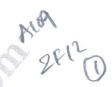
CBCS SCHEME



17EE742

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.

Module-1

- a. Derive and explain the design procedure for a circular and rectangular strip heating element.

 (08 Marks)
 - b. A 16kW resistance oven employing Nichrome wire is to be operated from a 220V, single phase power supply. If the temperature of the element is to be limited to 1170°C and average temperature of the charge is 500°C, find the diameter and length of the element wire. Radiating efficiency is 0.57, emissivity is 0.9, and specific resistance of Nichrome is 109×10^{-8} ohm-m. (06 Marks)
 - c. Explain high frequency dielectric Heating.

(06 Marks)

OR

- 2 a. With a neat sketch, explain flash butt welding and spot welding. (08 Marks)
 - b. A worn-out cylinder shaft 14cm in diameter and 30cm long is to be repaired by coating it with a layer of 1.5mm Nickel. Determine the theoretical value of current required and the time taken if the current density used is 200Amp/m². ECE of Nickel is 0.000304gm/coulomb and density of Nickel is 8.9gm/cm³. (06 Marks)
 - c. Discuss the factors affecting electro deposition process.

(06 Marks)

Module-2

- 3 a. Define the terms i) Solid angle ii) Plane angle. State and explain the laws of illuminations.
 (08 Marks)
 - b. If the Lamp of 200cp is placed 1 meter below a plane mirror which reflects 90% of light falling on it. Determine illumination at a point 3 meters away from foot of lamp, which hung 4 meters above the ground.

 (08 Marks)
 - c. Mention the importance of polar curve.

(04 Marks)

OR

4 a. Discuss the requirement of good lighting.

- (08 Marks)
- b. With a neat diagram, explain the construction and working of sodium vapour lamp.
 - (08 Marks)
- c. Mention the factors to be considered while designing lighting schemes.

(04 Marks)

- Module-3
- 5 a. Mention advantages and limitations of electric drives.

- (06 Marks)
- b. Assuming a quadrilateral speed time curve, derive equations for (i) total distance travelled by the train between two stops and (ii) velocity at the time of braking. (08 Marks)
- c. A train is required to run between two-stations 1.0 km apart at a schedule speed of 30 kmph the stopping time is 20 secs. Assume braking retardation 3 kmphps and maximum speed 1.25 times average speed. Determine acceleration required to run the service for a trapezoidal curve. (06 Marks)

OR

- 6 a. A 256 tonne motor coach train with 4 motors takes 20 secs to attain a speed of 40.25 kmph starting from rest on a 1 percent up-gradient. The gear ratio is 3.5 and gear efficiency 95%, wheel diameter 91.5 cm, train resistance 44 NW/tone and rotational inertia 10% of the dead weight. Find the torque developed by each motor. (08 Marks)
 - b. With a neat figure, explain the construction and working of a single phase AC series motor.

 (06 Marks)
 - c. Explain (i) Shunt transition (ii) Bridge transition applied to series parallel starting of DC motors with figures. (06 Marks)

Module-4

- 7 a. Mention the advantages and disadvantages of Regenerative braking of electric traction motors. (05 Marks)
 - b. Derive an expression for energy returned to the line regenerative braking on a level track.
 (08 Marks)
 - c. Write short notes on:
 - i) Compressed air brakes
 - ii) Magnetic track brakes.

(07 Marks)

OR

- 8 a. Write short notes on:
 - i) Trolley buses
 - ii) Pantograph collector

iii) Trolley wires.

(10 Marks)

b. With a neat sketch, explain the function of a negative booster in a tramway system.

(10 Marks)

Module-5

9 a. Explain the conceptual illustration of general EV configuration. (08 Marks)
b. With relevant graph, explain train motor characteristics. (08 Marks)
c. Mention the need for Electric Vehicles. (04 Marks)

OR

10 a. Explain the configuration of series hybrid electric drive train.
b. Explain the conceptual illustration of hybrid electric drive train.
c. Mention the disadvantages of series hybrid electric drive trains.
(08 Marks)
(08 Marks)
(09 Marks)
(04 Marks)

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