MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PE- EEE-801A Utilization of Electric Power

UPID : 008291

Time Allotted : 3 Hours   *Full Marks :70*

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following :   [1 x 10 = 10]

   (I)   Explain why a series motor is preferred for the electric traction.

   (II)   Which is Electrolyte used in a lead-acid cell?

   (III) What are the factors which limit the choice of frequency in induction and dielectric heating?

   (IV)   What is meant by seam welding?

   (V)   What is meant by electrical welding?

   (VI)   Where used the neon tubes widely?

   (VII) What is the acceleration rate for urban or suburban services?

   (VIII) What is the need of polar curves?

   (IX)   What is the Stefan's formula for heat dissipation?

   (X)   In an electric arc welding, how many the voltage required to strike dc arc?

   (XI)   What is the illumination level when some persons can read without much strain?

   (XII) What kind of power factor works in direct arc furnace?

Group-B (Short Answer Type Question)

Answer any three of the following :   [5 x 3 = 15]

2. Sate & explain the Laws of Illumination.   [5]

3. Describe the advantage and application coreless induction furnace.   [5]

4. Describe lumen method for indoor lighting calculation. What is Lambertian surface ?   [5]

5. Discuss the various methods of controlling the temperature in resistance ovens.   [5]

6. A room 8 m × 12 m is lighted by 15 lamps to a fairly uniform illumination of 100 lm/m^2. Calculate the   [5]
    utilization coefficient of the room given that the output of each lamp is 1600 lumens.

Group-C (Long Answer Type Question)

Answer any three of the following :   [15 x 3 = 45]

7. (a) Define the term "coefficient of adhesion" and explain the factors on which it depends.   [7]

    (b) A 250-tonne motor coach having 4 motors, each developing a torque of 8000 N-m during   [8]
        acceleration, starts from rest. If up-gradient is 30 in 1000, gear ratio 3.5, gear transmission
        efficiency 90%, wheel diameter 90 cm, train resistance 50 N/t, rotational inertia effect 10%,
        compute the time taken by the coach to attain a speed of 80 km/h. If supply voltage is 3000 V and
        motor efficiency 85%, calculate the current taken during the acceleration period.

8. (a) What is a polar curve?   [2]

    (b) Explain Rousseau's construction for calculating M.S.C.P. of a lamp.   [3]

    (c) Write the short note on Startless Fluorescent Lamp.   [5]

    (d) The illumination in a drawing office 30 m × 10 m is to have a value of 250 lux and is to be provided [5]
        by a number of 300-W filament lamps. If the coefficient of utilization is 0.4 and the depreciation
        factor 0.9, determine the number of lamps required. The luminous efficiency of each lamp is 14
        lm/W.

9. (a) Derive an expression for specific energy output on level track using a simplified speed–time curve.   [10]

    (b) The peripheral speed of a railway traction motor cannot be allowed to exceed 44 m/s. If gear ratio   [5]
        is 18/75, motor armature diameter 42 cm and wheel diameter 91 cm, calculate the limiting value
        of the train speed.

10. (a) Explain the operations of the Halogen Lamp.   [5]

(b) Write advantages & application of Halogen Lamp. [5]

(c) Write the comparison between Incandescent lamps, Fluorescent lamps, Mercury vapour lamps, Sodium vapour lamps. [5]

11. A train is required to run between two stations 1.6 km apart at the average speed of 40 km/h. The acceleration, retardation during coasting and braking are 2 km/h/s, 0.16 km/h/s and 3.2 km/h/s respectively. Assuming quadrilateral approximation of speed-time curve, determine: [15]

(i) The duration of acceleration, coasting and braking periods, and

(ii) The distance covered during these periods.

*** END OF PAPER ***