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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, 1 $\phi$  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  $109 \times 10^{-8}$  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: (08 Marks)
    - (i) Throwing of power.
    - (ii) Current efficiency.
    - (iii) Energy efficiency
    - (iv) Electro chemical equivalent
  
3.
  - a. State and explain: (06 Marks)
    - (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: (08 Marks)
    - (i) Under each lamp
    - (ii) Midway between the lamps.
  
4.
  - a. With a neat diagram, explain the construction and working of the sodium vapour lamp. (06 Marks)
  - b. Define the following terms: (06 Marks)
    - (i) MHCP
    - (ii) MSCP
    - (iii) Candle power.
  - c. An illumination on the working plane of 75 lux is required in a room 72 m  $\times$  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 be 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 kmphs 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 kmphs and braked at 3 kmphs. 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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