

Total No. of Questions :8]

SEAT No. :

P1717

[Total No. of Pages :3

[5058]-350

T.E. (Electrical)

UTILIZATION OF ELECTRICAL ENERGY

(2012 Course) (Semester - II) (End-Sem)

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) Describe construction and working of Ajaxwyatt furnace. [6]
- b) Explain construction and working of Limit switch and Push button. [6]
- c) Estimate the number and wattage of lamps which would be required to illuminate a workshop space 60 X 15 meter by means of lamps mounted 5 meter above the working plane. The average illumination required is about 100 lux, coefficient of utilization is 0.4, luminous efficiency is 16 lumens/watt. Assume specific height ratio of unity and candle power depreciation of 20%. [8]

OR

- Q2)** a) Explain electric circuit used in Refrigerator. [6]
- b) Explain Mercury vapour lamp. [6]
- c) An insulating slab of 2 cm thick and 150 cm² in area is to be heated by dielectric heating. The power required is 220 watts at a frequency of 32 MHz. The material has relative permittivity of 5 and power factor of 0.06. Determine the voltage necessary for heating and the current flowing through the material. Also calculate frequency to obtain the same heating if the voltage is limited to 620 volt. [8]

P.T.O.

- Q3)** a) Explain function of Transformer and Interrupter used in traction substation. [8]
- b) How electric traction will be advantageous. [8]

OR

- Q4)** a) Draw and explain block diagram of electric locomotive. [8]
- b) Explain following systems of track electrification [8]
- i) Three phase low frequency AC system.
- ii) Single phase AC to DC system.

- Q5)** a) Draw Trapezoidal speed-time curve and obtain expression for maximum velocity. [8]
- b) A schedule speed of 45 kmph is required between two stops 1.5 km apart. Find the maximum speed over the run if the stop is of 20 sec duration. Acceleration and retardation are 2.4 kmphs and 3.2 kmphs respectively. Assume trapezoidal speed - time curve. [8]

OR

- Q6)** a) Define: [8]
- i) Average Speed
- ii) Schedule speed
- iii) Coefficient of adhesion
- iv) tractive effort
- b) Elaborate the parts of total tractive effort with usual notations. [8]

- Q7)** a) Write a note on Anti-collision system. [4]
- b) What are the desirable characteristics of motor for traction purpose. [6]
- c) A 2340 tonnes train including loco proceeds down a gradient of 1 in 80 for 5 minutes during which period its speed gets reduced from 60 kmph to 36 kmph by application of regenerative braking. Find the energy returned to the lines if the tractive resistance is 5 kg/tonne, rotational inertia 10% and overall efficiency of the motor during regeneration is 70%. [8]

OR

- Q8)** a) How Three phase Induction motor is suitable for traction service. [4]
- b) Explain transition methods with neat diagram. [6]
- c) A train weighing 400 tonne has speed reduced by regenerative braking from 40 kmph to 20 kmph over a distance of 2 km on a down gradient of 2%. Calculate the electrical energy returned to the line. Tractive resistance is 40 N/tonne and allow rotational inertia of 10% and efficiency of conversion is 75%. [8]

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