**TU/CDOE**

**TEZPUR UNIVERSITY**

**SEMESTER END EXAMINATION (AUT 21 & SPR 22)**

**DRE203: ENERGY EFFICIENCY IN ELECTRICAL UTILITIES**

Time: **3 Hours** Total Marks: **70**

*The figures in the right-hand margin indicate marks for the individual question.*

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1. Select appropriate answer for each of the following questions: **1×10=10**
2. The maximum unbalanced load between phases should not exceed …… % of the capacity of the DG set

a) 2 b) 10 c) 8 d) 10

1. Heat release rate (kcal/min/ton) to the cooling tower in vapour compression refrigeration system is equal to:

a) 63 b) 500 c) 127 d) 220

1. The efficiency figures for energy efficient motors (in comparison with standard efficiency motor) can be generally higher by

a) 1-3% b) 3-7% c) 8-10% d) above 10%

1. The minimum illuminance required for non working interiors as per IS 3646 is

a) 1000 lux b) 100 lux c) 50 lux d) 20 lux

1. The maximum permissible percentage unbalance in phase loads on DG sets is

a) 1% b) 5% c) 10% d) 15%

1. Natural draft cooling towers are mainly used in

a) steel industry

b) alumina industry

c) fertiliser industry

d) power stations

**P.T.O**

1. The percentage reduction in distribution loses when tail end power factor raised from 0.8 to 0.95 is

a) 15.8% b) 71% c) 29% d) 81%

1. The total losses in a transformer operating at 50% load with designed no load and load losses at 2 kW and 20 kW respectively are

a) 4.5 kW b) 7 kW c) 12 kW d) 22 kW

1. With decrease in speed of the motor, the required capacitive kVAr

a) decrease

b) remains same

c) increase

d) none of the above

1. The compressor capacity of a reciprocating compressor is directly proportional to

a) speed b) pressure c) volume d) all

1. A company is running foundry industry drawing 1020 kVA of average power from a 1600 kVA rated transformer. The transformer no-load and full-load losses are 2.4 and 18.57 kW/h, respectively. The company is utilising the electricity at a power factor (PF) of 0.65 and an energy management farm advised them to improve the power factor to 0.95. If the demand charges levied by the power distribution company is ₹230/kVA and unit cost of capacitor is 600 per kVA, calculate the following:  **3+3+3=9**
2. kVAr required to improve the PF,
3. reduction in kVA demand, and
4. techno-economics of the PF improvement.
5. Explain the simple method of capacity assessment of air compressors.  **10**
6. A cooling tower is designed to cool down the process water temperature from 37℃ to 32℃ in 3 concentrating cycles. If the drift loss of the cooling tower is 0.1% evaluate the following for a flow rate of 1260 m3/h. **2+2+2=6**
7. Daily make up water requirement
8. Evaporation loss
9. Blow down loss
10. Describe the step by step methodology of lighting system audit in a plant and list all the possible energy conservation measures in lighting system. **7+8=15**
11. Explain few characteristics of load which influences the efficient use of DG set. **10**
12. Briefly explain the methodology of refrigeration plant energy audit.  **10**

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