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Roll No. ....

Total Pages : 3

**80787**

**B.Tech. (EL)-VIII Semester Examination  
UTILIZATION OF ELECTRICAL ENERGY (EL-412)**

Time : 3 Hours]

[Max. Marks : 60

**Notes:**

- (i) *Part-A is compulsory and attempt 4 Questions from Part-B.*
- (ii) *Assume relevant data/figure if found missing.*

**PART-A**

- 1. (a) State and explain laws of Illumination. (2)
- (b) What are the factors which limit the choice of high frequency in induction and dielectric heating? (2)
- (c) Explain in detail the general consideration in selecting motor power ratings. (2)
- (d) Explain why a drooping characteristics of supply voltage is essential for maintain a steady arc in case of electric welding? (2)
- (e) Explain the term 'polarisation' and 'throwing power'.(2)
- (f) Why is regenerative braking not applied on electric multiple unit trains? (2)
- (g) Explain Rousseau's construction for calculating Mean spherical candle power. (2)
- (h) What happens when an electric current is passed through solution of copper sulphate? (2)

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- (i) Under what circumstances series-parallel method of speed control of dc series traction motor developed. (2)
- (j) Why tappings are used on the welding transformer and on which side? (2)

### PART-B

2. (a) Compare Tungsten filament lamp with Fluorescent tubes. (5)
- (b) A lamp of 500 candle power is placed at the centre of a room,  $20\text{ m} \times 10\text{ m} \times 5\text{ m}$ . Calculate the illumination in each corner of the floor and a point in the middle of a 10 m wall at a height of 2 m from floor. (5)
3. (a) A low frequency induction furnace, whose secondary voltage is maintained constants at 10 volts, takes 400 kW at 0.6 power factor when the hearth is full. Assuming the resistance of the secondary circuit to vary inversely as the height of the charge and reactance to remain constant, find the height up to which the hearth should be filled to obtain maximum heat. (5)
- (b) Discuss the methods of temperature control of resistance ovens. (5)
4. (a) Explain various types of resistance and arc welding. How the mechanical pressure, amount of current and its duration is controlled in case of resistance welding? (5)
- (b) Explain the properties of arcing electrode. (5)
5. (a) Describe in detail the process of nickel-electro plating in industry, giving the composition of electrolyte. What are the factors on which the quality of electroplating depends. (5)

- (b) State Faraday's laws of electrolysis. What are the various application of electrolysis. (5)

6. (a) Discuss various systems of track electrification. Which system of track electrification has been adopted in Indian Railway and why? (5)
- (b) What speed-torque characteristics are desirable for traction motors operating suburban service. (5)
7. Derive the expression for : (10)
- (i) The tractive effort exerted by road wheels in terms of wheel diameter, motor torques, gear ratio, and efficiency of transmission power through gears.
- (ii) The tractive effort for the propulsion of train up and down the gradient.
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