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**EEE801**

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

PAPER ID : **120801**

Roll No. | | | | | | | | | |

# B. Tech.

## (SEM. VIII) THEORY EXAMINATION, 2014-15

### UTILIZATION OF ELECTRICAL ENERGY & TRACTION

Time : **3** Hours]     [Total Marks : **100**

**Note :**   Attempt **all** questions.

**1**     **Attempt any four parts of the following.**     **(5×4=20)**

(a)   State and explain advantages of electrically produced heat. What are the essential properties of resistance heating elements ?

(b)   What are different methods of heat transfer and under what conditions heat transfer by radiation is efficient ?

(c)   What is induction heating ? Define its application and advantages.

(d)   Differentiate the function of AJAX WYATT furnace and TAMA furnace.

(e)   Explain clearly pinch-effect and skin-effect.

(f)   A slab of insulating material 130 cm$^2$ in area and 1 cm thick is to be heated by dielectric heating. The power required is 380 W at 30 MHz material has a relative permittivity of 5 and power factor of 0.05. Absolute permittivity = $8.854 \times 10^{-12}$ F/m. Determine the necessary voltage.

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

(a)   Explain arc blow effect at the edges and due to ground currents. What are the advantages of using coated welding electrodes ?

(b)   What do you understand by resistance welding? Discuss the effect of welding time of resistance welding on the quality of the weld ?

(c)   (I)   With necessary figure explain the process of seam welding.

      (II)  Explain the following terms used in electrolytic processes :

            (i) Current efficiency (ii) Energy efficiency.

(d)   (I)   State Faraday's laws of electrolysis and explain them clearly.

      (II)  Explain the basic laws which govern electro-deposition.

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

(a)   Explain with the help of circuit diagram the working of high pressure mercury vapour lamp. A 250V lamp has a total flux of 1500 lumens and takes a current of 0.4 A. Calculates lumens per watt and M.S.C.P. per watt.

(b) What are the main faults of a lightning system and how these are overcome ? In a street lighting scheme, lamps having uniform C.P. of 500 are hung at a 6 meters. The distance between consecutive lamps posts is 8 meters. Find the illumination under lamp and at centre in between the lamp posts.

(c) Define following terms :

(1) Refrigerated system (2) Water cooler.

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

(a) What are different systems of track electrification ? Explain DC system and composite system of track electrification.

(b) What are the factors affecting the schedule speed of a train ?

A train runs between two stations 1.6 km apart at an average speed of 36 km/h. if the maximum speed is limited to be 72 km/h, acceleration to 2.7 km/h/s, coasting retardation to 0.18 km/h/s and braking retardation to 3.2 km/h/s, compute the duration of acceleration, coasting and braking periods. Assume a simplified speed - time curve.

(c) Define following :

1. Steam engine drive

2. Tramways

3. Tractive effort for propulsion of train.

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

(a)    What are the advantages and disadvantages of diesel electric traction ? Discuss the main characteristics of diesel engine with special reference to its application for traction purposes.

(b)    What is the main advantage of series-parallel control of motors over Rheostatic method of starting and speed control ?

(c)    The following data refer to two traction motors rated at 1500 V :

Armature resistance by each motor = 0.15 Ω

Current drawn by each motor = 500A (During starting)

Effective weight of the train = 140 tonnes

Dead weight of the train = 120 tonnes

Specific resistance = 50 N/tonne

Tractive effort per motor = 38000N

Speed at the end of starting period = 40 km/h

Calculate :

    (i) Duration of starting period

    (ii) Speed of train at transition

    (iii) Rheostatic loss.

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