

Printed Pages : 4



EEE801

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

PAPER ID : 120801

Roll No.

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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 $= 8.854 \times 10^{-12} \text{ F/m}$. 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 250 V lamp has a total flux of 1500 lumens and takes a current of 0.4 A . Calculate 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 = 0.15Ω

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.