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NEW SCHEME

Seventh Semester B.E. Degree Examination, Dec.06/Jan. 07
Electrical and Electronics
Electrical Power Utilization

Time: 3 hrs.]   [Max. Marks:100

Note: *1. Answer any FIVE questions.*
2. Missing data, if any may be assumed suitably.

1 a. Explain the various methods or modes of heat transfer.   **(04 Marks)**
   b. Write the principle of arc furnaces and with neat sketch explain indirect arc furnace.
                                                                           (08 Marks)
   c. An electric furnace consuming 5 kW takes 15 minutes to just melt 2.5 kg of aluminum, the initial temperature being 15^0C. Find the efficiency of the furnace when the specific heat of aluminum is 0.212 joules per gram per ^0C, melting point 658^0C and latent heat of fusion 320 joules per gram (Assume 1 joule $= 2.78 \times 10^{-7}$ kWH)
                                                                           (08 Marks)

2 a. Write the classification of electric welding.   **(05 Marks)**
   b. Write the difference between arc welding and resistance welding.   **(05 Marks)**
   c. Explain with neat figure butt welding and spot welding.   **(10 Marks)**

3 a. State and explain the laws of Illumination and also find the illumination of a point.
                                                                           (07 Marks)
   b. What are the requirements of good lighting?   **(03 Marks)**
   c. A section of a road is to be illuminated by two lamps of 500 C.P. and 400 C.P. both being horizontally 20m apart and are suspended 6m above the surface level. Calculate illumination at A directly below the lamp of 500 C.P. and at B directly below the lamp of 400 C.P. Also calculate illumination at C in the middle of points A and B. **(10 Marks)**

4 a. What are the factors affecting schedule speed?   **(04 Marks)**
   b. Derive the relationship between principal quantities in speed time curve considering Trapezoidal speed time curve.   **(10 Marks)**
   c. A train runs with an average speed of 40 kmph. Distance between stations is 2km. Values of acceleration and retardation are 1.5km. ph.p.s. and 2.5 km ph.p.s. respectively. Find the maximum speed of train assuming trapezoidal speed time curve.   **(06 Marks)**

5 a. Define specific energy consumption and mention the factors affecting it.   **(06 Marks)**
   b. Define co-efficient of adhesion and give its value for various conditions of the track.
                                                                           (04 Marks)
   c. An electric train has an average speed of 42 kmph on a level track between stops 1,400m apart. It is accelerated at 1.7km phps and is braked at 3.3 km phps. Draw the speed time curve for run. Estimate the specific energy consumption. Assume tractive resistance as 50 N/tonne and allow 10% for rotational inertia.   **(10 Marks)**

6 a. Explain regenerative braking as applied to DC shunt motors.   **(06 Marks)**

b. State and explain Faradays laws of electrolysis. **(06 Marks)**

c. A rectangular plate 20×10 cm is to be coated with nickel with a layer of 0.2 mm thickness. Determine the quantity of electricity in ampere – hour and time taken for the process. Current density is 190 amp/m^2 and current efficiency is 90% and specific gravity of nickel is 8.9. **(08 Marks)**

7 a. What are the causes of law power factor and mention the methods of improving it?
   (06 Marks)

b. Derive an expression for the most economical p.f. on the basis of constant kW demand. **(06 Marks)**

c. A consumer has an average demand of 400 kW at a p.f. of 0.8 lag and annual load factor of 50%. The tariff is Rs 50 per KVA of maximum demand per annum plus 5 paise per Kwh. If the p.f is improved to 0.95 lag by installing phase advancing equipment . Calculate i) the capacity of the phase advancing equipment ii) the annual saving effected. The phase advancing equipment costs Rs. 100 per KVAR and the annual interest and depreciation together amounts to 10%. **(08 Marks)**

8 Write short notes on (any 4 each carry equal marks)
   a. Compact fluorescent lamp.
   b. Train lighting system.
   c. Plugging as applied to DC series motors.
   d. Seam welding.
   e. Advantages of electric heating over other methods. **(20 Marks)**

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