5. Write the short notes on any **three** of the following :

$$(6\tfrac{2}{3} \times 3 = 20)$$

(i) Rheostatic and Regenerative braking.

(ii) Phenomenon of electrolysis by earth currents.

(iii) Series parallel control of starting for pair of D.C. traction motors.

(iv) Refrigerator

(v) Resistant heating,

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0288   Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B. Tech.
(SEM. VIII) THEORY EXAMINATION 2010-11
UTILIZATION OF ELECTRICAL ENERGY AND TRACTION

Time : 3 Hours   *Total Marks : 100*

Note : Attempt **all** the questions. All questions carry equal marks.

1. Attempt any **two** parts of the following :   **(10×2=20)**

   (a) A 2.5 kW 240 V, single phase resistance oven is to have nichrome wire heating elements. If the wire temperature is to be 1500°C and that of the charge 450°C, estimate the diameter and length of the wire. The resistivity of nichrome alloy is 42.5 μΩ-cm. Assume the radiating efficiency and the emissivity of the element as 1.0 and 0.9 respectively.

   (b) With neat sketches, describe the construction, principle of operation, application and control methods of Ajax-Wyatt Vertical Core Furnace.

   (c) Write notes on the following :

   (i) Ultra-sonic welding

   (ii) Induction Heating

   (iii) Power control in arc welding.

2. Attempt any **two** parts of the following : (10×2=20)

(a) (i) Determine the maximum voltage required for electrolysis of water if one kg of hydrogen on oxidation to water liberates 14.212×10^7 joules and electro-chemical equivalent of hydrogen is 1.0384×10^{-8} kg C^{-1}.

(ii) Explain briefly :
(i) Electro-deposition of rubber
(ii) Anodic oxidation of aluminium.

(b) Define and explain 'Current efficiency', 'Voltage required' and 'Energy efficiency' when referred to electrolytic processes. Also state and explain Faraday's laws of electrolysis.

(c) Estimate the rating of an induction furnace to melt two tonnes of Zinc in one hour if it operates at an efficiency of 80%. Specific heat of Zinc = 0.1, Latent heat of fusion of Zinc = 26.67 K-Cal per Kg. Melting point is 555°C. Assume initial temperature to be 35°C.

3. Attempt any **two** parts of the following : (10×2=20)

(a) Write short notes on the following :
(i) Water cooler
(ii) Window air conditioner
(iii) Effective temperature.

(b) The following table gives the watts and Lumens :

Watts	300	500	1000	1500
Lumens	5000	9000	18000	27000

The front of a building measuring 60 m×15 m is to be flood lighted by means of projectors placed at a distance of 8 metres from the wall. The average illumination required is 50 lux. Determine the number and size of projectors required. Assume waste light factor of 1.2, depreciation factor 0.8 and coefficient of utilization 0.5.

(c) Write notes on the following :
(i) Filament Lamp
(ii) Sodium vapour lamp
(iii) Fluorescent Lamp.

4. Attempt any **two** parts of the following : (10×2=20)

(a) Derive an expression for –
(i) The tractive effort for propulsion of a train on level track
(ii) The tractive effort for propulsion of a train up and down a gradient.

(b) Discuss the main features of the various train services. What type of train services corresponds to trapezoidal and quadrilateral speed-time curve ?

(c) Discuss various factors affecting specific energy consumption in the traction.