as under:<br>Distance from (metes): 150 300 350 450<br>Loads (Amps) : 100 200 250 300.<br>The feeding point A is maintained at 440V and that of B at 430V. If each conductor has a resistance of 0.01 per 100 m, calculate i. The currents supplied from A to B. ii. The power dispatched in the distributor. | Understand | 04 |
| 6 | 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. | Understand | 04 |
| 7 | Assume that feeder has a length of 2 miles and that the new feeder uniform loading has increased to 3 times the old feeder loading. Determine the new maximum length of the feeder with the same percent voltage drop if the new feeder voltage level is increased to 3.45 kv from the previous voltage level of 12.47 kv. | Understand | 05 |
| 8 | Assume that a star connected three phase load is made up of three impedances of $50\angle 25^0$ ohms each and that the load is supplied by a three phase four wire primary express feeder. the balanced line to neutral voltages at the receiving end are $v_{an}=7630\angle 0^0$V, $V_{bn}=7630\angle 240^0$v, $V_{cn}=7630\angle 120^0$ v. Determine the following,<br>a) The phase currents in each line<br>b) The line to line phase voltages<br>c) The total active and reactive power supplied to the load. | Understand | 05 |
| 9 | Derive the equations for voltage drop and power loss in a radial feeder with uniformly distributed load. | Understand | 05 |
| 10 | Discuss the various substation bus schemes? Explain them with neat sketches. | Understand | 06 |
| 11 | Derive the total area served by four feeders is 0.667 times the total area served by six feeders if they are thermally loaded | Understand | 05 |

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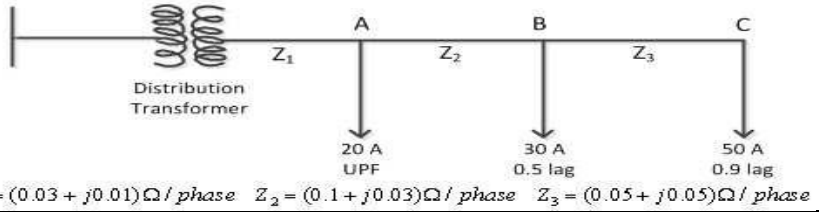
|---|---|---|---|
| 12 | Discuss about the methodology to fix the rating of a distribution substation. | Understand | 06 |
| 13 | A three phase 4.16 kv wye grounded feeder main has 4 copper conductors with an equivalent spacing of 1.0 m between phase conductors and a lagging load power factor of 0.9. 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 load end of 1 m long feeder main. | Understand | 05 |
| 14 | Calculate % voltage drop of hexagonally shaped area of distribution substation. | Understand | 06 |
| 15 | Calculate the % voltage drop in the main, if load 500 kva is uniformly distributed along the feeder main is shown in figure .Consider K=0.01% VD(kva-miles). | Understand | 05 |
| 16 | Define 'k' constant and give its importance. | Understand | 05 |
| 17 | Discuss voltage drop for loads of different power factor. | Understand | 04 |
| 18 | Discuss the voltage drop for uniformly distributed load. | Understand | 05 |
| | **UNIT – III**<br>**DISTRIBUTION SYSTEM ANALYSIS AND POWER LOSS CALCULATIONS** | | |
| | **Part - A (Short Answer Questions)** | | |
| 1 | Define multi grounded system. | Remember | 07 |
| 2 | Define real power. | Remember | 07 |
| 3 | What are the sources of reactive power. | Remember | 07 |
| 4 | Define apparent power. | Understand | 07 |
| 5 | What are the causes of low power factor | Remember | 07 |
| 6 | Define power. | Remember | 07 |
| 7 | Why do we transmit electricity at high voltages? | Remember | 07 |
| 8 | Write power loss equation | Remember | 07 |
| 9 | Why does voltage drop occurs? | Understand | 07 |
| 10 | Why high voltage can reduce power loss? | Remember | 07 |
| 11 | List out the advantages of transmitting power at high voltages. | Remember | 07 |
| 12 | Define power loss in transmission line. | Remember | 07 |
| 13 | Define voltage drop. | Remember | 07 |
| 14 | Discuss voltage drop for loads of different power factor. | Remember | 07 |
| 15 | Discuss the voltage drop for uniformly distributed load. | Understand | 07 |
| | | | |
| 16 | Define radial network | Remember | 07 |
| 17 | List out the manual methods of radial network | Remember | 07 |
| 18 | Discuss three phase balanced lines | Remember | 07 |
| 19 | A 3-phase star connected load is made of 3 impendences of 50/_ 250/ph each and the load is supplied by a 3-phase, 4-wire primary feeder. The balance phase voltages at receiving end are determine Phase currents each line. | Understand | 07 |
| 20 | A 3-phase star connected load is made of 3 impendences of 50/_ 250/ph each and the load is supplied by a 3-phase, 4-wire primary feeder. The balance phase voltages at receiving end are determine line to line voltages. | Understand | 07 |
| 21 | A 3-phase star connected load is made of 3 impendences of 50/_ 250/ph each and the load is supplied by a 3-phase, 4-wire primary feeder. The balance phase voltages at receiving end are determine the total active and reactive power supplied to the load | Understand | 07 |
| 22 | Define voltage drop? | Remember | 07 |
| 23 | List out the different types of manual methods used for the solution of radial networks | Remember | 07 |

| S. No | Question | Blooms Taxonomy Level | Course Outcome |
|---|---|---|---|
| 24 | Write about non - three phase primary lines | Remember | 07 |
| | **Part - B (Long Answer Questions)** | | |
| 1 | Derive an approximate voltage drop & power loss equation of primary feeder and give the condition for load p.f. at which voltage drop is maximum. | Remember | 07 |
| 2 | Prove the power loss due to the load currents in the conductors of single-phase lateral ungrounded neutral case is 2 times larger than one in the equivalent three phase lateral. | Remember | 07 |
| 3 | Discuss about non-three phase primary lines. | Understand | 07 |
| 4 | 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. | Understand | 07 |
| 5 | In terms of resistance and reactance of the circuit, derive the equation for load power factor for which voltage drop is minimum | Understand | 07 |
| 6 | Derive the expression for voltage drop and power loss for non-uniformly radial type distribution load. | Understand | 07 |
| 7 | What are the power losses in A.C distribution? How it is estimated approximately. | Remember | 07 |
| | | | |
| 8 | Derive the expression for the total series voltage drop and total copper loss per phase of at uniformly distributed load. Give the assumptions made, if any. | Understand | 07 |
| 9 | What is the importance of % Voltage drop in feeder lines? What are the factors that affect % voltage drop? | Understand | 07 |
| 10 | Discuss a four wire multi-grounded common neutral distribution system. | Remember | 07 |
| 11 | Discuss about the different types of manual methods used for the solution of radial networks? Explain them? | Understand | 07 |
| 12 | Prove that the power loss due to the load currents in the conductors of single-phase lateral ungrounded neutral case is 2 times larger than one in the equivalent three phase lateral. | Understand | 07 |
| 13 | 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 | Understand | 07 |
| 14 | Derive the voltage drop and power loss of non-three phase distribution systems and compare to the 3-phase balanced system. | Understand | 07 |
| | **Part – C (Analytical Questions)** | | |
| 1 | Consider a three phase, 3 wire 240V secondary with balanced loads at A,B and C as shown in figure determine:<br>i. The voltage drop in one phase of lateral<br>ii. The real power per phase for each load<br>iii. The reactive power per phase for each load.<br>  <br>$Z_1 = (0.03 + j0.01)\Omega/phase \quad Z_2 = (0.1 + j0.03)\Omega/phase \quad Z_3 = (0.05 + j0.05)\Omega/phase$ | Understand | 07 |
| 2 | Consider a single-phase, 2-wire secondary distributor of length 'I' meters from the distribution transformer .At a length of '$I_1$" meters from source, a load of $I_1$ amps with a p.f of cos$\Theta_1$ (lag) is tapped. At a length of '$I_2$' amps with a power factor cos$\Theta_2$ (lead) is tapped. At a length of $I_3$ meters from second load, a third load of $I_3$ amps with a UPF is tapped. If resistance and reactance of each wire are r and x ohms/meter respectively, derive approximate voltage drop equation in the distributor. | Understand | 07 |
| 3 | A single phase feeder circuit has total impedance (2+j6) ohms, receiving end voltage is 11 kv and current is 40⌊_-45$^o$ A.<br>Determine<br>i) P.f of load<br>ii) Load p.f for which the drop is maximum | Understand | 07 |

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|---|---|---|---|
| | iii) Load p.f for which impedance angle is maximum and also , derive the formula used | | |
| 4 | A single phase feeder circuit has total impedance (2+j6) ohms, receiving end voltage is 11 kv and current is $50\angle -30^o$ A.<br>Determine<br>i) P.f of load<br>ii) Load p.f for which the drop is maximum<br>Load p.f for which impedance angle is maximum and also , derive the formula used | Understand | 07 |
| 5 | A single phase feeder circuit has total impedance of (1+j3)Ω $V_R$= $2400\angle 0^o$ v and $I_R$= $50\angle -30^o$ A, respectively. Find<br>i) P.f of load<br>ii) Load p.f for which the drop is maximum | Understand | 07 |
| 6 | Electrical energy is supplied to a consumer from a substation at a distance of 250 m. if the power required by the consumer is three phase 100kw at 415 v unity power factor and resistance of single conductor of the connecting cable is 0.1/1000Ω/m. calculate,<br>i) The voltage at the bus bar of the substation<br>ii) The power loss in the cable. | Understand | 07 |
| | | | |
| 7 | Consider the single phase radial distributor shown in the following figure<br>The magnitude of the load currents, p.fs and distances are indicated in the figure. The resistance and reactance of each wire are 0.1 ohm and 0.2 ohms per km respectively. It is required to maintain voltage at point B as $230\angle 0^o$ volts. Find.<br>i) Voltage drop in the three sections<br>ii) Ii) the voltage drop in the feeder<br>iii) Supply voltage, current and power factor<br>iv) Kva output of supply<br>The p.f angle of individual loads are with respect to voltage at point B | Understand | 07 |
| 8 | An unbalanced three phase Delta connected load is connected to balanced three phase ,Three wire source the load impedance $Z_a$ ,$Z_b$ and $Z_c$ are given by $60\angle 30^o$ ohm/phase, $85\angle -45^o$ohm/phase,$50\angle 35^o$ ohm/phase respectively, the phase 'a' line voltage has been an effective value of 12.6 kv .use the A phase to Phase voltage as the reference and determine the following<br>line currents and real and reactive powers | Understand | 07 |
| 9 | Consider the three phase ,three wire 240v secondary system with balanced loads at a A,B and C as shown in figure .Determine,<br>i) Calculate the total voltage drop<br>ii) Calculate the kva output and load p.f of the distribution transformer<br>iii) Calculate total power per phase for each load | Understand | 07 |
| 10 | An unbalanced three phase star connected load is connected to balanced three phase ,four wire source the load impedance $Z_a$ ,$Z_b$ and $Z_c$ are given by $70\angle 30^o$ ohm/phase, $85\angle 40^o$ohm/phase,$50\angle 35^o$ ohm/phase respectively, the phase 'a' line voltage has been an effective value of 13.8 kv .use the line to neutral voltage of phase 'a' as the reference and determine the following<br>i) line to neutral currents<br>ii) total power delivered to the load | Understand | 07 |
| | **UNIT - IV<br>PROTECTIVE AND COORDINATION** | | |
| | **Part - A (Short Answer Questions)** | | |
| 1 | Describe the operating principle of Fuses. | Remember | 08 |
| 2 | Describe the operating principle of circuit breakers. | Remember | 08 |
| 3 | Describe the operating principle of line sectionalizer. | Remember | 08 |
| 4 | Define Fuse? | Understand | 08 |

| S. No | Question | Blooms Taxonomy Level | Course Outcome |
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| 5 | List out the main objective of distribution system protection? | Understand | 08 |
| 6 | List out the advantages of circuit breaker? | Remember | 08 |
| 7 | Define Circuit recloser? | Remember | 08 |
| 8 | Define Circuit breaker? | Remember | 08 |
| 9 | What is the function of relay? | Remember | 08 |
| 10 | Discuss about transmission line protective devices. | Remember | 08 |
| 11 | Define coordination? | Remember | 09 |
| 12 | Discuss about importance of coordination. | Understand | 09 |
| 13 | Define protective device? | Remember | 08 |
| 14 | Discuss about advantages of fuse to fuse coordination. | Remember | 09 |
| 15 | Distinguish between the fuse to fuse coordination and fuse to recloser coordination? | Remember | 09 |
| 16 | Define fuse to recloser coordination? | Remember | 09 |
| 17 | Discuss about advantages and disadvantages of fuse to recloser coordination. | Understand | 09 |
| 18 | Discuss about Advantages and disadvantages of fuse to circuit breaker coordination. | Understand | 09 |
| **Part - B (Long Answer Questions)** | | | |
| 1 | The per unit values of positive, negative and zero sequence reactance's of a network at fault are 0.08, 0.07 and 0.05 respectively. Determine the fault current if the fault is double line to ground. | Understand | 08 |
| 2 | Discuss advantages and disadvantages of fuses. | Remember | 08 |
| 3 | Discuss about when maximum faults and minimum faults occur in distribution system. | Remember | 08 |
| 4 | List out the objectives of a distribution protection? | Understand | 08 |
| 5 | Discuss the Principle of a circuit recloser used in protection of distribution system. | Understand | 08 |
| 6 | Discuss the procedure for fault current calculation in following faults.<br>i. Double Line Ground fault ii. Line-Line fault. | Understand | 08 |
| 7 | What are the common faults occur in distribution system? Explain with line diagrams? | Understand | 08 |
| 8 | Discuss the procedure for fault current calculation in following faults.<br>i. three phase Ground fault ii. Phase to phase ground fault. | Understand | 08 |
| 9 | List out the common types of faults in a single phase 2-wire and 3-wire systems? Explain how fault current is computed with proper single line diagrams? | Understand | 08 |
| 10 | Explain briefly secondary system fault current calculation for?<br>a. Single phase 120/240 V three wire secondary service<br>b. Three phase 240/120 star/ delta or delta/star four secondary | Understand | 08 |
| 11 | Discuss the overall coordination procedure employed for protection of distribution systems. | Understand | 09 |
| 12 | Discuss in detail how the co-ordination of various protective devices helps in improving system performance. | Understand | 09 |
| 13 | Discuss about Fuse-Fuse coordination. | Understand | 09 |
| 14 | Discuss about Fuse-Circuit breaker coordination. | Understand | 09 |
| 15 | Discuss about different types of coordination of protective devices. | Understand | 09 |
| 16 | List out the data required for the general coordination procedure? | Understand | 09 |
| 17 | Discuss briefly the general coordination procedure? | Understand | 09 |
| 18 | Discuss recloser-circuit breaker coordination. | Understand | 09 |
| 19 | Discuss about fuse-recloser coordination. | Remember | 09 |
| **Part – C (Analytical Questions)** | | | |

| S. No | Question | Blooms Taxonomy Level | Course Outcome |
|---|---|---|---|
| 1 | Discuss the operation of line sectionalizer with a neat sketch. | Understand | 08 |
| 2 | The per unit values of positive, negative and zero sequence reactance's of a network at fault are 0.08, 0.07 and 0.05 respectively. Determine the fault current if the fault is double line to ground. | Understand | 08 |
| 3 | Considering a typical example, describe the procedure for fault current calculations in a distribution system, mentioning the assumptions to be made for the analysis. | Understand | 08 |
| 4 | The per unit positive, negative and zero sequence impedances of a distributed network are 0.06, 0.06 and 0.04 respectively. Determine the fault current for L-L and L-G faults. | Understand | 08 |
| 5 | A single phase 3 wire distribution line 600V-0-160V, feeds a load of 10 kVA on each line to ground. The transformer is 7620V/240V, 25KVA with 5% impedance. The line impedance is j0.15 ohm per wire. Calculate the fault current and fault MVA for<br>a. L-L fault 1 km from the transformer<br>b. L-G fault 1 km from the transformer | Understand | 08 |
| 6 | 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. | Understand | 08 |
| 7 | What is the data required for the selecting a circuit breaker. | Understand | 08 |
| 8 | Discuss about the automatic line sectionalizers? Discuss the purpose and advantages of using them. | Understand | 09 |
| 9 | Discuss about data required for selecting a circuit breaker? | Understand | 09 |
| 10 | List out the different types of over current protective devices and explain their merits and demerits. | Remember | 09 |
| 11 | Discuss in detail how the coordination of various protective devices helps in improving system performance. | Understand | 09 |
| 12 | Discuss about recloser to recloser coordination. | Understand | 09 |
| 13 | Discuss the coordination procedure between two fuses | Understand | 09 |
| | **UNIT - V<br>COMPENSATION FOR POWER FACTOR IMPROVEMENT** | | |
| | **Part - A (Short Answer Questions)** | | |
| 1 | Discuss the disadvantages of low voltage and low p.f of the system. | Remember | 10 |
| 2 | Discuss the importance of power factor correction. | Understand | 10 |
| 3 | Discuss the financial benefits due to voltage improvement. | Understand | 10 |
| 4 | Discuss advantages of series compensation. | Understand | 10 |
| 5 | Discuss importance of shunt capacitor compensation. | Remember | 11 |
| 6 | Discuss benefits due to released distribution substation capacity. | Remember | 11 |
| 7 | Define power factor? | Remember | 10 |
| 8 | Discuss advantages of shunt compensation. | Remember | 10 |
| 9 | Discuss about power factor correction. | Remember | 10 |
| 10 | Discuss financial benefits due to voltage improvement. | Remember | 11 |
| 11 | Define voltage regulation? | Remember | 10 |
| 12 | Define voltage drop? | Remember | 10 |
| 13 | Define nominal voltage? | Understand | 11 |
| 14 | Define rated voltage? | Understand | 11 |
| 15 | Define utilization voltage? | Remember | 10 |
| 16 | Discuss the applications of induction regulators. | Remember | 10 |
| 17 | What are the advantages and disadvantages of automatic voltage booster? | Understand | 12 |

| S. No | Question | Blooms Taxonomy Level | Course Outcome |
|---|---|---|---|
| 18 | Define maximum voltage? | Understand | 10 |
| 19 | Define minimum voltage? | Understand | 10 |
| 20 | Discuss use of tap-changing transformer. | Understand | 12 |
| | **Part - B (Long Answer Questions)** | | |
| 1 | Discuss the effect of shunt compensation on distribution system. | Understand | 11 |
| 2 | Compare and explain the role of shunt and series capacitors in power factor correction. | Remember | 11 |
| 3 | What are the differences between fixed and switched capacitors? What are their effects on distribution systems? | Remember | 10 |
| 4 | Discuss the procedure employed to determine the best capacitor location. | Remember | 11 |
| 5 | Discuss how a series capacitor boosts the voltage with the help of a phasor diagram? What are the drawbacks of this method? | Remember | 11 |
| 6 | Discuss different types of capacitors used in distribution network to improve power factor. | Remember | 11 |
| 7 | Why the improvement of power factor is very important for both consumers and generating stations? List the various causes of low power factor and explain | Remember | 10 |
| 8 | How economic power factor arrived at for a given distribution system with different loads? | Remember | 11 |
| 9 | 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? | Remember | 12 |
| 10 | Discuss how an overexcited synchronous machine improves power factor. | Remember | 12 |
| 11 | How an AVR can control voltage? With the aid of suitable diagram, explain its function? | Understand | 10 |
| 12 | Briefly explain the line drop compensation on voltage control? | Understand | 11 |
| 13 | How do the shunt capacitors and reactors control the voltage? List the disadvantages of using a shunt capacitor for voltage control? | Remember | 11 |
| 14 | Compare and explain the role of shunt and series capacitor in voltage control. | Understand | 12 |
| 15 | Describe different types of equipment for voltage control with neat diagrams. | Understand | 11 |
| 16 | Discuss need for maintaining good voltage profile in power systems and need to improve power factor. | Understand | 10 |
| 17 | Discuss the various methods adopted for voltage control. | Understand | 11 |
| 18 | Discuss about the control and rating of voltage regulators. | Understand | 11 |
| 19 | Discuss about the induction type regulator. | Understand | 11 |
| | **Part – C (Analytical Questions)** | | |
| 1 | A 3-phase substation transformer has a name plate rating of 7500 kVA and a thermal capability of 125% of the name plate rating. If the connected load is 8816 kVA with a 0.9power factor (lagging), determine the following:<br>i. the kVAR rating of the shunt capacitor bank required to decrease the kVA load of the transformer to its capability level<br>ii. The power factor of the corrected level. | Understand | 11 |
| 2 | A 3phase transformer rated 7000kVA and has a over load capability of 125 % of the rating. Ifthe connected load is 1150 kVA with a 0.8 p.f(lag), determine the following:<br>i. The kVAR rating of shunt capacitor bank required to decrease the kVA load of the transformer to its capability level,<br>ii. The kVAR raring of the shunt capacitor bank required to correct the load p.f. to unity.<br>iii. The p.f. of the corrected level. | Understand | 11 |
| 3 | A 440 V, 50 cycles three phase line delivers 250 KW at 0.7 p.f (lag). It is desire to bring the line p.f to unity by installing shunt capacitors. Calculate the capacitance if they are:<br>i. star connected ii. delta connected | Understand | 10 |
| 4 | A 3 phase substation transformer has a name plate rating of 7250 KVA and a thermal | Understand | 11 |

| S. No | Question | Blooms Taxonomy Level | Course Outcome |
|---|---|---|---|
| | capability of 120% of the name plate rating. If the connected load is is 8816 KVA with a 0.85 of lag p.f determine the following<br>a. The KVAR rating of the shunt capacitor tank required to decrease the KVA load of the transformer to its capability level<br>b. The power factor of the corrected level. | | |
| 5 | A single-phase motor takes a current of 10 amps at a p.f. of 0.707 lagging from a 230V, 50 Hz supply. What value must a shunting capacitor have to raise the p.f. to unity | Understand | 11 |
| 6 | Discuss the computerized method to determine the economic power factor. | Understand | 12 |
| 7 | A 750 KVA load has a power factor of0.75 lag. It is derived to improve the power factor to 0.9 lag . Find the KVAR rating of the capacitor for the power factor improvement. | Understand | 11 |
| 8 | A synchronous motor having a power consumption of 40 KW is connected with a load of 150KW, a lag power factor of 0.8. if the combined load has a power factor of 0.9, what is the leading reactive KVA supplied by the motor and at what p.f is it working. | Understand | 12 |
| 9 | A 3 phase substation transformer has a name plate rating of 7000 KVA and a thermal capability of 125% of the name plate rating. If the connected load is is 1150 KVA with a 0.8 of lag p.f determine the following<br>a. The KVAR rating of the shunt capacitor tank required to decrease the KVA load of the transformer to its capability level<br>b. The power factor of the corrected level. | Understand | 11 |
| 10 | A 400 V 50 cycles three phase line delivers 207KW at 0.8 p.f lag. It is desired to bring the line p.f to unity by installing shunt capacitors, calculate the capacitance if they are i. star connected ii.delta connected | Understand | 12 |
| 11 | Discuss about any two methods of voltage control. | Understand | 12 |
| 12 | Discuss the way to improve the distribution system overall voltage regulation | Understand | 12 |
| 13 | How to do the shunt capacitor and reactors control the voltage? | Understand | 10 |
| 14 | Discuss the methods to calculate the voltage dips due to fluctuations in distribution systems. | Remember | 11 |
| 15 | With the help of a phasor diagram, show how a series capacitor boosts the voltage. What are the drawbacks of this method? | Understand | 11 |
| 16 | Discuss the effect of AVR on voltage control. | Understand | 12 |

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