# INSTITUTE OF AERONAUTICAL ENGINEERING

**(Autonomous)**

Dundigal, Hyderabad - 500 043

## ELECTRICAL AND ELECTRONICS ENGINEERING

## ASSIGNMENT QUESTIONS

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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 Coordinator** | **:** | **Dr. P Sridhar, Professor, EEE** |
| **Course Faculty** | **:** | **Dr. P Sridhar, Professor, EEE** |

**OBJECTIVE:**

This course is deals with Economic operation of power system, hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

**ASSIGNMENT - I**

**UNIT - I**

| S. No | QUESTION | Blooms Taxonomy Level | Course Outcomes |
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| 1 | Discuss the characteristics of the Residential loads. | Remember | 02 |
| 2 | Discuss the characteristics of the Agriculture loads. | Remember | 02 |
| 3 | 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. | Understand | 01 |
| 4 | 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 | Understand | 01 |
| 5 | 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 ii) Total annual copper loss energy and its value Rs.1.50 per kwh | Understand | 01 |
| 6 | 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. | Understand | 01 |
| 7 | Discuss how the maximum demand and average demand can be obtained | Remember | 02 |

| Transformer | Load | Demand Factor | Diversity Factor |
|---|---|---|---|
| No.1 | 10kw | 0.65 | 1.5 |
| No 2 | 12kw | 0. | 3.5 |
| No.3 | 15kw | 0.7 | 1.5 |

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| | from daily demand variation curve. | | |
| 8 | A 50 MW hydro generator delivers 320 million kwh during the year. Calculate the plant load factor. | Understand | 02 |
| 9 | 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. | Understand | 02 |
| 10 | Assume that the annual peak load of a primary feeder is 2000 kw, at which the power is 80kw 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. | Understand | 02 |
| | **UNIT - II** | | |
| 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 |
| | **UNIT - III** | | |
| 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<br>distribution load. | Understand | 07 |
| 7 | What are the power losses in A.C distribution? How it is estimated approximately. | Remember | 07 |
| | **ASSIGNMENT - II** | | |
| 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 |

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| 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<br>compare to the 3-phase balanced system. | Understand | 07 |
| | **UNIT - IV** | | |
| 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<br>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 |
| | **UNIT - V** | | |
| 1 | How do the shunt capacitors and reactors control the voltage? List the disadvantages of using a shunt capacitor for voltage control? | Remember | 11 |
| 2 | Compare and explain the role of shunt and series capacitor in voltage control. | Understand | 12 |
| 3 | Describe different types of equipment for voltage control with neat diagrams. | Understand | 11 |
| 4 | Discuss need for maintaining good voltage profile in power systems and need to improve power factor. | Understand | 10 |
| 5 | 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 |
| 6 | 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 |
| 7 | 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: i. star connected ii. delta connected | Understand | 10 |

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| 8 | A 3 phase substation transformer has a name plate rating of 7250 KVA and a thermal 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. | Understand | 11 |

**Prepared by: Dr. P Sridhar, Professor, EEE**

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