CBCS SCHEME

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18EE742

Seventh Semester B.E. Degree Examination, June/July 2024
Utilization of Electrical Power

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Mention the advantages of electrical heating over other forms of heating. **(06 Marks)**

b. With a neat diagram, explain the working of direct arc furnace. Mention its applications. **(06 Marks)**

c. A resistance oven employing nichrome wire is to be operated from 220 V, single phase supply and is rated at 16 KW. If the temperature of the limited to 1170°C, and the average temperature of the charge is 500°C, find the diameter and length of element wire, radiating efficiency is 0.57, emissivity = 0.9, specific resistance of nichrome 109×10^{-8} Ωm. **(08 Marks)**

OR

2 a. With a neat diagram, explain laser beam welding. **(06 Marks)**

b. A 20 cm long portion of a circular shaft 10 cm diameter is to be coated with a layer of 1.5 mm nickel, determine the quantity of electricity in Ah and the time taken for the process. Assume a current density of 195 A/sq.m and the current efficiency of 92%, specific gravity of nickel is 0.9. **(06 Marks)**

c. What is electro deposition? Discuss the factors that influence the electro deposition. **(08 Marks)**

Module-2

3 a. State and explain inverse square law and Lambert's cosine law with respect to illumination. **(06 Marks)**

b. Explain the construction and working of sodium vapour camp, with neat circuit diagram. **(06 Marks)**

c. Two lamps posts 14 meters apart and are fitted with 200 cp lamp, each at a height of 5m above the ground, calculate the illumination on the ground:
(i) Under each lamp (ii) Midway between lamps **(08 Marks)**

OR

4 a. Briefly explain polar curves. Mention its importance. **(06 Marks)**

b. Explain the measurement of mean spherical candle power by integrating sphere with neat diagram. **(06 Marks)**

c. If a lamp of 200 cp, is placed 1 meter below a plane mirror, which reflects 90% of light falling on it, determine the illumination at a point 3 meters away from foot of lamp, which hung 4 meters above the ground. **(08 Marks)**

Module-3

5 a. Discuss the direct steam engine system along with their advantages and disadvantages. **(06 Marks)**

b. A scheduled speed of 45 kmph is required between two stops 1.5 km apart. Find the maximum speed over run, if the stop is 20 seconds duration the values of acceleration and retardation are 2.4 km per hour per sec and 3.2 km per hour per second respectively. Assume simplified trapezoidal speed time curve and what is meant by scheduled speed of a train. **(06 Marks)**

c. Derive the expression for tractive effort for propulsion of train and also define tractive effort. **(08 Marks)**

OR

6 a. Explain the term: (i) Dead weight (ii) Coefficient of adhesion (iii) Adhesive weight **(06 Marks)**

b. With a neat diagram, explain the construction and working of single phase AC series motor. **(06 Marks)**

c. Discuss briefly the speed control of dc motor by field control method, mention its merits. **(08 Marks)**

Module-4

7 a. Mention the advantages and disadvantages of regenerative braking in traction. **(06 Marks)**

b. Mention the system of electric traction, briefly explain any two types. **(06 Marks)**

c. A 400-tonne train travels down a gradient 1 in 70 for 120 secs, during which its speed is reduced from 80 km/hour to 50 km/hr by regenerative braking. Find the energy returned to lines if the tractive resistance is 5 kg/tonne and allowance for rotational inertia is 7.5%, over all efficiency motors is 75%. **(08 Marks)**

OR

8 a. Mention the different types of mechanical braking, discuss compressed air brake. **(06 Marks)**

b. Write a note on tramways and trolley buses. **(06 Marks)**

c. Explain the function of negative booster in a tramway system. **(08 Marks)**

Module-5

9 a. With a relevant graph, explain traction motor characteristics. **(06 Marks)**

b. Explain tractive effort and transmission requirements for electric vehicles. **(06 Marks)**

c. Explain the conceptual illustration of general EV configuration. **(08 Marks)**

OR

10 a. Explain the conceptual illustration of hybrid electric drive train. **(06 Marks)**

b. Explain with a neat diagram, the concept of parallel hybrid electric drive train. **(06 Marks)**

c. Compare electric vehicles over conventional internal combustion engine vehicles. What are the advantages and disadvantages of series hybrid electric drives? **(08 Marks)**

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