

Total No. of Questions : 8]

SEAT No. :

**P3612**

**[5560]-567**

[Total No. of Pages : 2

**T.E. (Electrical)**

**UTILIZATION OF ELECTRICAL ENERGY**

**(2015 Course) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.

- Q1)** a) Compare Resistance and Arc welding. [6]
- b) Explain with neat diagram Ajax Watt Furnace. [6]
- c) A 20 kW, 230V and 1ph resistance oven employs Nichrome wire as heating element. If the wire temperature is to be 1200°C and that of the charge 500°C. Estimate the diameter and length of the wire. The  $\rho$  of Nichrome alloy is  $109 \times 10^{-8} \Omega \text{m}$ . Assume  $k$  and  $e$  of the element is 0.57 & 0.9 respectively. [8]

OR

- Q2)** a) Draw electric circuit diagram used in Air Conditioner and explain in brief. [6]
- b) Explain temperature control methods of resistance furnace in brief. [6]
- c) Calculate the time taken to melt 3 ton of steel in 3ph arc furnace having following data

Current:- 5000A

Resistance:- 0.003 $\Omega$

Arc voltage:- 60V

Reactance:- 0.005 $\Omega$

Latent heat:- 8.89 kcal/kg

Specific heat:- 0.12

Initial temp:- 18°C

Melting Point:- 1370°C

If the overall efficiency is 60%, find power factor and Efficiency of the furnace. [8]

**P.T.O.**

- Q3)** a) Sketch the various arrangements of current collecting devices used in electric Locomotive. [6]  
b) Write a short note on flood lighting scheme. [6]  
c) Compare AC and DC track electrification system. [6]

OR

- Q4)** a) State and explain laws of Illumination. [6]  
b) Explain feeding and sectioning arrangement in traction substation. [6]  
c) Write a short note on Pantograph - current collecting device. [6]

- Q5)** a) A train weighing 200 tons is accelerated up a 1% gradient with an acceleration of 1 km/hr/sec. Determine the minimum adhesive weight of locomotive for this purpose if the coefficient of adhesion is 0.2. Assume train resistance as 50N/T and rotational inertia of 10%. [8]  
b) Write a short note on Anti-collision system. [8]

OR

- Q6)** a) Sketch a simplified Trapezoidal speed time curve and derive the expression for Maximum speed. [8]  
b) What is Specific energy consumption? State the factors affecting on it. [8]

- Q7)** a) An electric train uniformly accelerated at 6km/hr/sec for 21 sec on a level track, braked at 6km/hr/sec. the free running period for the train is 10 min and stop time of 5 min. Draw speed time curve and calculate distance between stations, average speed and schedule speed. [8]  
b) Explain Series- parallel transition process with suitable diagram. [8]

OR

- Q8)** a) An electric train has an average speed of 42km/hr on level track between stops 1400m apart. It is accelerated at 1.7 km/hr/sec and braked at 3.3km/hr/sec. Draw the speed time curve for the run and show all the timings. Estimate specific energy consumption of the train. Take tractive resistance as 50N/T and rotational inertia of 10%. [8]  
b) Write a short note regenerative braking in traction. [8]

