Total No. of Questions : 10] [Total No. of Printed Pages : 4

Roll No. .....

EX–501(N)

B. E. (Fifth Semester) EXAMINATION, Dec., 2010

(New Scheme)

(Electrical & Electronics Engg. Branch)

UTILIZATION OF ELECTRICAL ENERGY

[EX–501(N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt *one* question from each Unit. All questions carry equal marks.

Unit–I

1. (a) Explain the laws of illumination.

   (b) Describe with a neat sketch the principle of gas discharge lamp. State the advantages and disadvantages of discharge lamps over the filament lamp.

   (c) Discuss the effects of voltage variation on the life and illumination as regards tungsten filament and fluorescent lamp.

Or

2. (a) What is a polar curve ? How is it useful to an illumination engineer ?

   (b) A lamp of 500 watts having mscp of 1000 is suspended 2·7 metres above the working plane. Calculate :

P. T. O.

(i) Illumination directly below the lamp at the working plane

(ii) Lamp. efficiency

(iii) Illumination at a point 2·6 metres away on the horizontal plane from vertically below the lamp.

Unit – II

3. (a) What are the advantages of electric heating ? Give the classification of various electric heating methods along with their working principles.

(b) What are the desirable properties the materials for heating element should have ? Name a few materials.

Or

4. (a) Describe with relevant diagrams the various methods of electric resistance welding. Give merits and demerits with respect to arc welding.

(b) How much aluminium will be produced from aluminum oxide in 24 hours if the average current is 3000 A and current efficiency is 92% ? Aluminium is trivalent and atomic weight is 27. The chemical equivalent weight of silver is 107·98 and 0·00111 gm of silver is deposited by one coulomb.

Unit – III

5. (a) State the main requirements of an ideal traction system.

(b) What do you understand by speed-time curves ? What is its use in practice ?

(c) Explain the terms dead weight, effective weight and adhesive weight in a locomotive.

Or

6. (a) An electric train is to have acceleration and braking retardation of 0·8 km/h/s and 3·2 km/h/s respectively. If the ratio of maximum to average speed is 1·3 and time for stops 20 seconds, find schedule speed for a run of 1·5 km.

   (b) What is specific energy consumption of a train ? Discuss various factors affecting it.

Unit – IV

7. (a) State the component parts of the electric drive. What are the factors which decide the choice of an electric drive for industrial application ?

   (b) What is load equalisation ? How it is achieved ?

Or

8. (a) Describe various methods of electric braking and mention their merits.

   (b) In an air conditioning plant, it is required to rise the temperature of 2000 m^3 of air per hour from 0°c. It is further necessary to evaporate 0·5 kg of moisture per 100^3 of air per hour to control the humidity. The density of air may be taken as 1·3 kg/m^3, its specific heat 0·25 and latent heat of evaporation as 500 calories per gram. Estimate the power required.

Unit – V

9. (a) What are the requirements of current collectors and describe the various types of current collectors in common use for overhead contact system.

   (b) An electric train weighing 200 tonne has eight motors geared to driving wheels, each wheel is 90 cm.

diameter. Determine the required tractive effort to accelerate the train to a speed of 48 kmph is 30 seconds up a gradient of 1 in 200. The tractive resistance is of 50 newtons per tonne, the effect of rotational inertia is 10% of the train weight, gear ratio is 4 to 1 and gearing efficiency is 80%.

Or

10. (a) What is tractive effort of a train and what are its functions ? Derive an expression for the tractive effort developed by a train unit.

(b) An electrical train has an average speed of 42 kmph on a level track between stops 1400 m apart. It is accelerated at 1·7 kmphps and is braked at 3 kmphps. Estimate the energy consumption at the axel of the train per tonne km. Take tractive resistance constant at 50 newton per tonne and allow 10% for rotational inertia.