

NTK/KW/15/7553

**Faculty of Engineering & Technology
Seventh Semester B.E. (Electrical Engg.) (C.B.S.)
Examination
ELECTRICAL INSTALLATION DESIGN**

Time—Three Hours]

[Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

- (1) All questions carry marks as indicated.
- (2) Solve Question No. **1 OR** Questions No. **2**.
- (3) Solve Question No. **3 OR** Questions No. **4**.
- (4) Solve Question No. **5 OR** Questions No. **6**.
- (5) Solve Question No. **7 OR** Questions No. **8**.
- (6) Solve Question No. **9 OR** Questions No. **10**.
- (7) Solve Question No. **11 OR** Questions No. **12**.
- (8) Due credit will be given to neatness and adequate dimensions.
- (9) Assume suitable data wherever necessary.

- (10) Illustrate your answers wherever necessary with the help of neat sketches.
- (11) Use of non programmable calculator is permitted.
1. (a) Compare overhead v/s underground distribution of Electricity. 5
- (b) Maximum demand of a generating station is 100 MW, a load factor is 65%. The plant capacity factor and plant use factors are 50% and 80% respectively. Determine :
- (i) The daily energy produced
- (ii) Installed capacity of plant
- (iii) The reserve capacity of plant
- (iv) Maximum energy that could be produced if plant is running all the time.
- (v) The maximum energy that could be produced daily if the plant is running at full load (according to the operating schedule) and
- (vi) Utilization factor. 8

OR

12. (a) Define and explain the following terms as per IE rules : Accessible, Linked Switch, Cut-out, Circuit Breaker, Point of Supply, Lightning Arrestor. Why cut-out is not installed in Earthed or Earthed Neutral Conductor ? 8
- (b) Discuss various voltage levels and their tolerances as per IE Rules. Also explain provision for Intimation of Accidents as per IE Rules. 6

is running at full load with efficiency of 95.8% and power factor of 0.89 lag. Determine starting torque and starting current for star-delta and auto transformer (with 80% tap) starting. Assume starting current to rated current ratio of 6.0. 6

- (b) Explain DOL. Starting of Squirrel Cage Induction Motor (SCIM) along with its power and control circuit. Also draw the speed torque characteristics of SCIM used along with DOL starter. 8

OR

6. (a) What do you mean by Power Factor Improvement ? Explain various advantages of improving power factor. 6

- (b) A 415 V, 50 Hz, 150 HP Delta connected induction motor has an efficiency of 91% and power factor of 0.87 lag at full load :

- (i) Determine the rating of capacitors required to improve the power factor to 0.97 lag.

- (ii) If the cost of installation of capacitors is Rs. 375/- per KVA and the energy charges are Rs. 4.25/- per KWh, find the annual saving due to reduction in cable losses and the payback period for capacitor installation cost. Assume that the motor runs for 500 Hrs per month and the supply cable resistance is 0.05Ω per phase. Give your comment on result. 8

7. (a) Explain the construction and working of a Buchholz Relay. 7

- (b) Explain various pre-commissioning tests on power transformer (any **four**). 6

OR

8. (a) Draw neat sketch showing pole mounted substation for 400 KVA, 11 kV/433 volts transformer. Also draw single line diagram. Show important specifications for major equipments used. 8

- (b) Give the classification of Substation. 5

9. (a) Explain the importance of Demand and Diversity factors in assessing load demand. Also explain how these two are useful in determining the transformer capacity. 7
- (b) Explain various tests to be performed on an installation (Megger Testing for IR, Continuity and Earth Resistance.) 6

OR

10. (a) Write short note on PCC and MCC. 6
- (b) Explain various electrical characteristics for the selection of Electric motor drive.
- [Duty of motor; voltage, current and frequency; starting method; speed torque characteristics etc..] 7
11. (a) Define the terms Earth and Earth Electrode. Discuss the main objectives of system earthing and equipment earthing as per IS 3043. 6
- (b) Draw and explain with neat diagram showing plate type earthing as per IS 3043. 8

OR

2. (a) Explain various methods of Cable Laying. 6
- (b) Write detailed notes on AAC and ACSR conductors. 7
3. (a) Write a short note on Contactor. 7
- (b) Compare SF₆ and Vacuum Circuit Breaker. 6

OR

4. (a) Explain various locations of reactors in Power Systems. 6
- (b) A 10 MVA, 6.6 kV, 3 ϕ star connected alternator having a reactance of 20% is connected through a 5 MVA, 6.6 kV/33 kV transformer of 10% reactance to a transmission line having a resistance and reactance per conductor per kilometer of 0.2Ω and 1π respectively 50 km along the line, a short circuit occurs between the three conductors. Find the current fed to the fault by the alternator. 7
5. (a) A 3-phase, 200 kW, 4 pole, 1487 rpm, 415 volts, 50 Hz, Delta connected squirrel cage induction motor

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