

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]  
(2125)

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**B. Tech 6th Semester Examination**  
**Electrical Energy Utilization (EE/EEE) (OS)**  
**EE-6004**

**Time : 3 Hours**

**Max. Marks : 100**

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

**Note :** Attempt any FIVE questions in all, selecting at least one question from each section A, B, C, and D. Section E is compulsory.

**SECTION - A**

1. (a) Why braking is required? Explain each of the electrical braking briefly. Give advantages of Electrical Braking over Mechanical Braking. (10)
- (b) Explain how energy is saved using series parallel starting in DC traction drives. How contactor type controller works for controlling the traction drives? (10)
2. (a) Explain with suitable diagram the different types of collector gears for overhead equipment system. (10)
- (b) An electrical train has an average speed of 42 km/h on a level track between stops 1400 m apart. It is accelerated at 1.7 km/h/s and braked at 3.3km/h/s. Draw the speed time curve for the run. (10)

**SECTION - B**

3. (a) State factors to be considered while designing the lighting scheme. Write a note on flood lighting. (10)

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- (b) Give the construction and working of the following types of lamps
  - (i) Sodium Vapour lamp
  - (ii) Neon Lamp (10)
4. (a) State and explain 'Inverse Square Law' and 'Lambert's Cosine'. (10)
- (b) A drawing hall 30m×13m with a ceiling height of 5m is to be provided with a general illumination of 120 lux. Taking a coefficient of utilization of 0.5 and depreciation factor of 1.4, determine the number of fluorescent tubes required, their spacing mounting height and total wattage. Taking luminous efficiency of fluorescent tube as 40 lumens/watt for 80 watt tube. (10)

**SECTION - C**

5. (a) What are the different types of arc furnaces? Explain any two. (10)
- (b) Explain the principle of high frequency eddy current heating. Also discuss its applications and advantages. (10)
6. (a) What is the difference between direct resistance heating and indirect resistance heating? Discuss about their advantages and disadvantages. (10)
- (b) A resistance oven employing nichrome wire is to be operated from 220 V single-phase supply and is to be rated at 16 kW. 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. Radiation efficiency = 0.57, Emissivity = 0.9, Specific resistance of nichrome =  $109 \times 10^{-8} \Omega\text{-m}$ . (10)

**SECTION - D**

7. (a) What are the advantages and limitations of resistance welding? Explain clearly Butt welding along with its application. (10)
- (b) What are the various types of electrical arc welding? Explain any two. (10)
8. (a) Define electrical welding. Explain how is AC welding different from DC welding. (10)
- (b) Write detailed notes on ultrasonic welding and laser welding. (10)

**SECTION - E**

9. Attempt all questions
- (a) Why AC is more suitable for resistance welding?
- (b) Give disadvantages of electric welding.
- (c) What are the voltages used for electric traction in India?
- (d) Classify the supply system for electric traction.
- (e) Name the various methods of traction motor control.
- (f) Define (i) Illumination and (ii) M.H.C.P
- (g) What is polar curve?
- (h) What are all the sources of light?
- (i) What are the causes of failure of heating elements?
- (j) Define : Dead weight and accelerating weight. (2×10=20)