P3978

[5353]-568
T.E. (Electrical) (Semester - II)
UTILIZATION OF ELECTRICAL ENERGY
(2015 Pattern)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) Neat diagrams must be drawn wherever necessary.

2) Assume suitable data, if necessary.

3) Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator is and steam table is allowed.

4) Figures to the right indicate full marks.

Q1) a) Explain Modes of Heat Transfer with mathematical expression.   **[6]**

b) Write a note on anoidizing and state its applications.   **[6]**

c) Estimate the number and wattage of lamps which would be required to illuminate a workshop space 60×15 meter by means of lamps mounted 5 meters above the working plane. The average illumination required is 100 lux, coefficient of utilization = 0.4, luminious efficiency = 16 lumens per watt. Assume space height ratio of unity and a candle power depression of 20 %.   **[8]**

OR

Q2) a) An electric furnace consuming 5 KW takes 15 minutes to just melt 4 lbs of Aluminium, the initial temperature being 15° C. Find the efficiency of the furnace. Specific heat of Aluminium = 0.212, melting point = 658° C and latent heat of fusion 76.8 cal per gram, 860 Kcal = 1 kwh.   **[6]**

b) Explain with neat diagram electric circuit used in Refrigerator.   **[6]**

c) Define: **[8]**

   i)   Illumination

   ii) Luminous Intensity

   iii) Solid Angle

   iv) Coefficient of Utilization

Q3) a) Explain function of Interrupter and Circuit breaker used in traction substation.   **[8]**

b) Compare Steam engine drive with Electric drive.   **[8]**

OR

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Q4) a) Draw and explain layout of traction substation. **[8]**

b) Explain following systems of track electrification **[8]**

i) Single phase low frequency AC system

ii) Kando System

Q5) a) Define: **[8]**

i) Average Speed

ii) Schedule speed

iii) Coefficient of adhesion

iv) Tractive effort

b) An electric train has an average speed of 48 kmph on a level track between stops 1500 m apart. It is accelerated at 2 kmphps and is braked at 3 kmphps. Estimate the energy consumption at the axle of the train per tonne km. Take tractive resistance as 50 N/ tonne and allow 10% for rotational inertia. **[8]**

OR

Q6) a) The speed time curve of a train consists of uniform acceleration of 4 kmphps for 30 sec, free running for 10 minutes, uniform deceleration of 6 kmphps and a stop of 6 minutes. Find the distance between stations, average speed, schedule speed. **[8]**

b) Elaborate the parts of total tractive effort with usual notations. **[8]**

Q7) a) State desirable requirements of traction motor. **[4]**

b) Write a note on Anti - collision system. **[6]**

c) Obtain efficiency for Series parallel starting of two motors. **[8]**

OR

Q8) a) Explain sutaibility of D.C. series motor for traction purpose. **[4]**

b) Explain open, shunt and bridge transition with neat diagram. **[6]**

c) A train weighing 300 tonne has speed reduced from 80 kmph to 30 kmph while going down an incline of 1 in 100 through a distance of 3 km by employing regenerative braking. Calculate the electrical energy returned to the line assuming overall efficiency of 75 %. Tractive resistanceis 4 kg per tonne and allow rotational inertia of 8%. **[8]**

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