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Seventh Semester B.E. Degree Examination, Dec.09/Jan.10
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. Mention the advantages of electrical heating. (06 Marks)
 - b. Derive and explain design procedure for a circular heating element. (06 Marks)
 - c. A piece of plastic material of size 5 x 2 x 1 cm is heated by placing it between two electrodes, each having an area of 20 x 2 cm and are separated by a distance of 1.6 cm. The frequency of the supply is 20 MHz. If the power consumed is 100 watts, determine the voltage to be applied across the electrodes and current through the material. Assume relative permittivity as 5 and power factor 0.05. (08 Marks)

- 2
 - a. State and explain the Faraday's laws of electrolysis. (06 Marks)
 - b. What is electro deposition? Discuss the factors affecting the electro deposition. (06 Marks)
 - c. If 20 gm of Nickel is deposited by 100 amperes flowing for 8 minutes. How much copper would be deposited by 50 amperes for 6 minutes? Atomic weight of Nickel = 58.6 and atomic weight of copper = 63.18 valency of both is 2. (08 Marks)

- 3
 - a. Define the various terms used in illumination:
 - i) Solid angle
 - ii) Illumination
 - iii) Glare. (06 Marks)
 - b. Discuss the requirements of good lighting. (06 Marks)
 - c. A hall 28 m x 48 m is illuminated by indirect lighting using inverted bowl fittings. An average illumination of 108 lumens/m² is to be provided on a horizontal plane parallel to the floor and 0.75 m above it. The walls and ceilings are brightly painted. Design a suitable lighting scheme using filament lamps by taking utilization and depreciation factors as 0.4 and 0.85 respectively. If instead of indirect lighting 80 watts fluorescent lamps are used for the scheme of illumination, what would be the saving in power consumption? (08 Marks)

- 4
 - a. Define and explain the following terms:
 - i) Reflection
 - ii) Diffusion
 - iii) Absorption. (06 Marks)
 - b. Explain the working of compact fluorescent lamp. (06 Marks)
 - c. Explain the following:
 - i) Flood lighting
 - ii) Street lighting. (08 Marks)

PART – B

- 5 a. Compare the system of traction with merits and demerits. (06 Marks)
b. What is speed time curve? With graph explain speed – time curve. (06 Marks)
c. An electric train has a scheduled speed of 30 kmph between stations 1 km apart. The duration of stop is 20 seconds, the crest speed is 25 percent higher than the average running speed and braking retardation is 3 kmphs. Calculate the acceleration. (08 Marks)
- 6 a. What is tractive effort? Derive an expression for tractive effort of train considering the gradient and train resistance. (10 Marks)
b. An electric train has an average speed of 45 km/hr on a level track between stops 1.6 km apart. If the acceleration and retardation are 1.8 km/hr/sec and 3.2 km/hr/sec, draw the speed time curve for the run. Determine the energy consumption at the axles of the train per tonne km. Take tractive resistance constant at 50 Nw per tonne and allow 10% for the effect of rotational inertia. (10 Marks)
- 7 a. Explain how energy saving is achieved by series parallel control. (06 Marks)
b. Write a note on train lighting system. (06 Marks)
c. What is braking? Explain the following : i) Plugging ; ii) Regenerative braking as applied to traction motors. (08 Marks)
- 8 a. With neat block diagram representation, explain the working concept of electric vehicles. (08 Marks)
b. With relevant graph explain traction motor characteristics. (06 Marks)
c. Discuss the energy consumption in electric vehicles. (06 Marks)

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