

Total No. of Questions : 8]

SEAT No. :

P1737

[Total No. of Pages : 3

[5460] - 567

T.E. (Electrical)

**UTILIZATION OF ELECTRICAL ENERGY  
(2015 Pattern) (Semester - II)**

*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) Calculate the efficiency of a high frequency induction furnace which takes 15 minutes to melt 2 kg of Aluminium. The input to the furnace being 5 kW and initial temperature 15°C, Specific heat of Aluminium is 0.88 kJ/kg°C, melting point of Aluminium is 660°C, latent heat of fusion of Aluminium is 32 kJ/kg, 1 kJ = 2.78 × 10<sup>-4</sup> kWh. [8]
- b) Write a brief description of vapour compression refrigeration cycle with a neat diagram. [6]
- c) Write a short note on street lighting with principle. [6]

OR

- Q2)** a) Explain Ajax Wyatt furnace with neat diagram. [6]
- b) Explain Factors governing electro - deposition. [6]
- c) A filament lamp of 500 W is suspended at a height of 5 meter above working plane and gives uniform illumination over an area of 8 m diameter. Assume reflector efficiency as 60%. Determine the illumination on the working plane. Lamp efficiency is 0.9 watt per candle power. [8]
- Q3)** a) Explain advantages of electric traction. [8]
- b) Draw block diagram of electric locomotive and describe function of various equipments and accessories. [8]

**P.T.O.**

OR

- Q4)** a) Explain advantages and disadvantages of Steam engine drive. [8]  
b) Explain composite system of track electrification. [8]

- Q5)** a) Obtain equation of maximum speed with trapezoidal speed time curve with sketch. [8]  
b) An electric train has quadrilateral speed time curve having uniform acceleration from rest at 2 km/hr for 30 sec, coasting for 50 sec, breaking period of 20 sec. The train is moving up gradient of 1%, tractive resistance is 40 N/tonne rotational inertia effect 10% of dead weight, duration of station stop is 15 sec and overall efficiency of transmission gear and motor as 75%. Calculate schedule speed and specific energy consumption of run. [8]

OR

- Q6)** a) A train is required to run between two stations 1.6 km apart at an average speed of 40 kmph. The run is to be made a simplified quadrilateral speed time curve. If the maximum speed is 64 kmph, acceleration is 2 kmphps, coasting is 0.16 kmphps, breaking retardation is 3.3 kmphps. Determine the acceleration time, costing time and breaking time. [8]  
b) Define with unit [8]  
i) Tractive Effort  
ii) Schedule speed  
iii) Average speed  
iv) Coefficient of adhesion

- Q7)** a) Explain suitability of following motors for traction purpose: [9]  
i) DC series motor  
ii) AC series motor  
iii) Linear Induction Motor  
b) Obtain efficiency for Series parallel starting of two motors. [9]

OR

**Q8)** a) Explain following transition methods with neat diagram. [9]

- i) Open Transition
- ii) Shunt Transition
- iii) Bridge Transition

b) A 2340 tonne train including loco proceeds down a gradient of 1 in 80 for 5 minutes during which 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%. [9]

