

Total No. of Questions : 10]

SEAT No. :

P3517

[5560]-167

[Total No. of Pages : 3

T.E. (Electrical)

UTILIZATION OF ELECTRICAL ENERGY

(2012 Pattern) (End Sem.) (Semester - II)

Time : 2½ 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, Q.9 or Q.10.*
- 2) *Neat diagrams must be drawn wherever required.*
- 3) *Assume suitable data, if necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
- 5) *Figures to the right indicates full marks.*

Q1) a) Explain various ways in which temperature of resistance furnace can be controlled. **[4]**

b) A 40 Kilo Watt, 3-phase, 400 V resistance oven is to employ Ni-Cr strip of 0.3 mm thickness. The heating elements are connected in delta, if the temperature of wire to be 1200°C and that of charge is 700°C. Determine length and width of wire. Take radiation efficiency 0.55, emissivity as 0.9 and specific resistance as $1.03 \times 10^{-6} \Omega\text{m}$. **[6]**

OR

Q2) a) State faraday's laws of electro deposition and explain the need for it. **[4]**

b) Explain the construction and working of contactor. **[6]**

Q3) a) Explain metal halide lamp construction & working with neat diagram. **[4]**

b) Describe the construction and working of core type induction furnace. **[6]**

OR

P.T.O.

- Q4)** a) Define following terms, [4]
- i) Illumination
 - ii) Depreciation factor
 - iii) Candle power
 - iv) Reflection
- b) A room size of 15×8 meter is to be illuminated by 22 number of 200 Watt each lamp. The MSCP of each lamp is 250. Take depreciation & utilization factor as 1.2 and 0.6 respectively. Find average illumination produced on the floor. [6]
- Q5)** a) Draw the block diagram of electric locomotive and state the function of each component. [8]
- b) Explain the functions of following equipment in traction substation. [8]
- i) Circuit breaker
 - ii) Interrupter

OR

- Q6)** a) Explain diesel electric drive with its merits and demerits. [8]
- b) Explain composite system for track electrification. [8]
- Q7)** a) Derive the expression for total tractive effort. [8]
- b) An electric train uniformly accelerated at 6 km/hr/sec for 21 second on a level track, braked at 6km/hr/second. The free running period for the train is 10 minutes and stop time of 5 minutes. Draw speed time curve and calculate distance between stations, average speed and scheduled speed. [8]

OR

- Q8)** a) Define following terms and state it's unit. [8]
- i) Specific energy consumption
 - ii) Tractive effort
 - iii) Coefficient of adhesion
 - iv) Dead weight
- b) Derive the expression for simplified quadrilateral speed time curve. [8]

- Q9)** a) What is a transition, explain shunt & bridge transition in detail. [6]
- b) Explain suitability of D.C series motor for traction service. [4]
- c) Two 600 Volt DC series motors are started by series parallel method. Each motor takes a current of 400A during starting time of 20 second. And has a total resistance of 0.1 Ohm. Calculate. [8]
- i) Energy loss in starting rheostat
 - ii) Energy loss in a motor
 - iii) Motor output
 - iv) Total energy input
 - v) Starting efficiency

OR

- Q10)**a) What are the desirable characteristics of motor used in traction? Explain. [8]
- b) Draw and explain block diagram of route relay interlock. [4]
- c) Explain following systems of colour light signalling, [6]
- i) Two aspect colour light signalling
 - ii) Three aspect colour light signalling
 - iii) Four aspect colour light signalling