

Electrical Installation Design

P. Pages : 3

NRT/KS/19/3550

Time : Three Hours

0251

Max. Marks : 80

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- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Illustrate your answers whenever necessary with the help of neat sketches.

- 1.** a) What do you understand by time of day (TOD) based tariff? Discuss how TOD tariff can be utilized by a consumer for reducing cost of electrical energy. **7**
- b) Maximum demand of a generating station is 100mw, a load factor is 65%. The plant capacity factor and plant use factor are 50% and 80% respectively. **6**
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 plants is running all the time
 - v) The maximum energy that could be produced daily if the plant is running at full load
 - vi) Utilization factor.

OR

- 2.** a) Draw and explain construction of cable classify cables on the basis of voltage level. **7**
- b) Draw cross sectional view for (with specification) **6**
- i) 1 core, 11kv, Cu/AL conductor, XLPE Armoured cable
 - ii) 3 core, 3.3kV, Cu/AL XLPE, Armoured cable
 - iii) Three and half core AL/Cu conductor PVC unarmoured for 1.1kV.
- 3.** a) Explain working principle of MCB? What are the advantages and disadvantages of MCB. **7**
- b) Classify circuit breaker on the basis of voltage level. Explain vacuum circuit breaker with neat sketch. **7**

OR

4. a) What do you mean by current limiting reactor? Explain in short along with its advantages and disadvantages. **7**
- b) 50MVA, 132/33kV, Y-Y transformer with 10% impedance at full load Cu loss of 300kw is feeding an industrial transformer of rating 5MVA < 33/0.433kV. The full load Cu loss 30kw at impedance of 7%. Find the fault current on transformer LT Terminals. Assuming infinite bus on 132kV side. Line resistance and reactance per phase to be 0.32Ω/km and 0.37 Ω/km. (Length of transmission line 35km) **7**

5. a) Draw the control and power circuit for Star-Delta starter and explain its operation. **7**
- b) Write short note on selection of power contactors. **6**

OR

6. a) What do you mean by power factor? State various disadvantages of overcompensation of power factor. **7**
- b) A 415V, 50Hz, 200HP delta connected induction motor has an efficiency of 90% and power factor of 0.85 (lag) at full load. **6**
- i) Determine the rating of capacitors required to improve the power factor to 0.99 (lag).
- ii) If the cost of installation of capacitors is Rs 400/- per KVAR and the energy charge are Rs 6/- per kwhr, find the annual saving due to reduction in cable losses and the payback period for capacitor installation cost. Assume that motor runs for 500hrs per month and the supply cable resistance is 0.05Ω/ph.

7. a) Write short note on Buchholz relay. **7**
- b) Explain various factors for selection of transformer. Also give steps in determine size and rating of transformer. **7**

OR

8. a) Explain any three important equipment of a substation. Also give sequence of operation of Isolator, circuit breaker and earth switch during opening and closing of a circuit. **7**
- b) Explain various pre-commissioning test on power transformer. **7**

9. An electrical installation consists of three load areas A, B and C each of which has its own motor control centre. The MCC are receiving the supply from power control centre located on the secondary of the supply transformer. The load details are 3 phase, 415V, 50Hz induction motors are as under. **13**
- i) Area A: - 50 HP (3 Nos), 30 HP (4 Nos), 5 HP (6 Nos)
- ii) Area B: -100 HP (2 Nos), 60 HP (3 Nos), 7.5 HP (4 Nos)
- iii) Area C: - Lighting load – 15 HP, 3 phase Heating load – 70 kW, 3 phase
- Draw neat single line diagram of PCCs and MCCs with rating and specifications of protective devices. Assume overall efficiency of 85%, power factor of 0.9 (lag) and demand factor of 0.65, determine rating of transformer also.

OR

- 10.** a) Write short note on PCC and MCC. **7**
b) Explain various factors deciding for selection of transformer. **6**
- 11.** a) Explain potential fall method with neat sketch for earth resistance measurement. **7**
b) Draw and explain pipe type earthing as per IS 3043 and also explain the effect of salt and moisture content on soil resistivity. **6**

OR

- 12.** a) Discuss the main objectives of system earthing and equipment earthing as per IS3043. **7**
b) Explain any five safety IE rules in detail. **6**
