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Code No: 157FB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, December – 2023/January - 2024
UTILIZATION OF ELECTRICAL ENERGY
(Common to CE, ME, ECE)

Time: 3 Hours **Max.Marks:75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a) What are the modes of the transfer of heat? [2]
b) What are the advantages of dielectric heating? [3]
c) What is meant by electrical welding? [2]
d) List out the factors based on which the electric welding can be carried out properly. [3]
e) What is the need of polar curves? [2]
f) List out the properties should be possessed by the filament material. [3]
g) What are the various systems of track electrification? [2]
h) What are the various factors affecting the schedule speed? [3]
i) What are the systems used for train lighting? [2]
j) List out the special requirements of train lighting. [3]

PART – B

(50 Marks)

2.a) What are the advantages and the disadvantages of direct and indirect arc furnaces?
b) Describe the dielectric heating with neat diagram. [5+5]

OR

3.a) Explain with a neat sketch the principle of Ajax–Wyatt induction furnace.
b) A piece of insulating material is to be heated by dielectric heating. The size of the piece is $10 \times 10 \times 3$ cm^3. A frequency of 30 mega cycles is used and the power absorbed is 400 W. Determine the voltage necessary for heating and the current that flows in the material. The material has a permittivity of 5 and a power factor of 0.05. [5+5]

4.a) Explain varies types of arc welding processes.
b) Compare and contrast AC and DC welding. [5+5]

OR

5.a) Draw and explain the resistance welding? List out its merits and demerits.
b) Describe the metal extraction and metal processing. [5+5]

6.a) What do you understand by polar curves? Explain Rousseau's construction for calculating MSCP of a lamp.
b) A room of 15 × 20 m is illustrated by ten 150-W lamps. The luminous efficiency of the lamp is 100 lumens/W and the coefficient of utilization is 0.7. Find the average illumination. [5+5]

OR

7.a) Describe the construction and working principle of MA type lamp.

b) A hall of 30 × 20 m area with a ceiling height of 6 m is to be provided with a general illumination of 200 lumens/m^2, taking a coefficient of utilization of 0.6 and depreciation factor of 1.6. Determine the number of fluorescent tubes required, their spacing, mounting height, and total wattage. Take luminous efficiency of fluorescent tube as 25 lumens/W for 300-W tube. [5+5]

8.a) Explain the requirements for ideal traction system.

b) What are the various electric traction systems in India? Compare them. [5+5]

OR

9.a) Derive the expression for the tractive effort for a train on a level track.

b) An electric train is to have acceleration and braking retardation of 0.8 km/h/s and 2.5 km/h/s, respectively. If the ratio of the maximum speed to the average speed is 1.3 and the time for stop is 30 s. Then, determine the schedule speed for a run of 1.8 km. Assume simplified trapezoidal speed–time curve. [5+5]

10.a) Explain the methods of obtaining unidirectional polarity with necessary diagram.

b) Draw and discuss the schematic diagram of single battery system. [5+5]

OR

11. Describe the double battery parallel block system with neat diagram. [10]

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