

B.Tech IV Year I Semester (R13) Regular Examinations November/December 2016

**UTILIZATION OF ELECTRICAL ENERGY**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

**PART – A**

(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- How does the illumination of a surface depend?
  - List out the methods of Energy Conservation.
  - List out some welding defects
  - List the properties of a good heating element.
  - What are the problems associated with AC traction system?
  - What is the need for Negative Boosters?
  - On what factors does the schedule speed of a given train depend when running on a given service?
  - What is the essential characteristic of electric drive to become suitable for traction application?
  - Reactive Power compensation system is to be designed for a 3-phase load with capacitors connected in Star ( $C_s$ ) or Delta ( $C_d$ ). What would be the rating of capacitor in Star when compared to Delta?
  - "Maintenance of power factor at unity would reduce the size of the cable". Justify.

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

- 2 (a) Explain briefly the principles employed in the design of Street lighting installations.  
 (b) Two lamp posts are 14 meters apart and are fitted with 200 C.P lamp each at a height of 5 meter above the ground. Calculate: (i) Illumination mid-way between them. (ii) Illumination under each lamp.

**OR**

- 3 (a) Explain the working of fluorescent with the help of the circuit diagram giving the function of each various parts. How stroboscopic effect is eliminated in fluorescent tube lighting?  
 (b) Write a note on Polar Curves.

**UNIT – II**

- 4 (a) What is dielectric heating? Derive an expression for the heat produced in a dielectric material and hence deduce the factors influencing dielectric heating.  
 (b) Explain the processes of Carbon arc and Metallic arc welding.

**OR**

- 5 (a) Explain the design procedure of the heating elements when the power and voltage of the oven is known.  
 (b) What are the applications of Electrolysis?

**UNIT – III**

- 6 (a) What are the desirable electrical and mechanical characteristics of traction motors?  
 (b) Explain the process of Dynamic braking on Series motors with Equalizer connection and Cross connection.

**OR**

- 7 (a) Explain the means of current collection for overhead equipment (OHE).  
 (b) Discuss in brief why series motors are ideal for dc or ac traction.

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**UNIT - IV**

8 A 200 Tonne motor coach having four motors each developing 6000 N-M torque during acceleration, start from rest. If up gradient is 30 in 1000, gear ratio is 4, gear transmission efficiency is 90%, wheel radius is 45 cm, train resistance is 50 N per Tonne, addition of rotational inertia is 10%. Calculate time taken to attain speed of 50 kmph. If the line voltage is 3000 V d.c and efficiency of motors is 85%, find the current drawn during notching period.

**OR**

9 What is Specific Energy Consumption? Derive the expression for Specific Energy Consumption in propelling a train. Comment on the factors influencing the Specific Energy Consumption.

**UNIT - V**

- 10 (a) Define "Economical limit of power factor correction".  
(b) Prove that the most economical power factor is independent of original power factor but is governed by the relative costs of supply and power factor equipment.

**OR**

- 11 Discuss the role of the following in minimization of annual costs of customer:  
(a) Improvement of power factor.  
(b) Improvement of Load factor.  
(c) Use of off-peak energy.

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