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10EE72

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Electrical Power Utilization

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. With a neat sketch, explain the working of indirect resistance heating. **(06 Marks)**

b. Discuss methods of temperature control of resistance oven. **(06 Marks)**

c. A 16 KW resistance oven employing nicrome wire is to be operated from a 220 V, 1φ power supply. If the temperature of the element is to be limited to 1170° and average temperature of the charge is 500°C. Find the diameter and length of the element wire. Radiating efficiency is 0.57 and emissivity is 0.9 specific resistance of Nicrome is 109×10^{-8} ohm-m. **(08 Marks)**

2 a. Explain the factors affecting the appearance of deposition in electro deposition. **(06 Marks)**

b. Explain briefly the various applications of electrolysis. **(06 Marks)**

c. Explain the terms used in electrolytic process:
   (i) Throwing of power.
   (ii) Current efficiency.
   (iii) Energy efficiency
   (iv) Electro chemical equivalent **(08 Marks)**

3 a. State and explain:
   (i) Inverse square law.
   (ii) Lamberts cosine law, with respect to illumination. **(06 Marks)**

b. Explain the direct lighting and indirect lighting schemes. **(06 Marks)**

c. Two lamp posts 20 m apart and are fitted with 200 CP lamp each at height of 6 m above the ground. Calculate the illumination on the ground:
   (i) Under each lamp (ii) Midway between the lamps. **(08 Marks)**

4 a. With a neat diagram, explain the construction and working of the sodium vapour lamp. **(06 Marks)**

b. Define the following terms:
   (i) MHCP
   (ii) MSCP
   (iii) Candle power. **(06 Marks)**

c. An illumination on the working plane of 75 lux is required in a room 72 m × 15 m in size. The lamps are hung at 4 m above the work bench. Assume a space height ratio around unity, utilization factor of 0.5. Consider a lamp efficiency of 14 lumens/watt and a candle power depreciation of 20%. Estimate the members rating and with a neat sketch show the deposition of the lamps. **(08 Marks)**

PART – B

5 a. Mention advantages and limitations of electric traction. (06 Marks)

b. With circuit connections, explain plugging and regenerative braking as applied to tractive motors. (08 Marks)

c. A train is required to run between two stations 1.6 km apart at an average speed of 40 kmph. The run is to made to a simplified quadrilateral speed time curve. If the maximum speed is to be limited to 64 kmph, acceleration 2 kmphs, coasting and braking retardation to 0.16 kmphps and 3.2 km phps respectively. Determine the duration of acceleration, coasting and braking periods. (06 Marks)

6 a. Define specific energy consumption and mention the factors affecting it. **(06 Marks)**

b. Explain the terms:
   (i) Adhesive weight
   (ii) Tractive effort. **(06 Marks)**

c. An electric train has an average speed of 45 kmph on a level track between stops 1.8 km apart. It is accelerated 2 kmphps and braked at 3 kmphps. Draw the speed time curve for the run. Estimate the energy consumption at axles of the train per tonne-km. Take tractive resistance as 45 N/tonne and allow 10% for rotational inertia. **(08 Marks)**

7 a. Assuming a quadrilateral speed time curve, derive equation for,
   (i) Total distance travelled by the train between two stops
   (ii) Velocity at the time of braking. **(10 Marks)**

b. Explain :
   (i) Shunt transition.
   (ii) Bridge transition.
   applied to series parallel starting of D.C. motors with neat figures. **(10 Marks)**

8 a. With relevant graphs, explain traction motors characteristics. **(06 Marks)**

b. Discuss the concept and its subsystem of modern electric drives in detail. Draw relevant figure. **(08 Marks)**

c. Write a note on Hybrid vehicles. **(06 Marks)**

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