

Total No. of Questions : 12]

SEAT No. :

P774

[Total No. of Pages : 3

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T.E. (Electrical)

UTILIZATION OF ELECTRICAL ENERGY

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) Answer three questions from Section-I and three questions from Section-II.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 6) Assume suitable data, if necessary.

SECTION - I

Unit - I

- Q1) a) A 50kW 3 phase 440 volts resistance oven is to provide three star connected heating element of thickness 0.3 mm. If the temperature of heating element is to be 1500°C and that of the charge is to be 1000°C calculate suitable length and width of strip. Take resistivity of material for heating element as 1.016×10^{-6} ohm-meter, emissivity as 0.91 and radiant efficiency as 0.6. [8]
- b) State the various methods of controlling the temperature in resistance heating furnace. [6]
- c) What should be the properties of heating element material used in resistance oven? State the different types of heating materials used. [4]

OR

- Q2) a) Describe the construction and working of Ajax Wyatt induction type furnace. [8]
- b) Write note on the method of Laser beam welding. State its advantages over the conventional methods of electric welding methods. [6]
- c) Dielectric heating is adopted for heating of an insulating material slab of size 10cm × 15cm × 1cm. The power required is 50 watts at source frequency of 40 MHz. the loss factor of material is 0.2. Calculate the voltage necessary. Take relative permittivity of insulating material as 5. [4]

P.T.O.



Unit - II

- Q3)** a) With neat diagram of refrigeration cycle explain the function of four main parts of refrigeration cycle. [8]
 b) State the various applications of electrolytic process and write note on anodizing. [6]
 c) Explain the difference between the off delay timer and on delay timer. [2]

OR

- Q4)** a) Write note on electroplating. [8]
 b) Draw the electric circuit diagram of window air conditioner and explain it. Out of starting and running capacitor which is of greater value and why? [8]

Unit - III

- Q5)** a) Define the terms : [6]
 i) luminous flux.
 ii) illumination and
 iii) luminance. State the units for these terms.
 b) A small light source with intensity of light uniform in all the direction is mounted at a height of 8 meters above a horizontal plane surface. The two points A and B both lie on this surface with point A directly beneath the source. How far is point B from the point A if illumination at B is only one half as great as at A? [5]
 c) Compare filament lamp with the sodium vapor lamp. [5]

OR

- Q6)** a) A hall 30 meter long and 12 meter wide is to be illuminated by 300 watt lamps and illumination required is 50 lumens/meter². The output of each lamp is 4700 lumens. Take depreciation factor as 1.3 and coefficient of utilization as 0.5 and calculate the number of lamps required. Draw the layout of lamps and determine space height ratio. Take mounting height as 5 meter. [8]
 b) Write note on polar curve and explain how mean hemispherical candle power is determined from the polar curve. [8]

SECTION - II**Unit - IV**

- Q7)** a) What are the various methods of track electrification? Discuss any one in brief. [8]
 b) Explain the pantograph and bow collector. [8]

OR

- Q8) a) Draw a general block diagram for electric locomotive and explain the function of each part. [8]
- b) Describe single phase low frequency A.C system for track electrification with its merits and demerits. [8]

Unit - V

- Q9) a) Draw a typical trapezoidal speed-time curve between the two stations and explain the different sections in it. Define average speed, crest speed and schedule speed. [9]
- b) A 200 tonne motor coach having 4 motors, each developing 6000 N-m torque during acceleration, starts from rest. If up gradient is 30 in 1000, gear ratio 4, gear transmission efficiency 90%, wheel radius 45cm., train resistance 50 N/tonne, addition of rotational inertia 10%, calculate time taken to attain speed of 50 Km/h. If line voltage is 3000V.D.C. and efficiency of motors 85%, find the current taken during notching period. [9]

OR

- Q10) a) Derive an expression for specific energy output on level track using simplified speed time curve. [9]
- b) Calculate the specific energy consumption if a maximum speed of 12.2 m/s and for a given run of 1,525 metres an acceleration of 0.366 m/s² are required. Train resistance during acceleration is 52.6 N/1,000kg and during coasting is 6.12 N/1,000kg, 10% being allowable for rotational inertia. The efficiency of the equipment during the acceleration period is 50%. Assume a quadrilateral speed-time curve. [9]

Unit - VI

- Q11) a) What is transition? Compare the shunt transition and bridge transition. [8]
- b) State and explain the desired electrical and mechanical characteristics of motors for traction duty. [8]

OR

- Q12) a) What are the advantages of regenerative braking? Also explain how regenerative braking can be obtained in D.C locomotive. [8]
- b) Explain with the energy diagram how the energy is saved with series parallel starting in case of a locomotive engine using four motors for the operation. [8]

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