

ONE TIME EXIT SCHEME

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10EE72

Seventh Semester B.E. Degree Examination, April 2018 Electric Power Utilization

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

1. a. Write a note on Advantages of electric Heating and methods of electric heating employed in industry. (05 Marks)
b. Find the length and diameter of a 20kW, 1ph, 220V resistance heating element, (Ni – Cr wire). Given data temperatures : - Max – 1170 °C, temperature of charge 500 °C, $e = 0.9$, $\eta = 0.6$, $\rho = 101.6 \times 10^{-6} \Omega\text{-m}$ (07 Marks)
c. Write explanatory note on the following electric welding method –
i) Resistance welding
ii) Arc welding. (08 Marks)
2. a. State and explain Faradays first and second law of electrolysis. (06 Marks)
b. What are the factors affecting electro deposition process? Explain. (08 Marks)
c. A sheet of iron having $61 \times 61 \text{ cm}^2$ is to be electroplated with copper to a thickness of 0.00254cm. Calculate the Quality of electricity required. ECE of copper -- 0.3294 mgm/C ; Density of copper 8.9gm/cc. (06 Marks)
3. a. Define the following terms related to illumination
i) Plane angle and solid angle
ii) Luminous flux and luminous intensity
iii) MHCP and MSCP (06 Marks)
b. State and explain :
i) Inverse square law of illumination
ii) Lambert's cosine law of illumination. (06 Marks)
c. A lamp having uniform CP of 250 in all directions is provided with a reflector that directs 65% of total light to a circular area of 8m diameter. It is 6.5m above the area. Calculate Illumination i) at the center ii) edge of surface. (08 Marks)
4. a. Write explanatory note on :
i) Flood lighting
ii) Street lighting (06 Marks)
b. With necessary diagrams, explain the working of
i) Incandescent lamp
ii) Fluorescent lamp
iii) CFL lamp. (09 Marks)
c. An workshop (15m \times 36m area) is to be illuminated by 20 lamps of 500W each efficiency of each lamp is 15 Lumens/w. Assume depreciation factor 0.7, coefficient of utilization 0.5, determine Illumination achieved on the working plane. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.

PART – B

- 5 a. What are the requirements of an ideal Traction system? (04 Marks)
- b. Explain the Merits and Demerits of the following traction systems :
 i) Steam engine system
 ii) Direct IC engine system. (08 Marks)
- c. An electric train has schedule speed 65 km/hr between two stations 6km apart, with stop time 30sec at any station, $\alpha = 2$, $\beta = 3$, Determine maximum speed to be attained by the train. (08 Marks)
- 6 a. Derive an expression for maximum speed in terms of acceleration and braking retardations of an electric train running between two stations (D km apart) using simplified trapezoidal speed time curve. (10 Marks)
- b. Write a note on factors to be considered while selecting a motor for electric traction purposes. (05 Marks)
- c. Explain with necessary circuits and vector diagrams the features of an AC series motor that can be employed for electric traction. (05 Marks)
- 7 a. Define coefficient of adhesion, why it is more in electric traction compared to steam traction. (05 Marks)
- b. Derive the components of the specific energy consumed in electric traction assuming trapezoidal speed time curve. (08 Marks)
- c. A 250 tonne train has 4 motors, takes 20sec to attain speed 40km/hr from rest and is moving on a track of gradient 1% ; its gear ratio is 3.5, gear efficiency 95%, wheel diameter 91.5cm. Train resistance 44 N/tonne, rotational inertia = 10% of Dead weight. Find Torque developed by each motor. (07 Marks)
- 8 Write explanatory notes on the following With reference to electric and Hybrid vehicles
- a. Performance of electric vehicles (05 Marks)
- b. Desirable characteristics of electric traction motor (05 Marks)
- c. Tractive effort calculation (05 Marks)
- d. Energy consumption. (05 Marks)

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