

8E8044

Roll No. \_\_\_\_\_

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B. Tech. VIII Sem. (Main / Back) Exam., April – May 2018

Electrical &amp; Electronics Engineering

8EX4.1A Utilization of Electrical Power

EE, EX

Time: 3 Hours

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Maximum Marks: 80

Min. Passing Marks: 26

*Instructions to Candidates:*

*Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

*Units of quantities used/calculated must be stated clearly.*

1. NIL2. NIL**UNIT-I**

- Q.1 (a) Explain the principle of dielectric heating. Derive the mathematical expression of power consumed in such process. State important applications of dielectric heating. [8]
- (b) Compare in details, the electric arc welding with resistance welding. Explain with the help of a neat sketch the process of spot welding. [8]

**OR**

- Q.1 (a) A piece of an insulating material is to be heated by dielectric heating. The size of the piece is 12cm × 12cm × 3cm. A frequency of 20 MHz is used and the power absorbed is 450W. If the material has a relative permittivity of 5 and a power factor of 0.05. Calculate the voltage necessary for heating and current that follows in the material? [8]

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- (b) Discuss advantages of electric heating over conventional methods. Derive the condition for maximum power output for electric arc furnace. Obtain the power factor for such condition. [8]

## UNIT-II

Q.2 Differentiate the following-

- (a) Illumination and luminous intensity. [4]  
(b) Lamp efficiency and specific consumption. [4]  
(c) Maintenance factor and depreciation factor. [4]  
(d) Specular reflection and diffusion reflection. [4]

### OR

- Q.2 (a) Compare the metal filament lamp, with discharge lamp. What is the advantage of coiled coil? Describe principle of operation, construction and working of a sodium discharge lamp. [8]  
(b) Compare fluorescent lamp, CFL and filament lamps on the basis of light, capital and running cost. [8]

## UNIT-III

- Q.3 (a) Explain the term 'Polarization', 'Throwing Power' and 'Electro-Deposition'. How are zinc and copper refined from their base metal electrically? [8]  
(b) What is meant by anodizing? Explain process of anodizing and describe the equipment used for it. [8]

**OR**

- Q.3 (a) Calculate the quantity of aluminium produced from aluminium oxide in 24 hours if average current is 2800 A and current efficiency is 98%. Aluminium is trivalent and atomic weight is 27. Chemical equivalent weight and ECE of silver are 107.98 and  $111 \times 10^{-8}$  kg/C respectively. [8]
- (b) What is electroplating? Describe various operations involved in electroplating. [8]

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**UNIT-IV**

- Q.4 (a) What are the advantages and disadvantages of electric traction over other types of traction system? [8]
- (b) What are the merits and demerits of D.C system track electrification? [8]

**OR**

- Q.4 (a) Discuss merits and demerits of the single phase A.C system for main and suburban line electrification of the railways. [8]
- (b) What are different types of current collection? Give their merits and demerits. [8]

**UNIT-V**

- Q.5 (a) Using a simplified speed time curve of a railway train, derive expression [8]

$$\frac{1}{\alpha} + \frac{1}{\beta} = \frac{7200 D}{V_m^2} \left[ \frac{V_m}{V_a} - 1 \right]$$

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Where  $\alpha$  and  $\beta$  are acceleration and retardation  $V_m$  is maximum speed, ' $V_a$ ' is average speed and  $D$  is total distance.

- (b) Discuss a method of electric braking for traction motors. [8]

**OR**

- Q.5 (a) State the mechanical and electrical features of electric traction motors and discuss relative suitability of (i) DC series motor (ii) AC series motor. [12]
- (b) Write a short note on series-parallel starting. [4]

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