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Seventh Semester B.E. Degree Examination, June/July 2017
Electrical Power Utilization

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. What are the properties of good heating element? (06 Marks)
b. With neat sketch, explain the principle dielectric heating. (06 Marks)
c. A 20 kN single phase, 220V resistance oven employees circular nichrome wire for its heating elements. If the wire temperature is not to exceed 1127°C and the temperature of the charge is to be 427°C. calculate the size and length of wire requires. Assume $e = 0.9$ and radiation efficiency $k = 0.6$. What would be the temperature of wire when the charge is cold? (08 Marks)
- 2 a. Discuss the factors governing the electro deposition process. (06 Marks)
b. Describe the process of extraction of metals. Explain how aluminium is extracted from the ore. (06 Marks)
c. The worn out part of a shaft 15cm in dia and 30cm long is to be reconditioned by depositing on it 1.5mm of Nickel by electro deposition process. Determine the quality of electricity required and the time taken. If the current density of 160 A/m² is adopted. Assume efficiency of 95%. Density of Nickel may be taken as 8.9 gm/cc. (08 Marks)
- 3 a. Define the following terms : i) Solid angle ii) luminous flux iii) candle power
iv) MHCP v) reduction factor vi) reflection factor. (06 Marks)
b. State and explain the laws of illumination. (06 Marks)
c. Explain requirements of good lighting system. (08 Marks)
- 4 a. Explain the terms : i) refraction ii) absorption iii) glare. (06 Marks)
b. write a note on the following : i) incandecent lamp ii) CFL. (06 Marks)
c. A lamp giving 400 candle power in all directions below the horizontal is suspended 3m above the centre of a square table of 1.5m side. Calculate the maximum and minimum illumination on the table. (08 Marks)

PART – B

- 5 a. Discuss the advantages of electric drives over other drives. (06 Marks)
b. Explain the speed–time curves for train movement. (06 Marks)
c. The distance between two stations is 1 km and the schedule speed is 30 Kmph. Station stopping time 20 sec. Assume braking retardation 3 Kmph. P.S and maximum speed 1.25 times the average speed. Determine the acceleration required to run the service if the speed-time curve is approximated by a trapezoidal curve. (08 Marks)
- 6 a. Discuss the factors affecting specific energy consumption. (06 Marks)
b. Discuss advantages of electric braking over mechanical braking. (06 Marks)
c. Define tractive effort. Derive an expression for traction effort of train considering its movement on an upward gradient and having track-resistance. (08 Marks)

- 7 a. Discuss the advantages of series parallel control of starting as compared to the rheostatic starting for a pair of DC traction motors. (06 Marks)
- b. With neat sketches, explain current collection system in electric locomotives. (06 Marks)
- c. Two motors rated at 1500V have armature resistance of 0.15ohm and take current of 500A each during starting. The effective weight of the train 140 tonnes, dead weight 120 tonnes, specific resistance of 50N Newton's / tonnes tractive effort/ motor 38000 Newton's, speed at the end of starting period 50 kmph, determine : i) duration of starting period ii) speed of train at transition iii) rheostatic loss. (08 Marks)
- 8 a. Explain conceptual illustration of general electric vehicles with block diagram. (10 Marks)
- b. With relevant graph, explain the electric vehicle performance characteristics.[speed v/s tractive effort]. (10 Marks)

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