

P3978

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[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 anodizing 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, luminous 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 kmphs and is braked at 3 kmphs. 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 kmphs for 30 sec, free running for 10 minutes, uniform deceleration of 6 kmphs 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 suitability 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 resistance is 4 kg per tonne and allow rotational inertia of 8%. [8]

