**TU/ CODL**

**TEZPUR UNIVERSITY**

**SEMESTER END EXAMINATION (SPRING) 2019**

**DRE 203: 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:

1.5x10=15

1. The total loss for a transformer loading at 60%, with no load and full load losses of 3 kW and 25 kW respectively, is

i) 3 kW ii) 12 kW iii) 18 kW iv) 25 kW

1. A two pole induction motor operating at 50 Hz, with 1% slip will run at an actual speed of

i) 3000 RPM ii) 3030 RPM iii) 2970 RPM iv) none of the above

1. For fans, the relation between power P and speed N is

i) ii) iii) iv)

1. For centrifugal pumps, the relation between flow discharge Q and pump speed N is

i) ii) iii) iv)

1. A fan is operating at 970 RPM developing a flow of 3000 Nm3/h. at a static pressure of 650 mmWC. If the speed is reduced to 700 RPM, the static pressure (mmWC) developed will be

i) 244.3 ii) 388.5 iii) 469 iv) none of the above

1. The refrigeration load in TR when 30 m3/h of water is cooled from a 14o C to 6.5oC is about

i) 74.4 ii) 64.5 iii) 261.6 iv) none of the above

**P.T.O.**

1. In electricity distribution, if the voltage is raised from 3.3 kV to 6.6 kV for the same loading conditions, the distribution losses are reduced by a factor of

i) 1/5 ii) 1/2 iii) 1/3 iv) 1/4

1. The nearest kVA rating required for a DG set with 1000 kW connected load, with diversity factor of 1.5 and 80% loading and 0.84 power factor is

i) 2000 kVA ii) 1500 kVA iii) 1000 kVA iv) 0500 kVA

1. The compression ratio in diesel engines is in the range of

i) 14:1 to 25:1 ii) 10:1 to 13:1 iii) 5:1 to 10:1 iv) 10:1 to 15:1

1. One ton of refrigeration (TR) is equal to

i) 12,00 BTU h−1 ii) 4.51 kW iii) 3024 kW h−1  iv) 3024 kCal h−1

2. A pulp & paper industry has installed a 22.5 MW CHP plant. The CHP

plant’s maximum condenser load is 10 MW, and extraction steam of 71.25

TPH is used for process and also for vapour absorption system. The

condenser heat load is 550 kCal/kg of steam and steam rate is 5 kg/kW for

condenser power. The heat load of vapour absorption system is 127

kCal/min/TR and has a capacity of 1375 TR. Estimate the cooling tower

heat load in kCal/h. If the tower is designed for 10°C range, calculate the

water flow in cooling tower. 10

3. A fan is delivering 22,000 Nm3/h. of air at static pressure difference of

60 mm WC. If the fan static efficiency is 70%, find out the shaft power of

the fan. 7

4. List down the benefits of maximum demand control. What are the options

for controlling maximum demand. 8

5. Write short notes on **any four**: 5x4=20

a) Multi speed motor

b) Energy saving opportunities in domestic lighting system

c) Synchronous motor

d) Evaporative cooling systems

e) Colour Rendering Index

f) Day lighting

6. What is the main difference between Vapor Compression and Vapour Absorption Refrigeration systems? How does a Vapour Compression System work? 5+5=10

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