Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

School of Engineering

Mid - Term Examinations - Nov 2024

Semester: VII | **Date**: 05/11/2024

Course Code: EEE3031 | **Time**: 02:00pm – 03:30pm

Course Name: Electrical Power Utilization | **Max Marks**: 50

Program: B. Tech (EEE) | **Weightage**: 25%

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **2Mx5Q=10M**

1	What are the main advantages of using electric heating over other heating methods?	2 Marks	L1	CO 1
2	List the advantages of resistance welding and arc welding applied to industrial applications.	2 Marks	L1	CO 1
3	List any two limitations of Laws of Illumination.	2 Marks	L1	CO 2
4	Define the following terms; a. Illumination and b. Luminous intensity.	2 Marks	L1	CO 2
5	What is electric traction, and how does it differ from traditional diesel traction systems in railways?	2 Marks	L1	CO 3

Part B

Answer ALL Questions. Each question carries 10 marks. **4Q X 10M=40M**

6	6a. Explain the working principle of dielectric heating with necessary diagram.	5 Marks	L2	CO 1
	6b. Assume you need to heat a room of 35 m^3 from 15°C to 20°C using an electric heater. The heater has a resistance of 20 ohms and operates on a 200 V supply. The specific heat capacity of air is 1000 J/kg°C, and the density of air is 1.3 kg/m^3. Assume no heat loss. Calculate the power output of the heater and Determine the time required to heat the room to the desired temperature.	5 Marks	L3	CO 1

or

7	7a.	A heating element is made of a material with a resistance of 60 ohms. It is connected to a 210 V supply. Calculate the power consumed by the heating element and the heat produced in 6 minutes.	5 Marks	L2	CO 2
	7b.	Obtain the comparison between Direct Heating and Indirect Heating.	5 Marks	L3	CO 2
8	8a.	State and Explain the law of Illumination.	5 Marks	L2	CO 2
	8b.	A room with an area of 8 × 10 m is illustrated by ten 90-W lamps. The luminous efficiency of the lamp is 90 lumens/ W and the coefficient of utilization is 0.65. Compute the average illumination.	5 Marks	L3	CO 2
		or			
9	9a.	Explain the various applications of Polar Curves.	5 Marks	L2	CO 2
	9b.	In a street lighting, two lamps are having luminous intensity of 300 candela, which are mounted at a height of 6 and 10 m. The distance between lamp posts is 12 m. Find the illumination, just below the two lamps.	5 Marks	L3	CO 2
10		Two sources of candle power or luminous intensity 200 candela and 250 candela are mounted at 8 and 10 m, respectively. The horizontal distance between the lamp posts is 40 m, calculate the illumination in the middle of the posts.	10Marks	L3	CO 2

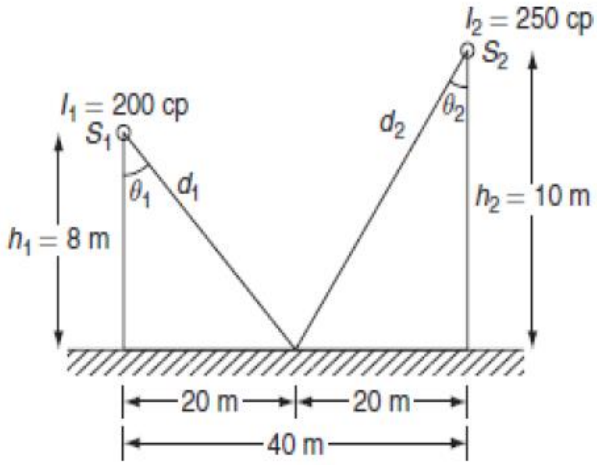

Fig. 1

		or			
11		When designing a street lighting system, it's important to take into account factors such as the width of the road, necessary illumination levels, spacing of the poles, and the types of luminaires to be utilized. For the street lighting design of a suburban road, the following parameters are considered: Road Width: 10 meters	10Marks	L3	CO 2

		Illuminance Level: 20 lux (standard for residential neighborhoods) Luminaires: LED fixtures with a luminous efficacy of 80 lumens per watt Mounting Height: 9 meters Uniformity Ratio: 0.8 (indicating the desired consistency of illumination across the road) Maintenance Factor: 0.9 (to account for the decrease in luminous output over time) Using this information, calculate the total luminous flux required, the number of luminaires needed, and determine the spacing between poles.			
12	12a.	Summarize the significance of braking in electric traction	5 Marks	L2	CO 3
	12b.	An electric tram decelerates from 25 m/s to 10 m/s. The tram has a mass of 40,000 kg. If 90% of the braking energy is sent back to the grid, how much energy is returned?	5 Marks	L3	CO 3
		or			
13	13a.	Explain various special features of traction motors	5 Marks	L2	CO 3
	13b.	An electric tram decelerates from 45 m/s to 25 m/s. The tram has a mass of 40,000 kg. If 90% of the braking energy is sent back to the grid, how much energy is returned?	5 Marks	L3	CO 3