

R18

Code No: 157FB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, February - 2025

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) Define conduction and convection. [2]
- b) What are the essentials requirements of heating elements? [3]
- c) What are the various types of electric arc welding? [2]
- d) What are the advantages of electrical welding? [3]
- e) List out the types of photometers used for the photometric measurements. [2]
- f) State the requirements of good lighting. [3]
- g) What is meant by specific energy consumption? [2]
- h) What are the requirements of ideal traction system? [3]
- i) What are the systems of train lighting used in India? [2]
- j) What are the special requirements of train lighting? [3]

PART – B

(50 Marks)

- 2.a) What are the advantages of electric heating?
 - b) Describe the temperature control of resistance heating. [5+5]
- OR**
- 3.a) Explain with a neat sketch the principle of core type induction furnaces.
 - b) The power required for dielectric heating of a slab of resin 150 cm^2 in area and 2-cm thick is 200 W, at a frequency of 30 MHz. The material has a relative permittivity of 5 and power factor 0.05. Find the voltage necessary and the current flowing through the material. If the voltage is limited to 700 V, what will be the frequency to obtain the same heating?[5+5]
- 4.a) Explain the resistance welding and its application.
 - b) Discuss the difference between carbon and metallic arc weldings. Give their relative merits and demerits. [5+5]
- OR**
- 5.a) What are the types of electrodes used for welding operation? Give the advantages of coated electrodes.
 - b) Explain the principle of electrolysis with neat diagram. [5+5]

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- 6.a) Explain the measurement techniques for luminous intensity.
b) A hall of $12 \times 12 \times 6$ m is to be illuminated by four lamps each 100 W. Find the illumination at a point midway between the two corners on the floor along the side. Assume the efficiency of the lamp as 25 lumens/W. [5+5]

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- OR**
7.a) Describe the construction and working principle of a fluorescent lamp.
b) Explain the basic principles of the control of the light. [5+5]

- 8.a) Review the existing electric traction systems in India.
b) Discuss the problems of single-phase electric traction with current unbalance and voltage unbalance. [5+5]

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- OR**
9.a) Discuss and compare various arrangements of current collection used in electric traction
b) A train has schedule speed of 45 kmph over a level track distance between the two stations being 4 km. Duration of the stop is 53s. Assuming the braking retardation of 2.8 kmphs and the maximum speed is 35%, which is greater than the average speed. Determine the acceleration required to run the service. [5+5]

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10. Explain the various methods of obtaining constant output with neat diagrams. [10]
OR
11.a) Draw and discuss the schematic diagram of coach wiring.
b) Describe how lighting by making use of 25KV AC supply. [5+5]

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