Code No: 157FB **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, July/August - 2023
UTILIZATION OF ELECTRICAL ENERGY
(Common to CE, ME, ECE, CSE, IT, ITE)

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) List out the properties of good electrical heating element. [2]
b) What are the advantages of electric heating over other systems of heating? [3]
c) What is the principle of electrolysis? [2]
d) List out the equipment required for electric welding process. [3]
e) Define Lux and Luminous intensity. [2]
f) What is photometry? Explain in brief. [3]
g) What is coefficient of adhesion? Write its significance. [2]
h) Distinguish between coasting and braking periods in speed – time curve. [3]
i) List out various systems for train lighting that are presently in use. [2]
j) What is a Rosenberg Dynamo? How a constant output is obtaining with this method. [3]

PART – B
(50 Marks)

2.a) Explain method of induction heating and describe core less type induction furnace.
b) A piece of an insulating material 2-cm thick and 120 cm^2 in area is to be heated by the dielectric heating. The material has a permittivity of 5 and a power factor of 0.05. The power at 800 V is 300 W. Determine the cycles per second. [5+5]

OR

3.a) Determine diameter and length of the wire, if a 17 kW, 220 V, and 1-phase resistance oven employs nickel-chrome wire for its heating elements. The temperature is not exceeding to 1,100°C and the temperature of the charge is to be 500°C. Assume the radiating efficiency as 0.5 and the emissivity as 0.9, respectively.
b) Explain the principal and operation of dielectric heating. Also explain its advantages and applications. [5+5]

4.a) Write short note on (i) Spot welding and (ii) Butt welding.
b) Give a detailed comparison between resistance and arc welding processes. [5+5]

OR

5. Explain the following:
a) Electroplating b) Electromagnetic stirs c) metal extraction and metal processing. [3+3+4]

6.a) What is an integrating sphere? Explain its use in illumination engineering.

b) A small light source with intensity uniform in all directions is mounted at a height of 10 meters above a horizontal surface. Two points A and B both lie on the surface with point A directly beneath the source. How far is point B from point A if the illumination at point B is only 1/10 as great as at point A. [5+5]

OR

7.a) Explain various steps followed in the calculation of illumination for designing the flood lighting in sports ground.

b) The candle power of a source is 200 Candela in all directions below the lamp. The mounting height of the lamp is 6 m. Find the illumination: (i) Just below the lamp (ii) 3 m horizontally away from the lamp on the ground (iii) The total luminous flux in an area of 1.5 m diameter around the lamp on the ground. [5+5]

8.a) Describe the procedure for calculating the specific energy consumption of an electric train.

b) A train is required to run between two stations 2 km apart at a scheduled speed of 36 kmph, the duration of the stops being 20 seconds. The braking retardation is 2.7 kmphps. Assuming a trapezoidal speed-time curve, calculate the acceleration if the ratio of maximum speed to average speed is 1.2. [5+5]

OR

9.a) What is tractive effort of a train and what are its function? Derive an expression for the tractive effort developed by train motion? How does the train resistance play its part in the mechanics of train motion?

b) A train runs with an average speed of 50 kmph. Distance between stations is 4.5 km. Values of acceleration and retardation are 1.5 kmphs and 1.8 kmphps respectively. Calculate maximum speed of the train assuming a trapezoidal speed time curve. [5+5]

10.a) Explain the coach wiring provided in trains.

b) Explain the factors affecting train lightning. [5+5]

OR

11. Draw and explain the sequence of operation of Single Battery System provided in Trains for lighting purpose. [10]

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