

**IV B. TECH I SEMESTER REGULAR EXAMINATIONS, NOVEMBER - 2023**  
**UTILIZATION OF ELECTRICAL ENERGY**  
**(ELECTRICAL AND ELECTRONICS ENGINEERING)**

Time: 3 hours

Max. Marks: 70

**Note : Answer ONE question from each unit (5 × 14 = 70 Marks)**  
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UNIT-I

1. a) What is Electric welding and classify different types of electric welding. [7M]
- b) Design a good heating element for a 10KW, Single-Phase, 220V resistance oven which employs circular nichrome wire for its heating element. The wire temperature is not to exceed 1100°C and the temperature of the charge is to be 500°C. Assume emissivity = 0.9, radiating efficiency = 0.6 and specific resistance of wire =  $1.0 \times 10^{-6} \Omega\text{-m}$ . [7M]

(OR)

2. a) Compare the AC and DC systems of welding methods. [7M]
- b) Dielectric heating is to be employed to heat a slab of insulating material 20mm thick and 1530 mm<sup>2</sup> in area. Power required is 200 W and a frequency of 3MHz is to be used. The material has a permittivity of 5 and p.f of 0.05. Determine the voltage necessary and the current which flows through the material. [7M]

UNIT-II

3. a) Explain the following terms w.r.t illumination Engineering: [7M]
  - (i) Reflection factor                      (ii) Absorption factor
  - (iii) Depreciation factor                (iv) Co-efficient of Utilization
- b) A lamp of 100 CP is suspended 3 meters above horizontal plane. Calculate the illumination at a point on the horizontal plane [7M]
  - (i) directly below the lamp (ii) 4 meters away from the vertical axis.

(OR)

4. a) Compare the tungsten filament lamp with fluorescent tube. [7M]
- b) Two sources of luminous intensity of 400 candela are hung at a height of 8m. The distance between the two lamp posts is 20m. Determine the illumination. [7M]
  - (i) beneath the lamp and (ii) in the middle of the posts

UNIT-III

5. a) What is meant by electric traction and also list out the advantages and disadvantages of electric traction system? [7M]

- b) An electric train has a schedule speed of 25 kmph between stations 800 metres apart. The duration of station stop is 20 seconds, the maximum speed is 20 percent higher than the average running speed and the braking retardation is 3 kmphs. Calculate the rate of acceleration required to operate this service. [7M]

(OR)

6. a) Derive the expression for the distance travelled and maximum speed attained in a run for the trapezoidal speed-time curve. [7M]
- b) A train is to run between two stations 1.6km apart at an average speed of 40kmph, the run is to be made to a quadrilateral speed-time curve. If the maximum speed is to be limited to 64 kmph, acceleration to 2 kmphs, coasting retardation to 0.16 kmphs and braking retardation to 3.2 kmphs respectively, determine the duration of a acceleration, coasting and braking periods. [7M]

#### UNIT-IV

7. a) Explain the process of applying regenerative braking to three phase induction motors. [7M]
- b) Describe the different methods of current collection used in electric traction with neat sketches. [7M]

(OR)

8. a) Write a note on: [7M]
- (i) Magnetic Track Brake
  - (ii) Electro-Mechanical Drum Brakes
- b) Explain the feeding and distribution system for AC traction systems. [7M]

#### UNIT-V

9. a) Describe the significance of energy star rating for various electrical appliances. [7M]
- b) Define tractive effort and calculate the tractive effort for normal driving vehicles. [7M]

(OR)

10. a) Explain the working of Electric water heater and calculate the energy consumption and efficiency of it. [7M]
- b) Discuss different configurations used in electric vehicles. [7M]

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