CBCS SCHEME

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18EE742

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023
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. With a neat sketch, explain Ajax Wyatt furnace. **(08 Marks)**

b. A 15 KW, 220 V single phase resistance oven employs Nickel Chrome wire for its heating elements. If the wire temperature is not to exceed 1000°C and the temperature of the charge is to be 600°C. Assuming radiating of efficiency as 0.6 and emissivity as 0.9. Calculate the diameter and length of wire. **(08 Marks)**

c. Mention the advantages of electric heating. **(04 Marks)**

OR

2 a. State and explain Faraday's laws of electrolysis. **(06 Marks)**

b. What is electro deposition? Discuss the factors influencing electro deposition. **(06 Marks)**

c. Explain: (i) Flash butt welding (ii) Projection welding **(08 Marks)**

Module-2

3 a. Define:
(i) Luminous flux
(ii) Luminous intensity
(iii) MSCP
(iv) Solid angle
(v) Lamp efficiency
(vi) Space height ratio. **(06 Marks)**

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

c. A lamp of 500 W and having MSCP of 1000 is suspended 2.7 m above the working plane. Calculate :
(i) The illumination directly below the lamp on the working plane
(ii) Lamp efficiency
(iii) Illumination at a point 2.5 m away on the horizontal plane from vertically below the lamp. **(08 Marks)**

OR

4 a. With a neat diagram, explain the construction and working of a sodium vapour lamp. **(06 Marks)**

b. Discuss briefly about the lighting fittings. **(08 Marks)**

c. Write short note on street lighting and flood lighting. **(06 Marks)**

Module-3

5 a. Discuss the Mechanical and Electrical characteristics of electric traction motors. **(06 Marks)**

b. Assume trapezoidal speed-time curve and derive the expression for maximum speed. **(08 Marks)**

c. Define: (i) Crest speed (ii) Average speed (iii) Schedule speed **(06 Marks)**

OR

6 a. Derive an expression for tractive effort required for propulsion of a train considering gradient and resistance to the train movement. **(08 Marks)**

b. A 254 tonne motor-coach train with 4 motors takes 20 seconds to attain a speed of 40.25 kmph starting from rest on a 1 percent gradient. The gear ratio is 3.5 and gear efficiency 95%, wheel diameter 91.5 cm, train resistance 44 NW per tonne and rotational inertia 10% of the dead weight. Find the torque developed by each motor. **(06 Marks)**

c. Define specific energy consumption. What are the factors affecting specific energy consumption. **(06 Marks)**

Module-4

7 a. Write short note on compressed air brake and magnetic track brake. **(08 Marks)**

b. Explain how regenerative braking is obtained with single phase ac series motors and 3ϕ induction motors. **(08 Marks)**

c. What are the advantages and disadvantages of regenerative braking? **(04 Marks)**

OR

8 a. With a neat sketch, explain the function of a negative booster in a tramway system. **(10 Marks)**

b. Write short notes on:
(i) Tramways
(ii) Trolley bus
(iii) Diesel electric traction **(10 Marks)**

Module-5

9 a. Explain the configuration of electric vehicles. **(10 Marks)**

b. Briefly explain the energy consumption in electric vehicles. **(10 Marks)**

OR

10 a. What are the advantages of electric vehicle over internal combustion engine vehicles? With a block diagram, explain the working principle of hybrid vehicles. **(10 Marks)**

b. With a neat diagram, explain series hybrid electric drive train (electric coupling). Mention the advantages of it. **(10 Marks)**

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